INTRODUCTION

0.1 The Background

0.1.1 The Kerala Perspective Plan 2030 (KPP) is a Government of Kerala initiative that will serve as the basis for implementation of a series of initiatives aimed at fostering sustainable and inclusive growth of the economy. These initiatives will facilitate Kerala's economy to leapfrog and to attain developmental parameters of high income countries /catch up with high income countries.

0.1.2 The KPP 2030 is a twenty year integrated strategic plan with a concrete policy framework and a well-defined Action Plan. Within this strategic framework, the KPP 2030 gives an outline of its development vision, mission, goals, targets, and a way to achieve them. It is built on a comprehensive analysis of the economy's strengths, challenges and opportunities. The tactical planning framework outlined in the Plan sets developed country benchmarks for the state; and draws on the best local, regional, national and international practices. It specifies an action plan based on the calculated policy directions, resources, competencies, and capacities.

0.1.3 The KPP 2030 represents a move away from traditional planning processes to outcome based strategic planning. The document has been formulated in consultation with people from different walks of life including policy makers, administrators, academicians, NGOs, civil society members, public and private enterprises, students, citizens, and other interest groups, thereby making it a participatory one.

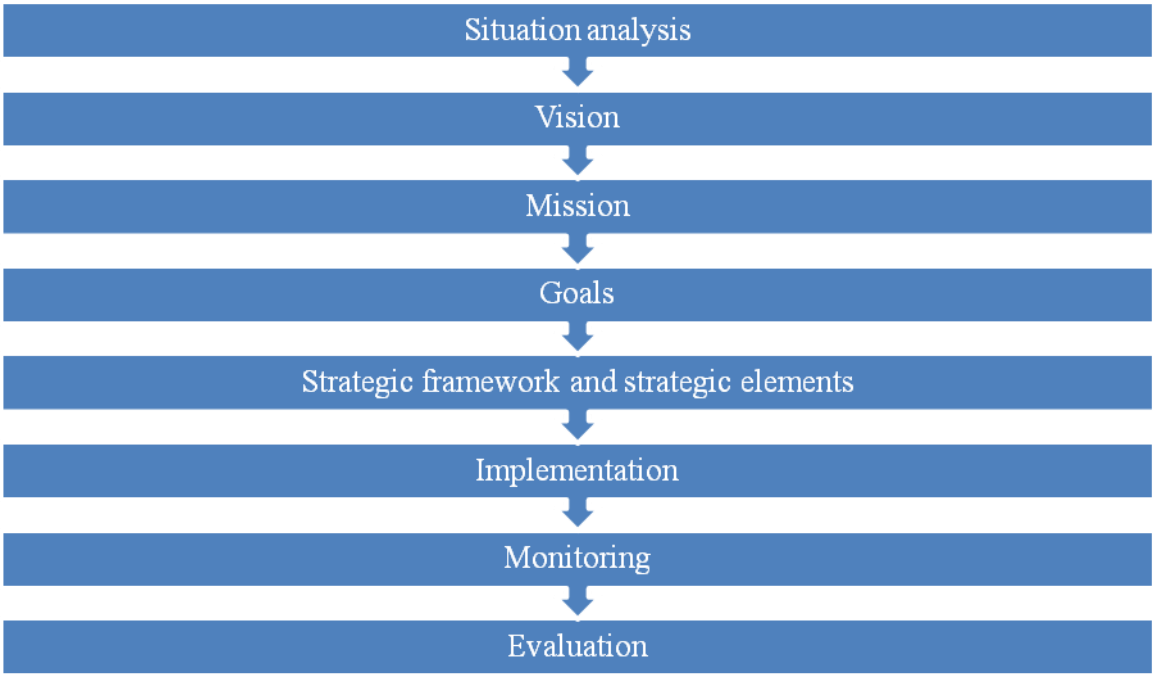
0.1.4 Creation of a knowledge-based economy is central to KPP 2030. It will be implemented through the next four Five Year Plans starting from the 12^{th} Plan (2012−2017) one. Plans developed by different ministries, agencies and sectors will be integrated with the blueprint specified in the KPP 2030. The successful implementation of the KPP 2030 and achievements of its objectives will require participation of all stakeholders from various walks of life that have a direct or indirect influence on the economic development process.

0.2 Elements of the Perspective Plan

0.2.3 This document sets out the outcome oriented planning for the next 20 years for Kerala with emphasis on monitoring and evaluation. Outcomes oriented planning uses identified development needs and desired results as the foundation for designing programmes. It identifies the development challenges, broad strategic outcomes and outlines high quality planning to achieve the goals, with focus on continuous monitoring and evaluation. Different from classical planning, the strategic variety involves setting a vision & mission for the economy and strategic planning to realise them based on out-of-the-box thinking. The KPP

2030 comprises of the macro-economic and sectoral perspective plans. The core elements that provide the basis of a Perspective Plan are eight-fold. Figure 1.1 illustrates the key steps used in the development of the KPP 2030.

Figure 1: Elements of Perspective Plan



Source: Conceptualised by NCAER

- **Situation analysis**: It involves an in-depth analysis of the historical, recent and current trends; achievements; weaknesses, opportunities and challenges that underpin the economy.
- **Vision**: A critical element of a perspective plan is a "vision" for the future. The vision reflects the region's history, its core values and competitive strengths. It should be widely shared by the public as well as economic and other stakeholders across the political spectrum. Or It should be well understood and owned by stakeholders in the State.
- **Mission:** Mission is the core purpose and focus of the economy on its track to realise the vision.
- **Goals:** Goals are tangible milestones to be achieved to realise the vision. These targets are measurable, specific, relevant, achievable and time-bound.

- **Strategic Framework:** It comprises of the strategic mechanisms to accomplish the goals and objectives set by the planning authority. It specifies and prioritizes initiatives and aligns resources.
- **Implementation**: Performance of the KPP 2030 is based on effective execution. Systems, principles and accountability measures are put in place for carrying out the KPP 2030.
- **Monitoring:** It is critical to monitor the success and challenges of planning assumptions and initiatives. Monitoring is necessary to be able to monitor progress towards agreed goals, identify necessary changes, assess options and constraints, and define realistic objectives,
- **Evaluation:** Programme evaluations are systematic assessments of programmes or policies, their design, implementation and results, with the aim of determining their relevance, efficiency, effectiveness, impact and sustainability with regard to overall government priorities. The document lays down the rules on evaluation to create a comprehensive and reliable base of evaluation evidence that is used to support policy and program improvement.

0.3 The Rationale

0.3.1 Since its formation in 1956, Kerala has recorded impressive achievements in development, significantly improving the material conditions and quality of life of its people. Acceleration in growth along with high levels of human development indicators and low poverty rates(relative to other states) has created/ seem to have created a strong basis for its future prospects. However, there is no guarantee of sustained growth.

0.3.2 While assessing the development patterns of the state, it has been observed that the quality of the growth process is questionable/ has not been optimal. It is essentially driven by growing demand for construction and other low value added services such as retail trade, hotel and restaurants, real estate, and community services. This in turn is driven by remittances, tourism and welfare expenditures (both by government and other social organisations), with no commensurate increase in productive capacities, structural transformation, enhanced economic competitiveness or improved institutions. Equally worrisome is the fact that the demand drivers themselves are highly dependent on the political and economic cycles, both at the national and international levels over which the government has no influence. This makes growth vulnerable to these cycles.

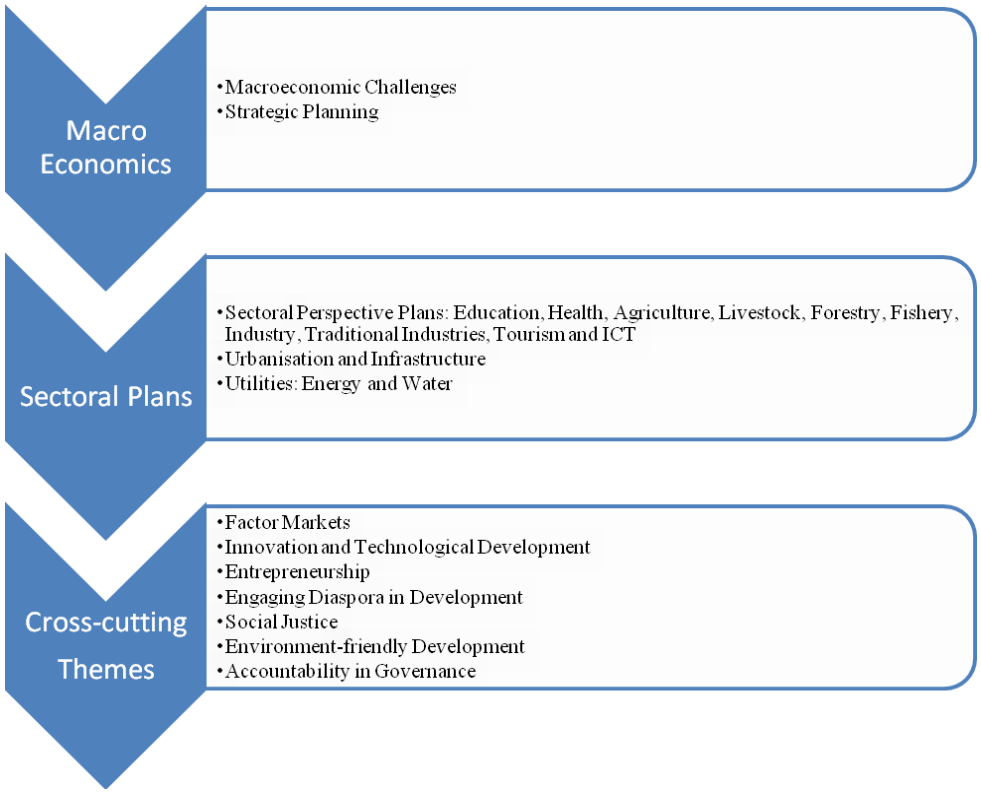
0.3.3 A pertinent question is: Is this rapid growth sustainable? The answer is “yes”, but only if it transitions from the current set of policies to ones that address the existing challenges. It

requires envisioning future directions and exploring new strategies based on outcome oriented goals and objectives. The KPP 2030 is a step in this direction. It sets out clearly the policy directions, action plans and outcome oriented goals and targets for the Kerala economy. The KPP 2030 outlines strategic priorities for major sectors in the Kerala economy for the upcoming twenty-year period. It provides a set of programme performance indicators and targets both, at the macro and sectoral levels.

0.4 Structure of the Perspective Plan

0.4.1 Based on the above framework, the document is organised into three volumes (Figure 2).

Figure 2: Organisation of the Perspective Plan



Source: Conceptualised by NCAER

0.4.2 Volume 1 comprises of two chapters. This introduction is followed by Chapter 1 which examines the characteristics of Kerala's economy and its development since 1956; identifies development challenges being faced by Kerala; considers future opportunities, challenges, and risks.

0.4.3 Chapter 2 describes a vision of Kerala in the year 2030. It maps a new strategy that will realise this vision, with a focus on the key choices for Kerala to sustain rapid economic and social development and become a knowledge driven creative high-income society by 2030.

0.4.4 Volume II comprises of 14 chapters from 3 through 16, covering major economic sectors (agriculture and allied sectors, ICT, industry and tourism), infrastructure (urbanisation, transport and road, and rural development) and utilities (energy and water) of the economy. Each chapter builds on situational analysis, diagnostics, regional and international benchmarking, projections for future growth, detailed strategies; and its impact on the economy. More specifically, each chapter comprises of the following:

- Performance of the sector
- Inter-state and international comparisons
- A brief review of government policies
- Issues and challenges
- Vision for the sector
- Targets
- Strategies
- International best practices

0.4.5 Volume III is spread over 8 chapters (17−24) and focuses on cross cutting themes. Chapters 17−20 address implementation issues in terms of enabling conditions. In particular, they focus on overcoming the obstacles that are likely to emerge while implementing the plan and realise the vision. These are pertaining to factor market rigidities, entrepreneurship, diaspora, and science and technology. Chapters 21−23 focus on environment, social justice and social issues. These chapters emphasise on mainstreaming environment and social justice while implementing the KPP 2030. The focus has been on weaknesses, strengths and opportunities in the application and mainstreaming of the cross-cutting priorities in the development plan. The recommendations are concrete enough to enable the government to consider and discuss ways to operationalise them. Finally, chapter 24 focuses on governance as a key element in the effective implementation of the strategic directions provided in the KPP 2030. It outlines the principles underpinning good governance, identifies indicators to capture its various dimensions, and proposes governance goals and targets in their own right.

*****

CHAPTER 1

GOING FORWARD: OPPORTUNITY AND CHALLENGES

Kerala has had unique economic and social history within India which has influenced its economic growth path over the last 150 years. The rigid caste system in the 18th century gave way to public investment in health and education sectors in the Travancore kingdom. At the time of independence, Kerala had higher life expectancy and literacy rates than the rest of India. Since the late 18th century, social movements have significantly influenced the social capital of Kerala and have reinforced the tradition of "public action". Kerala's economic growth is divided in two phases: the years between 1956 and 1987 were marked by economic stagnation, growing at 1.12 per cent. There was a turnaround in 1986−87 and the economy grew at 5.2 per cent till 2002−03. After that the economy has accelerated, growing at above 8 per cent till date. Examining the data from the 1970s show that Kerala's growth is mainly driven by construction; transport, storage & communication; trade, hotel and restaurants; real estate ownership, business, and legal; and other communication services. These services have low tradability and are mainly driven by domestic demand. The four factors that drive domestic demand are: Remittances, Tourism, Government welfare expenditures and the welfare role of social organisations. However, these factors are vulnerable to external and internal dynamics. Unless and until there are commensurate increase in productive capacity, maintaining growth rates above 8 per cent may proved to be difficult to sustain in the long run. Further, Kerala is caught in a low productivity trap of GSDP and employment. There is relatively high personal and regional inequality in Kerala. The state is facing an aging population; rapidly increasing urbanisation and increasing pressures on natural resources especially land and water. In face of a grim business scenario, there is need to improve the quality of growth in terms of productive capacity, structural transformation and the quality of human development. The strategic planning is an essential first step to place a region on an upward trajectory.

1.1 Unique features of Kerala: Historically, physically and culturally Kerala is one of the most distinctive states of India. It is endowed with rich human, social and environment capital, which present enormous opportunities for its policy makers. It has had a unique pattern of development which is as much an outcome of its geography as of history. Over the past two and half decades (1987−88 to 2009−10) Kerala has been growing at an impressive rate of over 6.3 per cent. Not only did economic growth soar, but the poverty rate also fell from more than 65 per cent to less than 15 per cent over this period. Today, Kerala is one of the most eligible aspirants for achieving a developed economy status among Indian states. A brief overview of its geography and history is critical for understanding the specific factors that lie behind both its impressive growth record and emerging development challenges that the State is facing.

1.1.1 Distinct geography

1.1.1.1 With a total area of 38.9 thousand square kilometres. Kerala is a relatively small Indian state. It lies along the coastline, to the extreme south west of the Indian peninsula, flanked by the Arabian Sea on the west and the Western Ghats mountain range on the east. Kerala stretches North-South along a coastline of 590 square kilometres with a varying width of 35 to 120 km. Thus it is a narrow strip of land forming 1.18 per cent of the total land area of India. However, it accounts for 2.76 per cent of the total population of the Indian union making it the ninth most densely populated state in the country (859 people per square km)[1].

1.1.1.2 Kerala is positioned at the junction of different climatic and geomorphologic features. The topography and physical characteristics change distinctly from east to west starting with the hills on the east sloping downwards to the coasts covered by coconut groves. As a result, the state is divided into three distinct regions from east to west that run longitudinally- hills and valleys (highlands), midland, and coastal lowlands.

a) **Highlands:** Nearly 48 per cent (18.7 thousand square kilometres) of the territory lies at altitudes exceeding 76 metres above sea level (MSL)[2]. The highlands zone is wet and relatively cool. It has large forest tracts. With a total recorded forest area of 11.3 thousand square kilometres, which is 28.99 per cent of the total area of the state[3], Kerala has rich biodiversity. Kerala possesses 95 per cent of the flowering plants in the Western Ghats; and has 90 per cent of the vertebrate fauna. The Western Ghats in Kerala is one of the world's 34 hotspots of biodiversity. Of the total recorded forest area, over 98 per cent is reserved with 13 sanctuaries and two national parks. There are 44 rivers in Kerala; all but three originating in the Western Ghats. These rivers are entirely monsoon fed.

b) **Midland:** The midland is made up of lateritic plateau. The area consists of dissected peneplains with numerous floodplains, terraces, valley fills and colluviums. At some places, this unit borders the sea without intervening coastal plains[4]. It constitutes 41.8 per cent (16.2 thousand square kilometres)[5] of the territory situated at an altitude between 7.6-76 MSL.

c) **Coastal lowlands:** The coast is low lying, alluvial and fertile. Beach dunes, ancient beach ridges, barrier flats, coastal alluvial plains, flood plains, river

[1] Census India 2011.
[2] ENVIS Centre, Kerala: State of Environment and Related Issues. http://www.kerenvis.nic.in/Database/LAND_817.aspx.
[3] Forest Survey of India, 2011. (See Chapter 8 for more details on forests.)
[4] Kerala State Council for Science, Technology and Environment. 2007. "State of Environment Report – Kerala 2007. Volume I: Land Environment, Wetlands of Kerala and Environmental Health". http://envfor.nic.in/sites/default/files/Kerala_SoE2007-V1.pdf . June.
[5] ENVIS Centre, Kerala: State of Environment and Related Issues. http://www.kerenvis.nic.in/Database/LAND_817.aspx.

terraces, marshes and lagoons form this area[6]. It is the most densely populated among the three regions. The lowlands represent only about 10.2 per cent (3.98 thousand square kilometres) of the entire territory[7]. Consequently, the settlement conditions and the establishment of economic activities are rather difficult.

1.1.1.3 Other characteristic physical features of Kerala include the backwaters and wetlands.

- Backwaters: The backwaters of Kerala are a unique ecosystem in Kerala wherein lagoons, lakes, canals, estuaries and deltas of several rivers meet the Arabian Sea. The backwaters of Kerala are made up of over 900 km of interconnected waterways, rivers, lakes and inlets8.
- Wetlands: The state consist of 160.6 thousand hectares (ha) of wetlands i.e. 4.13 per cent of the state9. There are a total of 4,354 wetlands out of which 2,592 are mainly tanks with area less than 2.25 ha each10. Rest of the 1,762 wetlands is divided into two types – inland and coastal. There are 1,593 inland wetlands with a total area of 117.1 thousand ha. Majority of the inland wetlands are natural (1,115 with the total area of 88.5 thousand ha). Man-made inland wetlands mostly consist of reservoirs/barrages (total 39 with the combined area of 26.2 thousand ha) and the rest are tanks/ponds (439 with the total area of 2.4 thousand ha). Kerala has 169 natural coastal wetlands with a total area of 40.9 thousand ha. Wetlands support a wide array of flora and fauna and deliver many ecological, climatic and societal functions.

1.1.1.4 These natural conditions have a direct bearing on settlement patterns, the specific structure of land use, agriculture, and water resources of Kerala. They also pose unique challenges.

1.1.1.5 Kerala shares its borders with Karnataka in the north, and Tamil Nadu in the south and southeast. However, it remains almost isolated from the bordering states by the Western Ghats. There are only two major gaps (Palakkad and Shencottah gaps) in the long chain of hills that connect it with Tamil Nadu. The Palakkad Gap which is a 40-kilometer wide low

[6] Kerala State Council for Science, Technology and Environment. 2007. "State of Environment Report – Kerala 2007. Volume I: Land Environment, Wetlands of Kerala and Environmental Health". http://envfor.nic.in/sites/default/files/Kerala_SoE2007-V1.pdf . June.

[7] ENVIS Centre, Kerala: State of Environment and Related Issues. http://www.kerenvis.nic.in/Database/LAND_817.aspx.

[8] M. Sivasankar. "Tourism, Powering Inland Waterway Development in Kerala". PowerPoint. http://iwai.gov.in/wsoniwt/CruiseTourisminKerala.pdf.

[9] Ministry of Environment and Forests, Government of India. 2011. "Information Brochure: National Wetland Inventory and Assessment". http://moef.nic.in/sites/default/files/NWIA_National_brochure.pdf.

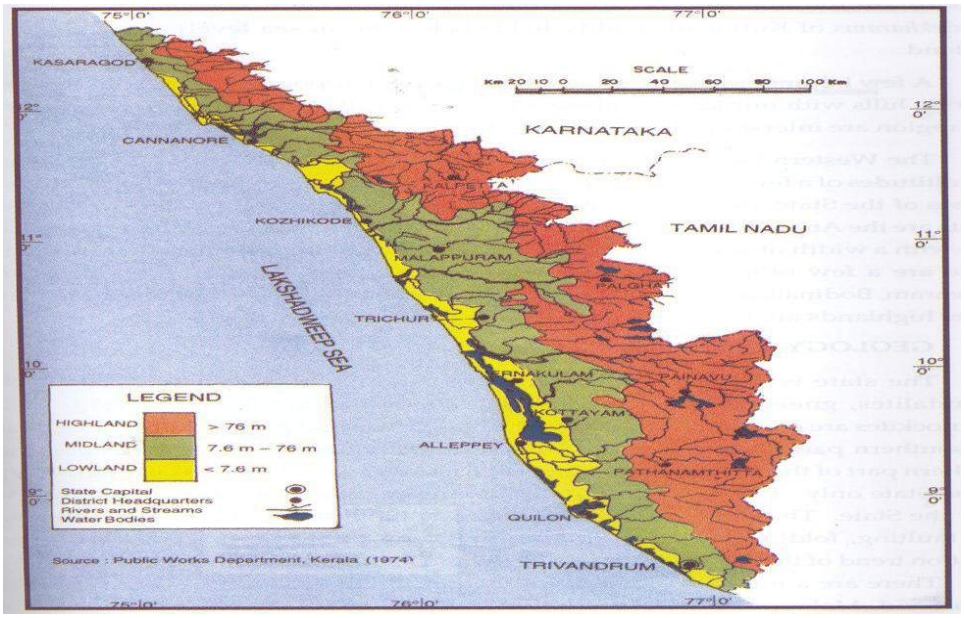
[10] Rest of the paragraph is from this reference.
Space Applications Centre, Indian Space Research Organisation, Ahmedabad and Kerala State Remote Sensing & Environment Centre, Thiruvananthapuram. 2010. "National Wetlands Atlas: Kerala". Sponsored by the Ministry of Environment and Forests, Government of India.
http://envfor.nic.in/sites/default/files/NWIA_Kerala_Atlas.pdf. February.

mountain pass is the widest gap. Historically, Palakkad gap has played a major role in enabling migrations into Kerala from other parts of India. Tamil Brahmins ("Palakkad Brahmins") are a prominent group that migrated to Palakkad from Tamil Nadu via the Palakkad gap from the 15th century to 18th century. The Shencottah gap, a narrow gap of 7.5 km, has been recognised as one of the critical wildlife corridors.

1.1.1.6 To the west of Kerala, a long coast line of 590 km exposes it to maritime influences. The long coastal line of Kerala permitted trading and cultural relations with the outside world. Contact with the Arab and European world in the trade of pepper and spices in the interiors of Kerala in the past influenced not only its economy but also its society, culture and regional consciousness. Merchants from West Asia and Southern Europe established coastal posts and settlements in Kerala. These coastal posts developed into centres of trade between the Arab countries, North Africa and the Roman Empire.

1.1.1.7 Arabs, Jews and Christians first came to Kerala as traders. Many of them settled in the state. This resulted in Kerala becoming a unique instance of communities of world's three major religions: Hindu, Muslim and Christian, living peacefully within one region. The three communities are widely distributed and are living in harmony though there are some areas of religious concentration. After the Punjab, Kerala is the only other major Indian state (excluding North East and smaller states) where only 54.5 per cent of the population is Hindu as per the 2011 Census. The non-Hindu population is fairly divided between Christians (19.0%) and Muslims (24.7%).

Figure 1.1: Physical Map of Kerala



Source: destinationkerala.wordpress.com

1.1.2 Unique historical developments

1.1.2.1 Kerala has been the first centre for European colonisation in India. In 1498 AD, Vasco da Gama a Portuguese explorer landed in Calicut (Kozhikode). This marked the beginning of European colonisation in the region. The Portuguese conquest of the region was followed by those of the Dutch and the British. The colonial interests in appropriating economic surplus and establishing social and economic control over Kerala led to extensive economic, political and social interventions by the various colonial powers. These interventions altered the social and economic institutions of Kerala. In terms of economic impact, growth in trade increased the production of spices and other cash crops which in turn generated more trade, trading and cultural contacts. Many of the plantation crops were introduced by the Europeans in Kerala from their other colonies in Africa and Latin America. They initiated cultivation of some of these crops in vast tracts of forest and hilly areas. This shaped up the plantation-based agricultural production patterns in the state. Along with cultivation, agro-processing industries like coir and cashew also expanded which till date occupy an important space in Kerala economy. The colonial interventions also produced degenerative and regenerative social forces which eventually altered the then existing agrarian relations and social institutions. All these changes had far reaching effects in shaping up the Kerala economy and society.

1.1.2.2 Further, the historical developments of the late 19^{th} and 20^{th} century also made a significant contribution to the shaping up of Kerala's economic growth patterns. This was a great turning period in the history of Kerala that changed its economy and society forever. Kerala witnessed an intellectual revolution or renaissance during this period which changed religious, cultural, social, ideological as well as economic institutions in the state. The renaissance was not accidental. This was the culmination of subversive forces that were forming and developing over the past one century. The social practices and religious beliefs of nineteenth century Kerala were ridden with acute inequalities of castes, power, status and material privileges. While the rest of the country was no exception to this, the severity of caste system was acute in Kerala. It was not merely untouchability that was practiced; the principles of un-approachability and un-seeability were also being observed. This means that the upper caste people did not allow the lower caste people to approach or even see them. The caste system that had stratified communities had direct connections with the economic structure. In the agrarian society of Kerala, land was the most important means of wealth, source of power and prestige. The land owners never tilled the land directly. The land was cultivated by tenants and labour. The relationship of the landowners (Brahmins and donees of land by them) with cultivating tenants and labour was one of social subservience. Their social subservience was expressed through numerous social practices which got translated into a highly rigid caste system and caste-based institutions. In the context of abundant arable land and low labour to land ratio, it had been profitable to landowners to enserf the cultivating

classes to land and impose a strict code of behaviour so that they could not rise above their ascribed position in life. Its severity was thus directly linked to the "land to labour ratio"[11].

1.1.2.3 By the end of 18th century, the whole of Kerala fell under the control of the British. The three political units, Travancore, Cochin and Malabar began to be influenced by the new systems of administration established by the British in India. Britishers' directly ruled over only Malabar. The other parts of present day Kerala viz. Travancore and Cochin were ruled by the native rulers. These rulers adopted progressive social policies in education and public health, especially for the elite and upper caste population who had a specific role assigned by the colonial rulers in the continuation of the colonial hegemony. However, the traditional systems were disrupted when in the early 19th century, the British Parliament permitted European missionaries to enter the country. In their pursuit to get access to the indigenous society, Christian missionaries played an important role in the promotion of education and health among the masses during the major part of the 19th century. They were cognizant of the fact that the religious interests could be enhanced only through education and health. It is significant that the Christian Missionaries introduced Malayalam as medium in their primary schools. As a result, Malayalam became a powerful vehicle for social reform and patriotism. Despite upper-caste opposition, the missionary efforts were given the support of state power in Travancore and Cochin under the colonial pressures. The introduction of modem western education created a realisation amongst the low caste that their emancipation was possible through consolidated and collective action along caste /religious line. The result was the rise of socio-religious movements like Malayali Memorial and Ezhava Memorial at the end of the nineteenth century and the formation of Sree Narayana Dharma Paripalana Yogam (SNDP) and Nair Service Society (NSS) at the beginning of the twentieth century with heavy emphasis on education as the liberating force of their communities from social evils. Dalits who were excluded from the mainstream social organisations also asserted themselves under the leadership of Ayyankali. Historical evidence thus indicates that the people were united along caste lines to strive for getting those social and political rights which had been denied to them for ages. This laid the foundation of public action in Kerala.

1.1.2.4 Public action is a bottom up process in which communities lay claim on public goods' provisions (such as education and health). This social transformation process was further strengthened with the rise of political parties in the state after the First World War. The Indian National Congress became active in the state and Kerala caught up with the rest of India in the independence struggle. In the 1930s, radicals among the Congressmen formed a separate organisation called the Congress Socialist Party (CSP). In 1939, the CSP was transformed into the Communist party. Within a few years they were able to mobilise Kerala's workers and peasants on a large scale, challenging the existing land relations and championing for the workers' rights.

[11] McKim Marriott. 1965. *Caste Ranking and Community Structure in Five Regions of India and Pakistan*. Poona: Deccan College Postgraduate and Research Institute.

1.1.2.5 These social movements and civic participation have had a strong impact on social equality, social network ties, social cohesiveness, political vibrancy and Malayali sub nationalism which in turn started the tradition of "public action". Evidence suggests that Keralites are more politically conscious and active when compared with people from other parts of the country. As measured by National Election Surveys in 1967, 1996 and 2004, Malayalis report significantly higher political interest than other Indians, as a whole. They tend to act collectively on various issues and exert strong public pressures on the government for progressive social policy and its implementation. It has had a far reaching effect on Kerala's growth process in the post-formation period as has been observed in the following sections.

1.2 The economic growth trajectory of Kerala

1.2.1 Kerala was formed in 1956 by merging the Travancore-Cochin districts with the Malabar district. Economic analysis from that period till the latest available data in 2010−11 indicates that Kerala's economic growth trajectory is divided in two major phases: 1956−87 and 1987 till date.

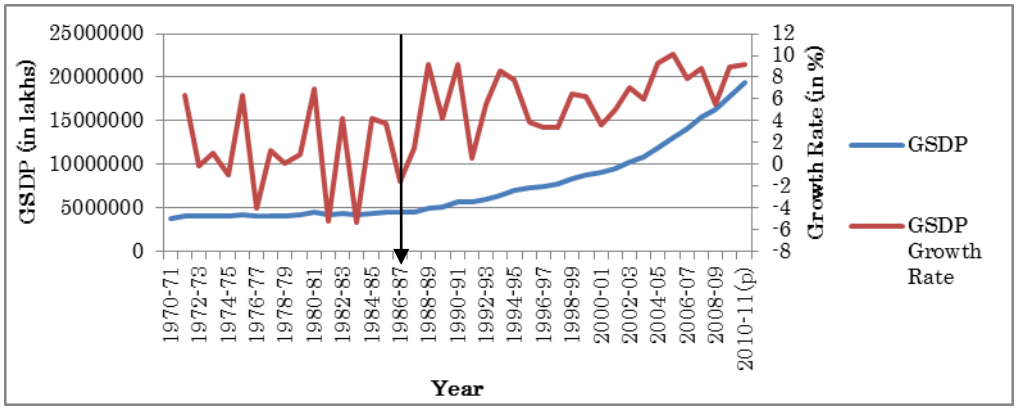
1.2.2 Figure 1.2 illustrates annual growth rates in Gross State Domestic Product (GSDP) of Kerala from 1970−71 to 2010−11. Our selection of the series is guided by the availability of data. While the state GSDP data is available for the period prior to 1970-71 also, it is not strictly comparable with that for the post 1970−71 period. This is because the new series with base 2004-05 is uniformly available from 1970-71 onwards. As depicted in Figure 1.2. Two distinct phases of growth are clearly discernible in the figure. These are:

- The phase of economic stagnation :1970−71 to 1986−87; and
- The phase of rapid economic growth: 1987 till date.

1.2.3 Statistical tests employed[12] to examine what, if any, breaks there have been in Kerala's growth performance confirm that a significant break occurred in the growth trajectory of Kerala in the late 1980s. Evidence however suggests[13] that the GSDP of Kerala did not grow impressively even between 1956−57 and 1970−71. The first 30 years of post-formation period in Kerala were thus characterized by economic stagnation.

[12] "Bai Perron" and "Clemente, Montanes and Reyes" tests were employed for the analysis.
[13] K. K. Subrahmanian and S. Prasad. 2008. Rising inequality with high growth isn't this trend worrisome? Analysis of Kerala experience. *CDS working paper 401* and several references therein.

Figure 1.2: Annual growth rate in GSDP of Kerala: 1970−71 to 2010−11 (2004-05 prices)



	Phase 1	***Phase II***	
Sub-phase: Year	***1970−71 to 1986−87***	***II.1: 1987−88 to 2001−02***	***II.2: 2002−03 to 2009−10****
Mean of GSDP growth rate	1.1	5.2	8.0
Standard Deviation of GSDP growth rate**	3.98	2.66	1.55
Coefficient of Variation of GSDP growth rate***	351.6	50.4	20.3

Notes: *Since the 2010-11 figure is provisional, it is dropped from caculations here.
**Standard Deviation measures how much variation exists from the average value.
***The coefficient of variation is the Standard deviation divided by the average and multiplied by 100. This shows the rate of dispersion.
Source: Computations by NCAER

1.2.4 Economic stagnation: 1956−1987

1.2.4.1 For over three decades after its formation in November 1956, Kerala's economic performance was below expectations. A comparable dataset on GSDP that has been made available by the Central Statistical Organisation at 2004−05 prices for a long term analysis shows that between 1970−71 and 1980−81 Kerala's GSDP grew at a mere 1.27 per cent per annum. The economy witnessed a real decline in the 1970's in both agriculture and industry. This was despite the fact that the economy started receiving significant remittances since the mid 1970's. A moderate growth that took place was due to growth in the tertiary sector. Between 1980−81 and 1986−87 the growth rate further fell to 0.044 per cent even though India's GDP grew at 4.71 per cent in the same period. Over the period from 1970−71 to

1986−87, the economy grew at a mere growth rate of 1.12 per cent. It is significant that the per capita income actually declined at the average annual rate of 0.52 per cent over this period. It stood at Rs 17,995 in 1970−71; it declined to Rs.16,321 by 1986−87, both in terms of 2004−05 prices.

1.2.4.2 The economic stagnation over the first three decades of Kerala's formation has been a subject of intense debate among development economists. It is not intended to fully capture the debate here[14]. In general, economic stagnation is said to have its genesis in the welfare oriented policy regime adopted by the successive governments. This in turn had been the expression of the public action politics initiated in response to the historical developments, which was further reinforced by the socio-political developments that took place after the formation of the state in 1956. As a result of continuous social struggles and educational attainments, a culture of pressurising 'public action' for various issues, had taken strong root in the state which continues to this present day. These 'public action' pressures started a tradition of "public action politics" in the state and served as a powerful impetus for the government to prioritise the social sector. Post−1956 developments such as **political instability**, alternative shifts in the electoral fortunes of the two political fronts, and an all-encompassing nature of unionisation in Kerala as a strong political institution in a democratic set up have reinforced this tradition. It became common for the successive governments to respond to popular demands by adopting an extensive welfare oriented policy regime. Kerala thus emerged as a strong welfare state. It succeeded in making impressive strides in health, education, and creating human and social capital through these welfare-oriented interventions. It achieved the highest human development index among Indian states, as will be discussed later. Not only that, evidence indicates that many of its social indicators are on par with the developed world (see, chapters 3 and 4 for details).

1.2.4.3 One of the most notable achievements of the state during this period was its success in implementing land reforms in the state which imparted drastic changes to the political, economic and social outlook. Different types of feudal relations existed in Travancore-Cochin and Malabar at the time of the formation of the state. The landless farmers and those who were evicted from their land were eager to get their grievances redressed. The clamour for changes started gathering strength. In response to public action for land, the government which came to power in 1957 introduced the Land Reforms Bill in the Legislative Assembly. The Agrarian Relations Bill introduced in 1958 was passed with minor amendments. The legislature passed subsequent land reform bills in 1960, 1963, 1964, 1969 and 1970. The objective was to put an end to the feudal system and ensure the rights of the tenants on land. The decades of 1970's and 1980's witnessed the state-wide agitations by peasants and other stakeholders which played a major role in implementing the law. Evidence suggests that land reform engineered poverty reduction in rural areas by creating asset base of the rural poor.

[14] The analysis in this section draws on the extensive literature available on Kerala's economic stagnation of this period.

This led to enhanced investment in human development by the poor, in particular, in education and health. This equipped them to respond to the emigration opportunities in the Gulf countries and generate inflow of remittances which played an important role in shaping up economic growth trajectory since the late 1980's (as discussed later).

1.2.4.4 Thus, the combination of top-down state policies and bottom-up social activism has generated remarkable social gains in Kerala over the years during the phase of so called 'economic stagnation'. From the perspective of labour also, Kerala's record in achieving a measure of human dignity and social progress is remarkable, viewed especially from an all-India context. The emergence of trade unions as a strong labour institution and the overall social progress led to a remarkable increase in wages, decline in the incidence of child labour (around 1% as against 8% in all India), social acceptance of certain work norms such as eight-hour work days, intervals between working hours, and formal labour relations as opposed to patron-client relations.

1.2.4.5 However, the human and social development achievements did not get translated into actual productive growth. Creation of productive capacities requires investment in productive assets. People in Kerala, irrespective of political leanings, favour public over private investment. Private investment is in general viewed as a source of exploitation of natural resources and labour. Private investment was not forthcoming essentially due to unfavourable public opinion and highly market interventionist policies of the government. The domestic capitalist class was already small and budding; in the absence of grooming efforts it became further marginalised in the system. It is also argued [15] that the presence of unions relegated the government to a number two position in the power structure. The bargaining power of private investors had been marginal at best. In the agricultural sector, fragmentation of land primarily due to land reform measures did away with the emergence of agrarian capital. The plantation sector retained a capitalist class but most of them were small-scale capitalists. While private investors were marginalised in the system, creation of an elaborate welfare regime impeded the ability of the government to undertake investment programmes. But , in the absence of a large capitalist class, the government emerged as the biggest entrepreneur in the state and the owner of the largest number of public undertakings among all states in India. But this investment was too small to give a major push to productive asset creation in the state. The result was a high level of unemployment, especially among educated and technically qualified persons. A high level of educational and health attainment without commensurate economic growth and employment opportunities led to migration of people in search of employment. Initially, a significant part of this migration was to other parts of India. Later, as a result of the oil boom in the Gulf countries in the mid 1970's, labour from Kerala migrated to those countries. Educational attainment and the historic trade & cultural contacts

[15] Kannan K.P. 1998. Political Economy of Labour and Development in Kerala: Some Reflections on the Dilemmas of a Socially Transforming Labour Force in a Slow Growing Economy. A paper presented at a Workshop on Rural Labour Relations in India Today held at The London School of Economics and Politics, London, during June 19 and 20, 1997.

with the Arabs made it easier for Keralites to respond to the emerging employment opportunities in the Arab world. Migration succeeded in keeping the unemployment pressures low but did not have a large impact on the economy of Kerala in terms of growth. Remittances were too small to make a significant impact on the economy, in part, due to a highly regulated foreign exchange regime at the centre.

1.2.4.6 The fact that a poor third world region like Kerala which shares almost all signs of chronic economic underdevelopment should achieve high physical quality of life for its people but without corresponding gains in economic growth appeared a big paradox to development thinkers worldwide and was termed as a "Kerala model of growth". But this lop-sided growth model caused a vicious circle of low revenue, low investment, low development, and low resource base. The low revenue generation led to tremendous pressures on fiscal management. Over the years, the fiscal crises of the state gathered momentum and came to a critical level in 1987. The economy in the late 1980's was generally pictured as "on the brink of disaster". This lowered the state's capacity to generate enough revenue to finance and maintain its social sector expenditure. This in turn stymied further progress in human development also (discussed later in this chapter).

1.2.5 Economic turnaround: 1986−87 onwards

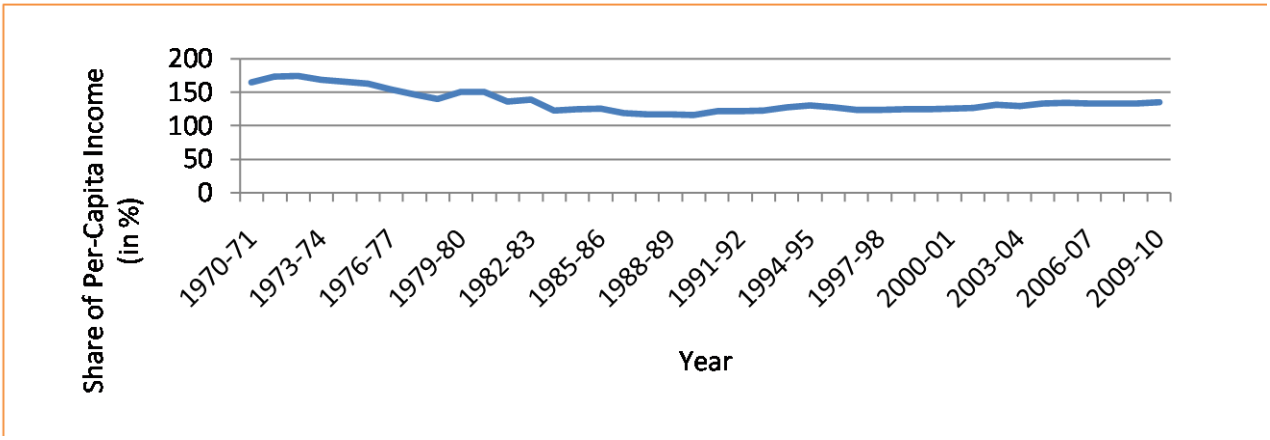
1.2.5.1 Growth did not remain elusive. In the late 1980's, a remarkable turn-around in Kerala's economic growth took place. The average annual growth rate which had been around one per cent for more than a decade and a half from 1970−1 to 1986−87 jumped to over six per cent between 1987 and 2011. A statistical analysis of endogenous break points in the GSDP shows that two distinct phases of growth can be identified even within this phase. These are:

- Moderate growth phase:1987−88 to 2001−02; and
- Accelerated growth phase: 2002−03 till date.

1.2.5.2 The GSDP grew at an average annual growth rate of 5.2 per cent (with standard deviation, SD=2.66) over the first period. Since 2002−03, it accelerated to 8.0 per cent (SD=1.55) signalling that growth is not only higher but more sustained in the latter period

1.2.5.3 Over all, Kerala has grown at an average annual rate of 6.3 per cent that is 0.7 per cent above the all-India average between1987−88 and 2010−11. In the 1970, Kerala's per capita GSDP was 65 per cent higher than the national per capita average (at 2004−05 prices). It remained just 17 per cent above the national per capita income by 1987 which obviously shows that the national economy grew at a faster rate than the state's economy. This trend has been reversed since then and the ratio has again climbed to 135 per cent of the national per capita income in 2009−10 indicating a turnaround in the growth performance of the state relative to the national economy (Figure 1.3).

Figure 1.3: Per Capita Income of Kerala as Percentage of National Per capita Income, 1970−71 to 2009−10

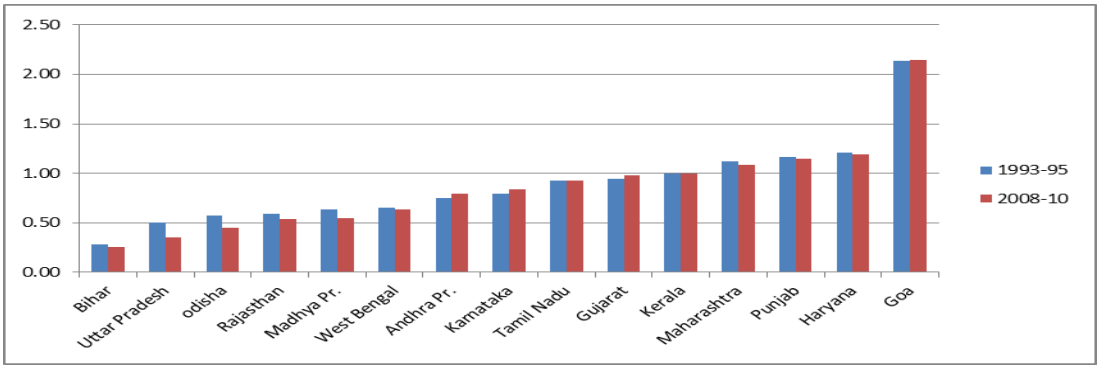


Note: Values at 2004-05 prices
Source: Computations by NCAER

1.2.5.4 The GSDP per capita was Rs 17,951 in 1970−71 in Kerala at 2004−05 prices; it declined to Rs 16,321 in 1986−87. But, thereafter it increased sharply to Rs 30,071 in 2001−02 and then went up to Rs 57,791 in 2009−10.

1.2.5.5 Kerala's economic performance during the last decade outshone that of other Indian states as well. Figure 1.4 presents the per capita income index of top 15 states (including Kerala) with Kerala per capita income as the base (=100). The results are recorded for two periods namely, 1992−3 to 1994−95 and 2007−08 to 2009−10. It shows that the relative position of the state has remained stable at fifth position in terms of per capita income over the period after liberalisation. The income index exceeds 100 only for four states namely, Maharashtra, Punjab, Haryana and Goa. But more importantly, it shows that the index value has declined in the latter period for all the states except Andhra Pradesh, Karnataka, Gujarat and Goa. This means that these were the only states that performed better than Kerala over the 2007−08 to 2009−10 period. Kerala not only outperformed the bottom six states namely, Bihar, Uttar Pradesh, Odisha, Madhya Pradesh, Rajasthan and West Bengal; it also seems to have done better than the top three states namely, Maharashtra, Punjab, and Haryana.

Figure 1.4: Per Capita Income Index by State: 1993−95 and 2008−10 (Kerala Per capita income=100)



Source: Computations by NCAER

1.3 What drives growth in Kerala?

1.3.1 Table 1.1 presents the decomposition of GSDP growth rates into sectoral contributions. It shows that growth in Kerala is driven by construction; Transport, Storageand Communication; Trade, Hotel and Restaurants; Real estate ownership, Business and legal; and Other (Community) Services. As a matter of fact, during the accelerated growth phase of 2002−11, over 77 per cent growth came from these sectors.

Table 1.1: Sectoral contribution to GSDP growth rates by sub-period: 1971−2011 (%)

Industry of Origin /Year			*1971−86*	*1987−2001*	*2002−2011*
		Agriculture	−58.7	14.5	0.4
Industry		**Total Industry**	39.1	22.9	20.6
	Manufacturing	Total Manufacturing	17.7	9.2	7.6
		Registered Manufacturing	8.2	4.0	3.0
		Un-registered Manufacturing	9.5	5.2	4.6
		Electricity, Gas and Water Supply	3.6	3.5	−0.1
		Construction	17.8	9.8	12.5
Services		**Total Services**	119.5	62.5	79.0
	Transport, Storage & Communication	Total	18.7	11.6	23.8
		Communication	1.7	2.6	14.1

	Trade, Hotel & Restaurant	19.6	20.2	16.8
	Banking & Insurance	9.5	7.3	9.1
	Real estate ownership, Business, and Legal	25.5	10.9	13.0
	Public Administration	14.9	3.8	5.2
	Other Services	31.3	8.7	11.1
Gross Domestic Product		100.0	100.0	100.0

Note: Based on values at 2004-05 prices
Source: Computations by NCAER

1.3.2 These services are also those that have low tradability within the Kerala context in the sense that they are not exposed to trade. The demand for services in these sectors arises within the domestic economy which in turn drives their growth. A pertinent question is: What factors drove consumption in these sectors? Our analysis indicates that these factors are four fold: Remittances, Tourism, Government welfare expenditures, and the welfare role of social organisations.

1.3.3 Phenomenal growth in remittances: In the late 1980 when the process of deregulation started at the Centre, remittances started swelling in Kerala essentially due to the discontinuation of the fixed exchange rate regime and deregulation of foreign exchange controls.

1.3.4 Growth patterns of remittances are documented in Chapter 21. It is important to note here that between 1991 and 2011, remittances grew at a trend growth rate of 16.7 per cent. The share of remittances in the GSDP of Kerala increased steadily from 12 per cent in 1991 to 21 per cent in 2011. The inflows of remittances have been larger than even the GSDP contribution of the whole of agriculture and industry sectors and some of the service sub sectors. Average annual remittances per household were as high as Rs 63,315 in 2011. In 2008, the figure was Rs 57,227.

1.3.5 The windfall gains from growth in remittances have had large direct consumption effects by raising disposable incomes in Kerala. There is sufficient evidence that the remittances led to a sharp rise in consumption. The NSS data show that Kerala which was ranked eighth among the Indian states in terms of per capita consumer expenditure in 1972−1973 (27th round) rose to the third position in 1983 (38th round), to the second position in 1993−1994 (50th round) and in 1999−2000 (55^{th} round) displaced Punjab to reach the top position. The remittance-induced effects on consumption were reinforced by the release of pent-up demand in the economy in the post reform period. This means that effective demand was building up in the Kerala economy even during the restrictive regime but a number of consumer goods and services were not available due to import restrictions. The acceleration and intensification of economic reforms contributed to removing these supply constraints by allowing unrestricted trade.

1.3.6 The consumption effects of remittances have reached phenomenal proportions and their impact has been felt in every aspect of life in the state. This has led to a surge in real estate, transport and communication, trade and tourism sectors. For instance, the inability of the manufacturing sector to meet the growing demand chiefly from migrants' households for consumer durables has resulted in the growth of inter-regional trade and transport. In the case of telecommunication, the demand mostly comes from the families of migrants who keep in touch with them. Cash remittances routed through banks have increased the demand for banking and financial services. Moreover, individuals who receive remittances have become more financially literate and hence exhibit a stronger demand for banking and financial services. Migrants' visiting their hometowns positively affects tourism, transport, hotels and restaurants. Clearly, remittance inflows led to the growth of a number of sectors that have driven growth in Kerala, and finally helped the economy break from the low growth/stagnation trap that Kerala found itself in for three decades prior to 1987.

1.3.7 Remittances also have had a direct and indirect unemployment reducing effect. A CDS study[16] shows that emigration contributed to a direct reduction in unemployment rate in 2003 by about 2.2 percentage points due to the migration of unemployed labour force. According to its estimates, with the extent of migration that took place, the actual unemployment rate was only 19.2 per cent. Had there been no migration, the unemployment rate in Kerala would have been 21.4 per 100 in the labour force.

1.3.8 Finally, remittances sent by migrants had direct and indirect poverty reducing effects by contributing to increased consumption on the one hand and education and health on the other.

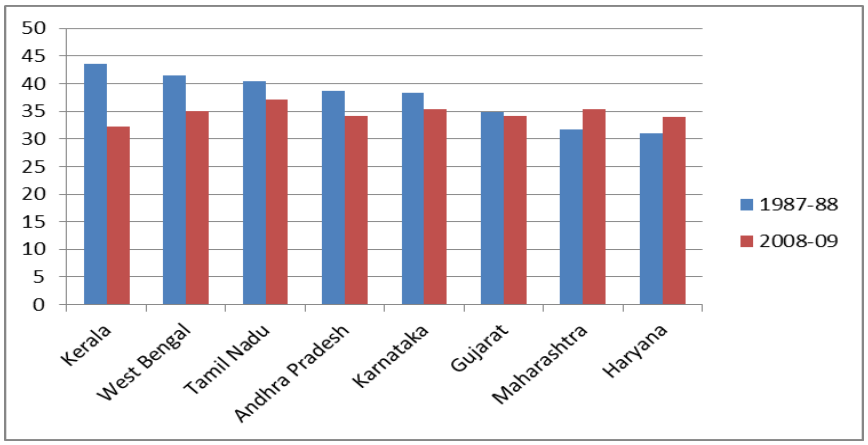
1.3.9 Tourism: Tourism in Kerala has a long history. Travellers from the Far East as well as West Asia and the Persian Gulf had trade and tourism links with Kerala. Until the mid 1980's however tourism was not seriously considered as a source of growth. It was in 1986 that tourism was given the status of an industry. Since then tourism receipts have been on rise (See Chapter 12 for details). The combined effects of forward and backward linkages of the growth in tourism, trade and transport have resulted in the growth of hotels and restaurant. In 2009−10, a NCAER study based on the Travel and Satellite Accounts finds the contribution of tourism income to GSDP to be 9.5 per cent. The tourism industry drove consumption-based growth in GSDP because it does not produce products or services; it delivers a diverse collection of products (durables and non-durables) and services (transportation, accommodations, food and beverage, entertainment, government services, etc) to visitors.

1.3.10 Expenditures by government on welfare schemes: Kerala had been the top performer in per capita allocation of social sector expenditures until the early 1990's (Figure 1.5). Even in 1986−87, when it was facing serious fiscal challenges, the share of social

[16] KC Zachariah and S. I. Rajan. 2005. Unemployment in Kerala at the turn of the century Insights from CDS Gulf study. *CDS Working paper 374*. Thiruvananthapuram.

welfare in total government expenditure was as high as 43.5 per cent[17] and it was ranked the highest among other Indian states. In the 1990's, Kerala started sliding in terms of ranking with Tamil Nadu and other states surpassing Kerala in terms of social expenditure. However, it still maintains its position among the top 5 states.

Figure 1.5: Social Services Expenditure as Percentage of Total Expenditure, 1987−88 and 2008−09



Source: P. Chakraborty et al (2010) Financing Human Development in Kerala: Issues and Challenges, Report submitted to the State Planning Board, Kerala

1.3.11 Role of social organisations: As mentioned above, the last quarter of the 19th century in the history of the state was marked by the rise of powerful social and religious movements in the state. The outcome was the emergence of social organisations which played an important role in bringing about the social change in Kerala. Two of the most powerful organisations were SNDP Yogam and Nair Service Society. These organisations contributed significantly to the material and education prosperity of the state by establishing schools and colleges widely in the State. The task taken up by Christian missionaries who were the pioneers in education, is still continued by different Christian denominations. Since the 1960, Muslim Education Society has also been making a significant contribution to education[18]. These organisations thus supplemented government efforts by investing heavily in welfare programmes. These expenditures act as a stimulus to the economy by driving up demand for various goods and services.

1.3.12 Theoretically, increase in spending on goods and services should affect investment positively by driving up prices and in turn increase returns on investment. This is known as the "spending effect" in economic parlance. Further, remittances should have a direct positive impact on productive investment by relaxing liquidity constraints and making the funding

[17] P. Chakraborty et al (2010) Financing Human Development in Kerala: Issues and Challenges, Report submitted to the State Planning Board, Kerala

[18] Unfortunately, the Dalits and most backward communities could not manage to have their own educational institutions.

available for investment. But, neither of these effects could be operationalised in the context of Kerala. Different explanations have been offered to explain this phenomenon. Some believe that it has been due to an investor-unfriendly image of the state which can be attributed a great deal to an unfavourable image of labour created in the early phase of development in Kerala when the presence of powerful unions, their spread to both unorganised and organised sectors, their multiplicity, rivalries and the political patronage provided to them discouraged private investors to take a risk[19]. It is noteworthy that investment is path-dependent and reactive. There is a tendency of investment to concentrate to reap location –bound effects. Kerala being a late comer needed a big push to start attracting investment. Indeed, the Kerala government, since 2001, has taken several initiatives to accelerate private investment. Yet, considering the fact that most other states have been offering attractive packages to investors, Kerala could not improve its attractiveness vis-à-vis other states[20]. The impact of government policy initiatives was not felt on the economy in the desired way due to an unfavourable socio-cultural and political environment, lack of consensus on several measures and problems associated with implementation and follow up. Capital as a class in Kerala continues to be mostly mercantile in character engaged in small-scale agro-processing activities such as coir, cashew, fisheries, wood, vegetable oils, etc. and in service enterprises, in particular in consumption-driven non-tradable sectors including education, retail trade, transport and real estate. This is reflected in the patterns of the tertiary sector growth.

1.3.14It has also been pointed out that remittances themselves have been instrumental in dampening growth in productive capacities in the state. They created a Dutch Disease or Resource Curse like situation in Kerala[21] by creating labour scarcity and pushing up wages. Migration of labour out of the state led to labour shortage in all other sectors and soared up wages. Increase in wages eroded the competitiveness of the economic sectors. The wage-rise effect could have been offset by the consumption effect as mentioned above. But it did not happen in the tradable sectors (goods and tradable service sectors) because these sectors are exposed to competition from outside in an open economy context which did not allow the domestic prices to increase. Not only have the goods' sectors (industry and agriculture) suffered but also the tradable service sector has remained small. Further, in a land scarce region, increasing remittances shot up the demand for land for construction activity. As a result, land prices have gone up steeply, further affecting investment activities adversely. Thus, the Dutch Disease (Resource Curse) like situation created by remittances adversely affected the growth of high productivity tradable sectors in the state. The image of the state as investor-unfriendly reinforced the phenomenon of the Dutch disease.

[19] See, for instance, Kannan (1998), footnote 18.
[20] P.D. Jeromi. 2005. Economic Reforms in Kerala. Economic and Political Weekly. 40 (30). July 23-29. 3267-3277
[21] K. N. Harilal and K. J. Joseph, 2003. Stagnation and Revival of Kerala Economy: An Open Economy Perspective. Economic and Political Weekly. 38 (23). June 7-13.. 2286−2294

1.3.15 Clearly, the "Kerala model of growth" which resulted in economic stagnation in the first 30 years of Kerala formation, generated typical economic forces that has led to consumption-driven growth since the late 1980's with no commensurate increase in productive capacities, structural transformation, and competitiveness in the state. Will Kerala be able to sustain this performance over the next two decades? Much depends on how the global environment evolves and on the structural forces that are at work within Kerala. But this is certain that the growth trends will be different over the next 20 years compared with the past 25 years because there are major fault-lines in the growth process that will significantly affect the future trajectory of the State. In what follows, the challenges that the current course of growth process has posed for the Kerala economy are discussed. These are

- growth challenges
- socio economic challenges,
- human development challenges,
- social challenges and
- environment related challenges.

1.4 Growth Challenges

1.4.1 Growth drivers are vulnerable

1.4.1.1 In 2010 Kerala's per capita GSDP (in 2005 PPP dollars) was about $4,763. By the standard World Bank classification of countries by income group, Kerala is in the lower-middle-income category. If during the next thirty years, Kerala's GSDP can keep growing at the rate that it has been over the last twenty years, by 2040, it will catch up with the per capita income of the developed countries today. However, sustaining such a growth rate over three decades is not easy. Evidence suggests that most countries that move into the middle income category after several years' high growth rate get stuck in this category and find it difficult to catch up with the high income countries. In 2010, 30 out of the 38 lower-middle-income countries had been in this income group for over 28 years. They could not attain an average annual growth rate of per capita income of 4.7 per cent to reach even the upper-middle income threshold. Upon reaching a certain level of per capita income their growth slowed down. This is because the factors that propelled growth in the initial phases disappeared at higher levels of income but they could not find new sources of growth. Kerala will also find it difficult to sustain the pace and pattern of domestic consumption-driven growth that it has been enjoying for the past 25 years, because the consumption drivers of the economy are vulnerable to internal and external dynamics. The conditions propelling the growth drivers of Kerala cannot be expected to last forever. For instance, the prospects for accelerated emigration from Kerala are not bright. It is highly plausible that future years will witness a decreasing trend in the supply of youngsters for emigration. This could be due to declining population trends, ageing of the population, rapidly narrowing wage differentials between Kerala and the Gulf in the last decade, increasing competition for emigration from other large

states in India such as Uttar Pradesh and Bihar, the increased cost of emigration from Kerala, and above all, increasingly restrictive immigration policies of the host countries due to growing domestic unemployment being faced by them.

1.4.1.2 Tourism industry another growth driver is also vulnerable to the economic crises and disasters, both natural and manmade. The recent economic and financial downturn that affected the tourism industry from 2007 has drawn substantial attention to the role that crisis events play in tourism. The scope and magnitude of these impacts has been severe. The World Tourism Organization (UNWTO) in a recent publication (2010) estimated that international tourist arrivals fell by 4 per cent in 2009, and that many destinations in the world reported negative growth. There have also been concerns over the carrying capacity of tourist destinations.

1.4.1.3 Finally, government expenditures on welfare cannot be sustained unless the resource base is widened by increasing productive capacity in the State. As mentioned above, large fiscal deficits have already forced the state to cut down on social expenditures. Apparently, once consumption stimuli slow down, economic growth will also taper off.

1.4.2 Quality of growth is vulnerable

1.4.2.1 Consumption driven growth cannot be sustained in the long run unless there is a commensurate increase in productive capacity. Once consumption growth decelerates due to weakening of consumption, the growth drivers will also slow down pulling the growth rates down. The policymakers also have realised this. To avoid this scenario, in 2001−02 the government introduced several reforms to promote private investment, and attract non-resident Keralites. But, the inflow of investment remains too small to make a perceptible dent. Inter-state competition for investors has intensified and other states have been offering attractive investment environments in relative terms. It is argued by some that Kerala's negative image as an 'investor unfriendly' state which has got stuck in the minds of prospective investors does not fade away due to frequent *hartals*; and continuation of some of the past labour practices. However, more important are the problems posed by energy crisis, scarcity of land, and weak physical infrastructure.

1.4.2.2 Kerala is deficit power deficit state[22]. For four consecutive years starting from 2007−08 to 2011−12, demand for power has exceeded supply with the gap increasing over the four years. The state produces 78 per cent of the total installed capacity in terms of megawatts (MW). However, the total installed capacity (MW) including state, central and private sector is less than the maximum demand in the system. The situation is worse when viewed in generation in terms of million units (MU). Total internal generation is less than fifty per cent of the total available energy. Majority of the generation (96.5%) is from the

[22] The statistics in this paragraph have been taken from the Economic Review of Kerala, 2012 published by the State Planning Board who in turn have referred to the Kerala State Electricity Board as the source for their statistics. http://www.spb.kerala.gov.in/images/pdf/er12/Chapter5/chapter05.html#energy.

hydel sector. Thermal generation has been declining from 2007−08 to 2011−12. Uncertain weather patterns affecting monsoon has translated to not enough hydel power being produced, which has effectively made Kerala into an energy deficit state. The state had not invested much into other forms of renewable energy or captive power thereby severely affecting power supply in the state.

1.4.2.3 In terms of physical infrastructure, Kerala is a state blessed with five options for transport – roads, railways, airways, ports and inland waterways. However, the road transport network carries the burden of moving passengers and freight. Although Kerala has one of the longest road networks in India, most of it is due to the rural road network. The primary and secondary road network which carries majority of the traffic is significantly narrow and land acquisition has hampered its growth. Further, lack of availability of public transport has meant that passengers have resorted to using private means for transportation further adding to the burden of roads.

1.4.2.4 Finally, due to high density of population as well as the increasing investment and speculation in land in the state, land prices has shot up tremendously. This has created scarcity of land for productive activities. Land acquisition is a major challenge before the government due to rising land prices and public action pressures. Increase in consumption with no commensurate increase in productive capacities is a major fault line in Kerala's growth story.

1.4.2.5 Further, an essential insight of development economics is that economic growth is intrinsically linked to changes in the structure of production. While some sectors are low value added low productivity sectors, others are dynamic sectors. The latter are essentially characterised by technological progress, capital accumulation, and economy of scale. Economic development requires continuous upgrading of resource allocation from low productivity to high productivity sectors. In Kerala however, economic turnaround was not driven by structural transformation and increase in competitiveness. There are two stages of structural transformation. The first stage of growth is characterised by a shift from primary to non-primary sectors. The primary sectors comprise of agriculture and other natural resource oriented sectors which are relatively low productivity sectors in an economy. Table 1.2 depicts the sectoral shares of Kerala GSDP over the three sub-periods: sub-period 1: 1970−71 to1986−87; sub-period II: 1987−88 to 2001−02; and sub-period 3: 2002−03 to 2009−10. It also provides the sectoral composition of GSDP for 2010−11. An analysis of the change in sectoral composition of the three broad sectors - primary, secondary and tertiary indicates that Kerala has undergone the first stage of economic transition from primary to non primary sectors.

Table 1.2: Composition of Kerala's GSDP: 1971−2011 (%)

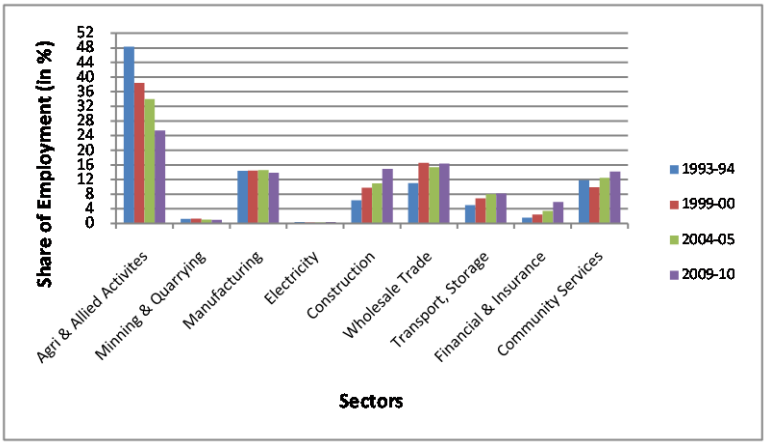
Industry of Origin /Year			*1971−1986*	*1987−2001*	*2002−2010*	*2010−2011*
Primary: Agriculture			**38.08**	**25.36**	**14.94**	**10.59**
Secondary: Industry	**Total Industry**		**16.2**	**20.44**	**21.78**	**20.60**
	Total Manufacturing		7.55	9.82	8.38	8.28
		Registered Manufacturing	3.27	4.79	3.75	3.69
		Un-registered Manufacturing	4.28	5.03	4.63	4.59
	Electricity, Gas and Water supply		0.82	1.2	1.62	1.05
	Construction		7.57	8.96	11.38	10.80
Tertiary; Services	**Total Services**		**45.72**	**54.2**	**63.28**	**68.80**
	Transport, Storage & Communication		2.93	6.09	11.47	15.73
		Communication	0.24	0.69	4.03	7.53
	Trade, Hotel and Restaurants		20.85	20.89	20.41	18.95
	Banking and Insurance		0.93	3.14	6.05	7.22
	Real estate ownership, Business, legal		9.92	10.56	11.64	12.19
	Public administration		1.62	3.3	4.13	4.36
	Other services		9.47	10.21	9.59	10.36
	Gross Domestic Product		100.00	100.00	100.00	100.00

Source: Computation based on Department of Economic & Statistics, Kerala

1.4.2.6 The second stage of structural transformation is characterized by intra-sectoral restructuring from low to high value added activities. An intra-sectoral analysis of Kerala's GSDP indicates that the challenge remains to bring about the transition within sectors from low to high value added dynamic subsectors. It reveals that within the secondary sector, there has been a decline in the share of manufacturing and infrastructure while that of construction leapfrogged. Construction boom is driven mainly by low value-adding residential construction. More worrisome is that even within manufacturing the share of low value adding unregistered manufacturing increased relative to high value adding registered manufacturing sector. Within services, hotel and restaurants, public administration, education, health and community services account for 46 per cent of the GSDP. In the category of "Real estate ownership, business and legal services" it is the first category which is a dominant contributor (data not shown here) while the latter are considered a dynamic high productivity sectors. This suggests that growth has not been accompanied by the required structural transformations in terms of GSDP. The economy seems to be trapped in low value adding activities.

1.4.2.7 The sector-wise work-force patterns indicate that the share of agriculture in workforce has indeed declined continuously and risen in the non primary sector (Figure 1.6)[23]. As a matter of fact, Kerala has been able to achieve a much larger release of labour force from agriculture as compared with the national level. While in Kerala 26 per cent of the workforce remains in the primary sector contributing 14 per cent of the GSDP, at the national level, 53 per cent of the workforce is still in agriculture (2009−19). However, two things must be observed. First, the share of agriculture in employment is still rather high. Second, the entire workforce shed by the agricultural sector has been absorbed by the construction and the tertiary sector due to a weak manufacturing sector where the share of employment remains stagnant. Around 45 per cent of the work force is absorbed in the services sector contributing 69 per cent of the GSDP. At the national level, 25 per cent of the work force contributes nearly 60 per cent of GDP in the service sector. This clearly implies that the service sector in Kerala is predominated by low value adding services as compared with the national average. It is worrisome that the employment share of manufacturing declined from 14.3 per cent in the early 1990's to 13.8 per cent in 2009−10. It indicates that the process of deindustrialisation has set in the state.

Figure 1.6: Structural Change in Employment: 1993−94 to 2009−10



Source: Computations by NCAER

1.4.2.8 The lack of capacity building in dynamic high value adding sectors manifests itself in the increasing share of employment in the unorganised sector. Statistics provided in the State Economic Review shows that persons employed in the organised sector were 12.51 lakh in 2000 and it decreased to 11.02 lakh in 2005 and then to 11.00 lakh in 2010. Within the

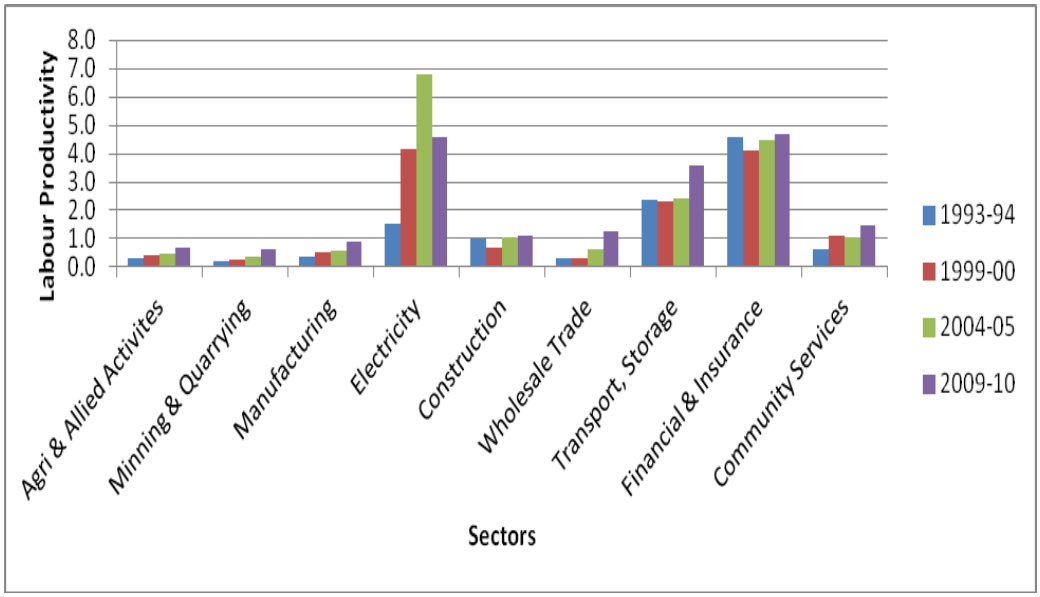
[23] This explanation is applicable to both Figures 1.6 and 1.7. The GSDP numbers follow national accounting methods and the labour numbers follow a slightly different method of classification. Broadly agriculture and allied activities, mining & quarrying, manufacturing, electricity and construction in the NSSO classification would be equal to the agriculture, mining, manufacturing s, electricity, gas & water supply and construction sectors, respectively in the national accounting method. Wholesale trade, Transport and Storage, Financial and Insurance and Community services fall in the tertiary sectors. Wholesale trade, transport & storage, financial and insurance and community services correspond to Trade, Hotels and Restaurants, transport, storage & communications, real estate, business & legal services and community services, respectively in the NAS

organised sector, public sector employment is more when compared to the private sector. For instance, in 2010 out of 11 lakh persons employed in the organised sector, 6.08 lakh (55%) were in the public sector. Similarly within the public sector 43 per cent were State Government and 10 per cent were Central Government employees and the rest were in quasi-State and quasi-Central institutions. In the organised sector, highest employment is in community, social and personal services (44%) followed by the manufacturing sector (22%).

1.4.2.9 The predominance of low value added activities in the composition of employment and GSDP have translated into low productivity levels and growth across sectors. Figure 1.7 presents labour productivity growth and patterns by sector. Labour productivity is calculated by dividing sectoral GSDP by employment from the NSS sources. It shows that there is almost convergence of productivity levels across sectors at very low levels with the exception of only three sectors, namely, electricity, real estate, business and legal services, and transport, storage & communication. Average productivity is rather high in these sectors. While "transport, storage and communication" is expected to have high productivity, in the electricity sector it may simply indicate that the labour share in this capital-intensive sector is quite low. In "real estate, business and legal services", it could be due to rising real estate prices in the state, as the real estate activities predominates this sector. Clearly the economy is stuck in low productivity circles due to lack of intra-sectoral structural change, as discussed above.

1.4.2.10 Further, not only is productivity rather low across majority of the sectors, so is the growth in productivity over the period since the early 1990's. Clearly, the release of labour from agriculture has ended up in activities with no appreciable increase in productivity, affecting adversely the future growth potential of the economy.

Figure 1.7: Labour Productivity by Sectors: 1993−94 to 2009−10 (Rs lakh per worker)



Source: Computations by NCAER

1.4.2.11 Despite the development of human capital that has taken place over the past several years, the state is yet to become known for knowledge-intensive service-oriented products and services. While the national economy is driven by skill-intensive, tradable and high value-added services like software, communications and financial services, Kerala which is at the top in terms of education, is dependent on stagnant non-tradable service sectors for its growth. Given the fact that the economy is driven by low value added and essentially non-tradable activities, leveraging the positive externalities of growth drivers for the development of other sectors seems to be limited. Increasing integration of the global economy challenges existing economic structures predominated by low value adding activities, forcing the developing economies to search for new activities in which they can excel and confront the competition. Specialisation in low value traditional activities is no longer a viable option for an economy. The main challenge for Kerala is to move up the value chain and become more specialised in knowledge-intensive, high value-added activities. Structural transformation from low to high value adding activities raises economy-wide labour productivity. Under diminishing marginal products, it will also bring about convergence in economy-wide labour productivities at high levels. The business-as-usual scenario is thus grim and may lead to a diminished economic future by eroding its growth potential.

1.4.3 Future growth prospects: The business-as-usual scenario looks grim

1.4.3.1 The next 20 years may see major changes in Kerala's economy. As discussed above, owing to vulnerabilities in the quality of growth and growth drivers, it may falter substantially if appropriate corrective measures are not taken to change the course of growth. It is observed that over the past 10 years, GSDP in agriculture has grown at only 0.5 per cent, and GSDP in manufacturing at 5.7 per cent per year. On the other hand, the service sector grew rapidly with communications growing spectacularly at 29 per cent per annum and banking & insurance at 12.6 per cent per year. The construction sector also grew rapidly at 9.8 per cent per year. The spectacular growth rates in these three sub-sectors have been demand driven and can be attributed to exceptional factors as discussed above. These factors such as growth in remittances and tourism are unlikely to continue in the future, if there is no path correction. It is expected that these sectors will slow down gradually to assume the trend growth rates at the national level. This in turn will affect the GSDP growth rate adversely. Further, the changes that have been taking place in the Middle East during the post global crisis period may pose a serious threat for the state's economy which has been heavily based on remittances. Since the demand-driven growth in the state is essentially triggered and sustained by remittances, fall in remittance growth may present the state growth with a major challenge. We present three sets of growth projections in Business-as-Usual (BAU) in Table 1.3 based on three alternative assumptions (For detailed calculations please see, Appendix A1.1):

- Growth in banking and communication sectors slow down
- Growth in banking, communication and construction sectors slow down

- Growth in remittances slows down

1.4.3.2 *Scenario 1 - Growth in banking and communication sectors slow down:* Growth rate in the communication and banking sector is assumed to slow down from current 20 per cent gradually to 5 per cent and 10 per cent to 4 per cent respectively, over the next 20 years. It may be observed that the result is an overall loss in GDP growth of around 3 to 4 percentage points. The overall growth rates in Kerala are expected to fall to 5.1 per cent in 2012−16, and later this growth rate could reach a new low of 4.6 per cent in 2027−31.

Table 1.3: Projection of Growth Rate of GDP in Kerala: 2012−2031

Year	***2012−16***	***2017−21***	***2022−26***	***2027−31***
Scenario1	5.1	4.8	4.5	4.6
Scenario 2	4.6	4.1	3.6	3.8
Scenario 3	4.4	3.8	3.3	3.3

Source: NCAER

1.4.3.3 *Scenario 2 - Growth slows down in banking, communication and construction sectors:* The growth scenario in Kerala is even grimmer than what is projected in scenario 1 because other sectors are also likely to be affected by the slow-down in the main driving sectors. In scenario 2, it is projected that growth rates of construction sector will also slow down along with banking and communication. This can bring Kerala economy further down to a range of growth rate from 3 to 4 per cent.

1.4.3.4 *Scenario 3 - Growth in remittances slows down:* In scenario 3, it is assumed that the annual growth rate in remittances falls from 7 per cent to 3 per cent in 2012−16 and then fall further to 2 per cent growth in 2017−21 and 1 per cent in 2022−26 and zero per cent growth in 2027−31 due to crises on policy changes in the Middle East. This will bring Kerala to the dismal growth experience of the 1970's and early 1980's, with a growth rate of 3.3 per cent and this will have severe implications for unemployment and standards of living.

1.4.3.5 Thus, if Kerala continues on the business-as-usual path, the scenario for 2030 looks grim.

1.5 Socio-economic challenges

1.5.1 Unemployment

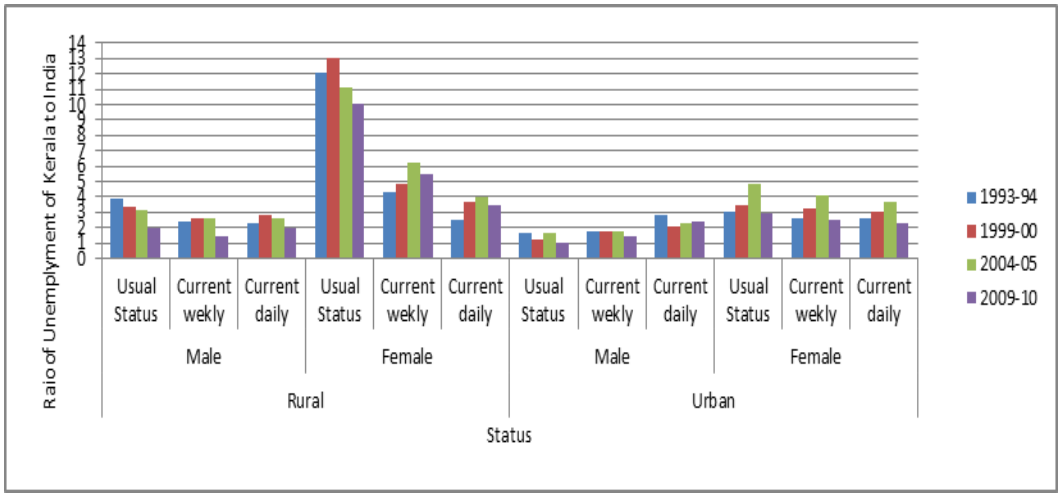
1.5.1.1 High unemployment rates:

a) While the economy has recovered from the slow growth of the late 1980, the situation seems to offer little hope for the unemployed as employment growth is dismal and unemployment rates remain high. High unemployment rate is all pervasive. Defined as

a proportion of the number unemployed to the total labour force (15−60), the unemployment rate is measured in terms of usual status, weekly status and daily status (see, Appendix A1.2 for definitions). While usual activity status implies regular unemployment, both weekly and daily status represent seasonal/temporary unemployment. Figure 1.8 shows unemployment rate of Kerala vis-à-vis national average by location and sex. In all three categories, unemployment in Kerala is found to be generally three to five times greater than the all India average. Female unemployment situation in particular in rural areas is worrisome in Kerala. The usual status unemployment rate amongst rural females is 12−13 times higher than the national average.

b) Compared to the situation in the early 1990, the long-term unemployment rates have come down (i.e. usual Status), in particular in rural areas, but there is little improvement in the short-term (weekly status) or seasonal rates (daily) of unemployment.

Figure 1.8: Unemployment rate by type: 1993−94 to 2009−10 (%)



Source: Computations by NCAER

c) An inter-state comparison presented in Table 1.4 indicates that Kerala has been at the top in terms of urban unemployment among 13 major Indian states. It also recorded the second highest unemployment rate in rural areas after Goa in 2004−05. In 2009−10, it was top ranked even in terms of rural unemployment. While it did register a sharp decline in unemployment rates over the two periods, its relative ranking worsened.

Table 1.4: Unemployment Rate per thousand, 2004−05 and 2009-10

State	*Rural*		*Urban*	
	2004−05	*2009−10*	*2004−05*	*2009−10*
Andhra Pradesh	7	12	36	31
Goa	111	47	87	41
Gujarat	5	8	24	18
Haryana	22	18	40	25
Karnataka	7	5	28	27
Kerala	107	75	156	73
Madhya Pradesh	5	7	28	29
Maharashtra	10	6	36	32
Orissa	50	30	134	42
Punjab	38	26	50	48
Rajasthan	7	4	29	22
Tamil Nadu	12	15	35	32
Uttar Pradesh	6	10	33	29
West Bengal	25	19	62	40

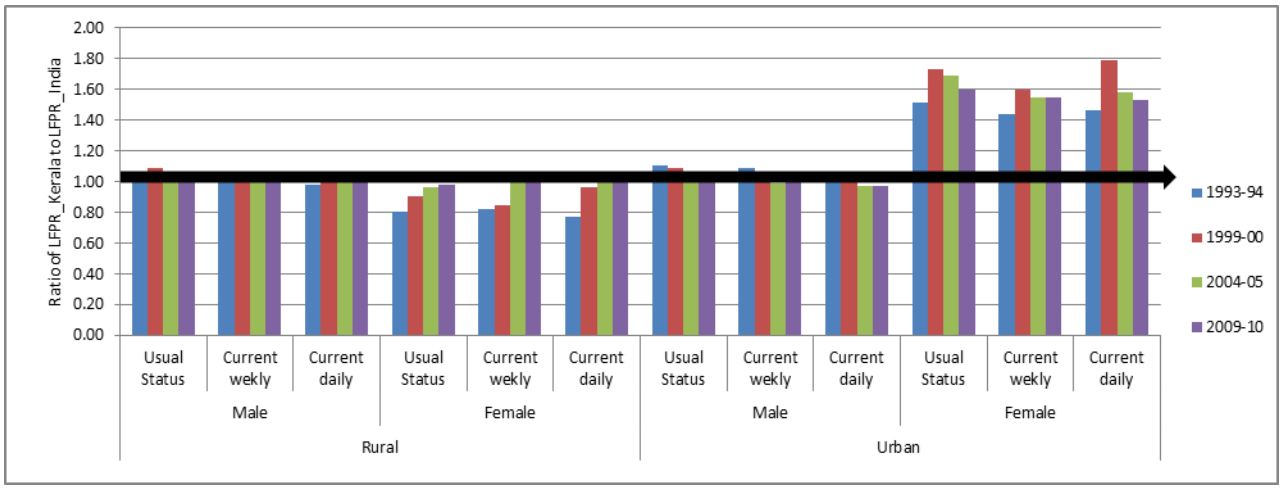
Note: The unemployment rate refers to unemployed persons per 1000 labour force
Source: National Sample Survey Organisation 61st, 66th & 68th rounds

d) Economic turnaround in the state thus seems to be a typical case of jobless growth. Often it is argued that the influx of women in the labour force in Kerala is responsible for high unemployment rates in Kerala. Figure 1.9 shows the ratio of labour participation rates by location and gender in Kerala to the national averages. If it takes the value greater than one, it means that the labour participation rate is higher in Kerala vis-à-vis the national average. It may be seen that the ratio is equal to one for male labour force participation rates. This means that Kerala is on par with the national average in terms of male labour participation ratio. The ratio for rural women has increased over time from 1993−94 to reach one in 2009−10. In contrast, the ratio for urban women has always been greater than one for the corresponding period. This indicates an exceptionally high female participation rate in the urban areas that could be the major cause of unemployment. The influx of a large number of women into the labour force can be attributed to increase in the number of females with secondary or higher levels of education, and decline in fertility rates which relieved women of their household responsibilities. However, women influx in labour force does not appear to be the complete story for the following reasons:

- One, in rural areas women labour participation rates have been lower than the national average *albeit* rising. Despite that the rural unemployment rate has been rather high.

- Two, the female-male sex ratio is rather high in Kerala as compared with the rest of India.
- Three, there has been a continuous decline in the female participation rates in urban areas.
- Finally, Figure 1.8 shows that the problem of unemployment is all pervasive in the state.

Figure 1.9: Labour force participation rates by status: 1993−94 to 2009−10



Source: Computations by NCAER

e) Unemployment, therefore, is a deeper problem than it is believed to be. It is directly linked with the quality of growth and growth drivers. Considering a shallow productive base in the economy and lack of structural transformation, it is hardly paradoxical in Kerala's context that gainful productive employment grows relatively at a low rate despite a high economic growth rate over the past 25 years and the availability of skilled workforce. This is underlined by the fact that the incidence of unemployment is acutely felt by the educated labour force than any other category of employment.

1.5.1.2 Rather high share of the educated unemployment

a) Unemployment rate is higher among the educated particularly those with middle level education and up to secondary level education. As the general education level of the population increased over time, the problem of unemployment has tended to become one of educated unemployment. According to the NSS data, overall, 14.38 per cent of males in the group of educated population[24] were unemployed (usual Status) in 1983

[24] Educated unemployment here refers to the unemployment in the age group of above 15 among persons with above secondary level education.

which increased to 17.88 per cent in 1987−88[25]. For women the increase was from 17.11 per cent to 24.23 per cent. Those with less education showed low incidence of unemployment whereas those with school education up to the secondary level showed the highest incidence. Those with higher qualifications such as graduates and higher education levels showed a relatively lower incidence of unemployment again compared to the secondary school-educated population. This pattern remained almost the same over time except that the incidence of unemployment among those with degree level education also rose to close the gap with unemployment at the secondary level education. The unemployment rates for the educated in Kerala are the highest for both rural and urban areas among the major states. By 2004-05, the unemployment rate for educated persons in rural areas of Kerala increased to 29.6 percent against the all India figure of 8.5 per cent. The corresponding figures for urban Kerala and India were 29.6 percent and 8.2 per cent[26].

b) A CDS study[27] indicates that unemployment in Kerala could be due to the choice that the young educated Keralite population has been exercising in not taking up employment. It has been found that unemployment has been rather high among men and women below 30 years of age. These are essentially educated unmarried people who are dependent on their parents for their living. They are not the breadwinners. Apparently, they prefer to remain unemployed rather than take up any unskilled job that comes their way. This means that the problem of Kerala's unemployment has genesis in the paradoxical growth patterns. It is a manifestation of high attainment in education and health in an economy which is characterised by low productivity and low knowledge intensive sectors.

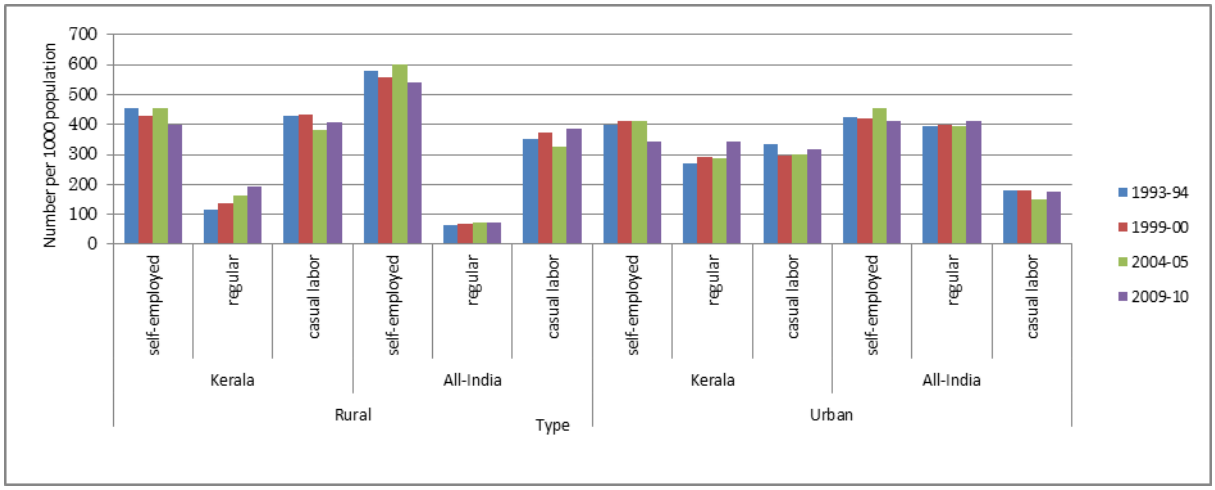
1.5.1.3 Casualisation of employment

a) Since regular jobs remain near constant, most new jobs created are casual in nature. A high level 'casualisation' of the workforce in Kerala has seen the quality of new employment created further deteriorate (Figure 1.10).

b) Further, the proportion of self employed workers is found to be declining over time with a corresponding rise in that of casual workers. The proportion of regular salaried workers remains stagnant. This tendency is evident across both, rural and urban areas, and for both genders. A rise in casual workers is essentially displacing self employed workers.

[25] E. T. Mathew. 1995. Educated Unemployment in Kerala: Some Socio-Economic Aspects. *Economic and Political Weekly*. 30(6). 325-335. February 11.
[26] K.K.George. 2011. Kerala Economy: Growth, Structure, Strength and Weakness. *Working Paper No.25*, Centre for Socio-Economic & Environmental Studies, Kochi
[27] K.C. Zachariah and S. I. Rajan. 2005. Unemployment in Kerala at the turn of the century Insights from CDS Gulf study. *CDS Working paper 374*. Thiruvananthapuram.

Figure 1.10: Workforce rates by category: 1993−94 to 2009−10



Sources: Household consumption expenditure in India, NSSO−50th Round (July 1993− June 1994), 55th Round (July 1999−June 2000), 61st Round (July 2004-June 2005) and 66th round (July 2009−June 2010)

c) In rural areas, agriculture is increasingly becoming unable to productively absorb the growing rural labour force. However, there has been growth of employment opportunities in low productivity non-agricultural activities such construction, services especially trade which can partly be attributed to state sponsored employment programmes. These opportunities have been temporary and of casual nature. But they have become a major source of casual employment. It is worrisome. A wider use of non-regular work arrangements has led to greater uncertainty about workers' employment status, giving rise to instability and vulnerability among certain groups of workers. There is evidence that casual workers are more likely to lack elements associated with decent employment, such as adequate social security and recourse to effective social dialogue mechanisms.

d) Apparently, a poor quality of growth has resulted in a poor quality of employment in a setting of high quality human resources. The paradox of high economic growth with unemployment is intrinsically linked to the quality of growth in the state. The growth drivers in the state are thus subject to scrutiny.

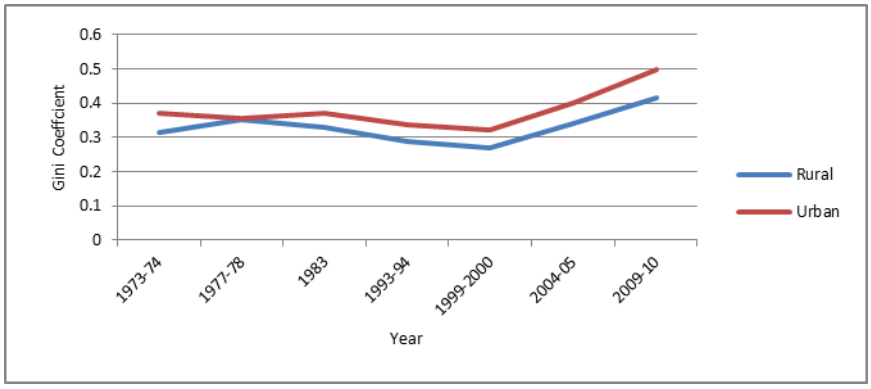
1.5.2 Inequities

1.5.2.1 High inter-personal inequities

a) Within the broad unity of Kerala society and culture there are broad economic and social inequalities across people, communities and regions. While social inequalities have no measurement, economic inequality can be measured quantitatively using the consumption expenditure data. The most commonly used measure of inequality is the

Gini coefficient. It ranges from a minimum value of zero to a maximum value of one. A Gini coefficient of zero represents perfect equality, while "one" implies perfect inequality. Figure 1.11 shows the patterns of inequality in personal consumption in Kerala as measured by Gini coefficient. It reveals that since 1999−2000, there has been a sharp rise in consumption inequalities in Kerala in both rural and urban areas. This coincides with the accelerated growth phase of the post 2002−03. Clearly, growth has been accompanied by rising economic inequities in the economy.

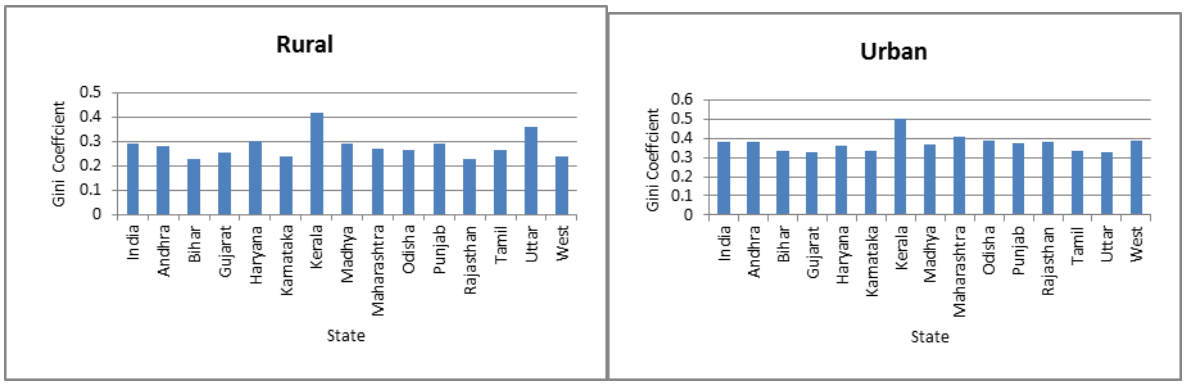
Figure 1.11: Gini coefficient of Per Capita Expenditure in Selected Years between 1973−74 to 2009−10



Source: Computations by NCAER

b) An inter-state comparison of inequality shows that in 2009−10, Kerala had the highest Gini coefficient in both rural and urban areas among all major Indian states. This is again paradoxical. Deepening inequalities within and between different groups in society are generally associated with low levels of social cohesion and participatory citizenship. This is in contradiction with the Kerala tradition of strong participation in public life. This could in part be attributed to remittance-induced-consumption driven growth in the state with little capacity building in productive areas. Social inequality is a major challenge that can impede growth process by stimulating social conflict and political instability.

Figure 1.12: Gini Coefficient of Per Capita Expenditure by State for 2009−10

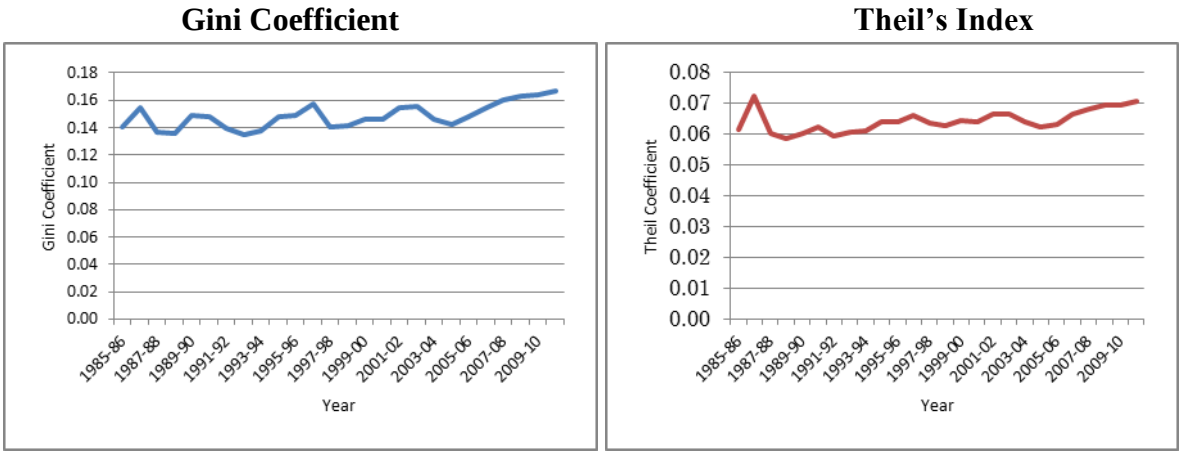


Source: Computations based on Planning Commission database

1.5.2.2 Slowly widening inter-regional inequalities

a) Regional imbalance has also been one of the major concerns before policy makers and planners. Redressal of economic disparity happens to be an important objective in any plan in India both at the centre and state levels. Two of the commonly used regional inequality measures are: Gini index and Theil's index. The estimates of these measures for GSDP per capita have been used here to gauge the level of inter-district inequality in Kerala during the period from 1985−86 to 2009−10. As presented in Figure 1.13 they show that regional inequities are rather low in Kerala. Further, they remained almost stagnant from 1985-86 through to 1993-94. In 1993-94, they rose marginally and stagnated at that level. In the accelerated-growth phase of the post 2002-03 however they started rising *albeit* slowly.

Figure 1.13: Inter-district inequality indices in GSDP per capita: 1985−86 to 2009−10



Source: Computations by NCAER

b) Figure 1.14 shows the distance of each district from Ernakulam, the district that enjoys top position in terms of average GSDP per capita, during three decadal periods: 1981−90, 1991−2000 and 2001−2010. It shows that the basic hierarchy of the top three and bottom four districts has remained the same over the past three decades. Ernakulam, Thiruvananthapuram and Thrissur continue to be at the top while Wayanad, Kasaragod, Pathanamthitta and Idukki remain at the bottom in that order. In between the top and bottom districts, there have been some changes in the ranking of seven districts. Mallappuram and Palakkad for instance took rapid strides in terms of net state district product per capita. Mallappuram moved up 5 places from 10th to 5th, close to Kollam. Palakkad also improved its position marginally from 8th to 7th rank. Both Malappuram and Palakkad are most affected by migration. The improvement in their ranking could thus be migration-led rather than due to acceleration in productive activity. On the other hand, Kollam, Kannur, and Alappuzha, three towns known for traditional industries: cashew nuts, handicrafts and

coir, worsened their relative position vis-à-vis Ernakulam. The poor performance of Kollam pulls its relative ranking down benefiting Kozhikode which in absolute terms did not show any improvement. Kozhikode moved closer to Ernakulam and occupied the 4th rank. Kottayam despite marginal improvement retained its position at 9th place.

Figure 1.14: Changes in District Ranking by Per-Capita NSDP: 1981−2010

Rankings	1981-90	1991-00	2001-10
1	Eranakulam	Eranakulam	Eranakulam
2	Thiruvananthapuram	Thiruvananthapuram	Thiruvananthapuram
3	Thrissur	Thrissur	Thrissur
4	Kollam	Kozhikode	Kozhikode
5	Kozhikode	Kollam	Malappuram
6	Kannur	Kannur	Kollam
7	Alappuzha	Palakkad	Palakkad
8	Palakkad	Malappuram	Kannur
9	Kottayam	Alappuzha	Kottayam
10	Malappuram	Kottayam	Alappuzha
11	Idukki	Idukki	Pathanamthitta
12	Pathanamthitta	Pathanamthitta	Idukki
13	Kasaragod	Kasaragod	Kasaragod
14	Wayanad	Wayanad	Wayanad

Source: Computation based on Statistics for Planning & Economic Review, Kerala

1.5.3 Poverty

1.5.3.1 Poverty rates declined sharply

a) There are three different measures of poverty that capture its *incidence*, *depth* and *severity.* These are:

- Head-count index (H): H indicates the incidence of poverty or poverty rate, and is given by the proportion of the population below the poverty line.
- The poverty gap index (PG): PG measures the depth of poverty. It is the average mean consumption deficit below the poverty line, counting a zero deficit for the non-poor, with the mean formed over the whole population.
- The squared poverty gap index (SPG): SPG is the average of the squared poverty gap (PG index) as a proportion of the poverty line. SPG is sensitive to distribution of inequality amongst the poor, and can be interpreted as a measure of the severity of poverty.

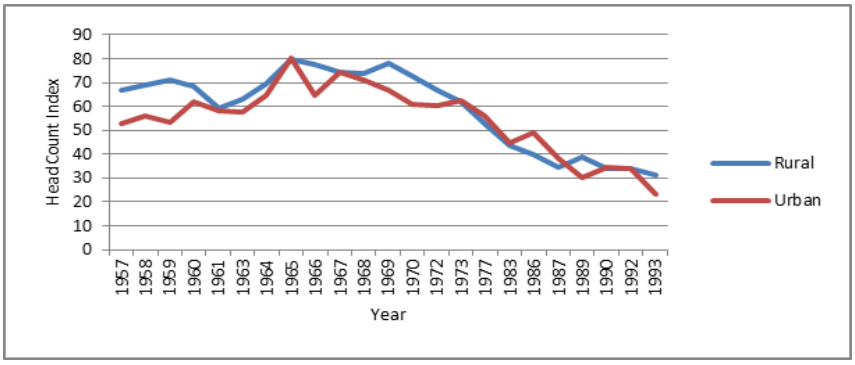
b) Of them, the head count index method is most commonly used to depict the prevalence of poverty. There are numbers of estimates on poverty. These estimates are

in general fragmented and non-comparable over time. We present here two sets of poverty estimates that make long time series.

c) **The World Bank Estimates: 1957−58 to 1993−94:**

(i) In one of the most comprehensive studies[28], the World Bank presents all the three measures of poverty for a long period of 1957−58 to 1993−94. Figure 1.15 plots the head count index of rural and urban Kerala for this period. It shows that the poverty rates have declined drastically starting from the mid 1960's.

Figure 1.15: Rural and urban poverty rates: 1951−1994



Source: G. Datt., 1998. Poverty in India and Indian states. *FCND discussion papers 47*. International Food Policy Research Institute (IFPRI).

(ii) According to this study, in 1957−58 Kerala had the third highest rural poverty incidence ratio after Maharashtra and Tamil Nadu with a rural headcount ratio of over 66 per cent. The head count ratio increased during the late 1950. By 1959−60, Kerala achieved the distinction of being the poorest state in terms of the percentage of people below the poverty line. The incidence of poverty continued to increase during the 1960. In 1969−70, 78 per cent of the rural population was below the poverty line. Not only was poverty widespread but it was also deep and severe (not shown here). Of all the 15 major states, Kerala performed the worst in terms of the extent, depth and severity of poverty. The poverty started declining first slowly in the 1970 and then rapidly since the 1980. Rural poverty declined in Kerala from 70 per cent in 1969−70 to 31 per cent (29.5% according to Planning Commission estimates) in 1987−88. The depth and severity also declined. Over the period between 1957-58 and 1993-94, the trend rates of decline in the three indicators of poverty, namely, the head-count index (H), the poverty gap index (PG), and the squared poverty gap index (SPG) had been 2.4 , 4.07 and 5.26 per cent, respectively, which were the most drastic among Indian states. It could in part be attributed to land reforms. Kerala only

[28] G. Datt., 1998. Poverty in India and Indian states. *FCND Discussion Paper No. 47*. International Food Policy Research Institute (IFPRI).

lagged behind Andhra Pradesh, West Bengal, Punjab and Haryana in terms of rural poor.

(iii) The urban poverty rate was above 52 per cent in 1957−58. It increased sharply to 80per cent by 1965−−66 and remained above 70 per cent during the 1960 which was higher than all the other states of India. It started falling in the 1970 and declined sharply to 38 per cent (23.8% according to Planning Commission estimates) by 1987−88. It was only higher than Punjab, Haryana and West Bengal. Kerala performed most impressively after Punjab and Haryana in terms of the reduction in urban poverty with the trend rates of decline in head country ratio being 2.07 per cent. The poverty gap ratio and squared poverty ratio declined at the trend rate of 3.37 per cent and 4.28 per cent (after Punjab and Haryana) over the period 1957−58 to 1993−94.−

d) **The Planning Commission estimates***:*

(i) From the year 1973−74 onwards, the Planning Commission has been providing estimates of the proportion and number of poor separately for rural and urban India at national and state levels using a consistent set of poverty lines. These are available for the years 1973−74, 1977−78, 1983−84, 1987−88, 1993−94, 1999−00, 2005−06, 2009−10 and 2011−12. For 2004−05, two sets of poverty estimates have been provided. These are based on Uniform Recall period (URP) and Mixed Recall period (MRP). The latter uses 365 ‑ days' consumption for low frequency items (clothing, footwear, durables, education and institutional health expenditure) and 30 ‑ days for all the remaining items unlike the URP method which uses 30 days' reference period for all. In 2009−10, the Planning Commission introduced another change when it adopted a new definition of poverty based on the recommendation of the Tendulkar Committee. These estimates are not strictly comparable with the earlier rounds. The Planning Commission revised the estimates of 1993−94 and 2004−05 based on the new definition. These are presented in Table 1.5. It shows that there has been considerable upward revision in the estimates of poverty. However, there is an unmistakable trend of decline in poverty across rural and urban Kerala up till 2000. In 2004−05, urban poverty continued to decline irrespective of the method selected (MRP or URP). Rural poverty appears to have increased though. Overall, however, poverty rates declined as per the MRP based estimates, which are normally preferred over URP based estimates. Poverty rates further declined dramatically in 2009−10 and 2011−12.

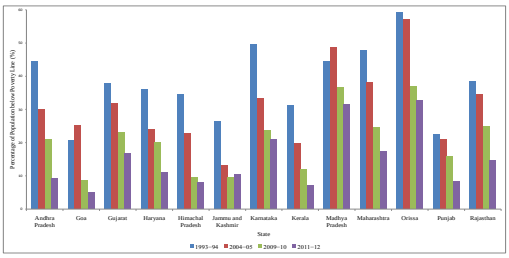
Table 1.5: Estimate of Poverty in Kerala, 1973−74 to 2011−12

Year	*Rural*		*Urban*		*Combined*	
	No. of persons (lakh)	*% of persons*	*No. of persons (lakh)*	*% of persons*	*No. of persons (lakh)*	*% of persons*
Traditional methodology						
1973−74	111.36	59.19	24.16	62.74	135.52	59.79
1983−84	81.62	39.03	25.15	45.68	106.77	40.42
1993−94	55.95	25.76	20.46	24.55	76.41	25.43
1999−2000	20.97	9.38	20.07	20.27	41.04	12.72
2004−05 MRP	23.59	9.60	13.92	16.40	37.51	11.40
2004−05 URP	32.43	13.20	17.17	20.20	49.60	15.00
Tendulkar's Methodology						
1993−94	Na	na	Na	na	na	31.3
2005−06	42.2	20.2	19.8	18.4	62.0	19.6
2009−10	21.6	12.0	18.0	12.1	39.6	12.0
2011−12	15.48	9.14	8.46	4.97	7.05	23.95

Source: Planning Commission, Government of India.
http://planningcommission.nic.in/data/datatable/0512/databook_55.pdf

(ii) Figure 1.16 shows the estimates of poverty based on Tendulkar's methodology for top 10 states and it reveals that the Kerala has maintained the top position in terms of low poverty rates among major states. Goa, Jammu and Kashmir and Himachal Pradesh were the only three states with poverty rates below that of Kerala. In 2011−12, Kerala further improved its ranking and it emerged as the second best state in terms of poverty rates after only Goa.

Figure 1.16: Poverty rates of Selected State: 1993−94 to 2011−12 (%)



Source: Planning Commission

e) Decline in poverty in Kerala was essentially made possible by five processes.

(i) First, the sustained process of social development. Two major factors that have contributed to poverty reduction are: the increase in real wages negotiated by strong labour unions; and state sponsored redistribution programmes. An ambitious poverty eradication programme was launched by the government in 1998. This initiative termed as "*Kudumbasree*" aimed at wiping out absolute poverty from the state through concerted community action under the leadership of Local Self Governments. *Kudumbashree* is one of the largest women-empowering projects in the country. It is a community based self-help initiative involving poor women. Under *Kudumbashree*, women have organized themselves under a three – tier community based organisation. The bottom of the programme is formed by the Neighbourhood Groups (NHGs) comprising of 20−40 women members selected from poor families. Area Development Society (ADS) is formed at the level of ward of local government by federating 8−10 NHGs. The Community Development Society (CDS), the highest tier, is the federation of all the ADSs in the respective panchayat (rural) or municipality (town) or corporation (city). The programme works in close association with both the urban and rural local governments through a network of Community Based Organizations working with women. It strives to tackle poverty in an integrated manner through an effective convergence of resources and actions to develop micro finance and

micro enterprises. The programme has 37 lakh members and covers more than 50 per cent of the households in Kerala[29].

(ii) Second, the enhancement of human capabilities through education, health and related realms.

(iii) Third, the process of migration which resulted in significant remittances from the Keralite diaspora in Gulf countries. A significant proportion of migrant labour was rural in origin and unskilled or semi-skilled.

(iv) Fourth, the process of demographic transition taking place in Kerala, which reached its last stage by the end of the 1980's limiting the size of family.

(v) Finally, the growth of low productivity tertiary sector which absorbed labour released from agriculture.

f) Notwithstanding the drop in poverty rates, policy makers are still facing challenges. It is significant that at 2004−05 prices, the official state rural poverty line of Rs 430 per capita per month is based on only 1,480 calories per person per day which is far below the 2,400 and 2,100 calorie norm adopted at the national level. The head count ratio will swell if the standard norm is adopted in its estimation.

1.5.3.2 Poverty rates are still high

Officially, approximately 4 million people were under the poverty line in the state in 2009−10. Of them, 2.2 million were in the rural areas and 1.8 million were in urban areas. In 2011−12, the figures dropped to 1.5 and 0.8 million. Overall, over 2.3 million people were below the poverty line. It is noteworthy that the official estimates are based only on consumption. Other dimensions of human lives are ignored. There have been efforts in recent years to measure multidimensional poverty ratios. Keeping this in view Oxford Poverty & Human Development Initiative and the United Nations Development Programme have developed a Multidimensional Poverty Index (MPI). Multidimensional poverty is made up of several factors that constitute poor people's experience of deprivation – such as poor health, lack of education, inadequate living standards, lack of income, disempowerment, poor quality of work and threat from violence. The Multi-dimensional Poverty Index (MPI) for Kerala shows that there were 5.6 million people living in poverty in Kerala in 2010. The challenge is to pull this vast population out of poverty. It also shows that Kerala ranks 169 among 673 provinces of 104 countries across the world in terms of the head count ratio. Its position is slightly better in the intensity of deprivation. Yet, it is 128th.

1.5.3.3 High intra-regional inequality in terms of poverty

a) The poverty ratio is more than 10 fold higher in the worst performing districts when

[29] Kudumbashree website. www.kudumbashree.org/?q=home.

compared between the districts with highest and lowest incidence of poverty. In 2004−05, Thiruvananthapuram was the best Monthly Per Capita Expenditure (MPCE) district in both rural (Rs 1,442) and urban (Rs 1,867) Kerala. It also had the lowest urban poverty ratio of 6 per cent[30]. At the other extreme was Kannur with the lowest average MPCE (Rs 556 in rural areas and Rs 824 in urban areas) and highest poverty ratio in both rural and urban areas (35.4% and 39.4%, respectively).

b) This brings out the issue of regional disparities within Kerala, in relation to the incidence of poverty. This is also to emphasize that even though Kerala's overall outcome in social and economic achievements is far better compared to many other states and the national average, there exist pockets of deprivation when compared with Kerala's own achievements.

1.5.3.4 Nutritional deprivation is serious

The Hunger index was estimated for 17 major states in India in 2008, covering more than 95 per cent of the population of India[31]. In that year, India's rank on the Global Hunger Index (GHI) 2008 with the score of 23.7 was 66 out of 88 countries. The Hunger Index scores for Indian states ranged from 13.6 for Punjab to 30.9 for Madhya Pradesh. Among Indian states Kerala ranked 2nd next to Punjab, indicating relatively low prevalence of hunger in the state. However, its rank in relation to the international GHI was 47th between Mauritania and Swaziland with the score of 17.6. Overall, the rank of Indian states ranged from 34 for the state of Punjab (placing it between Nicaragua and Ghana) to 82 for Madhya Pradesh. Notably, the per capita calorie intake as per the report of National Sample Survey Organisation in Kerala is below the national average of calorie intake (Table 1.6).

Table 1.6: Average Per-capita Intake of Calorie, Protein and Fat per Day, 1972−73 to 2009−10

Calorie (kilo calories)							
Urban/Rural	***Geography***	***1972−73***	***1983***	***1993−94***	***1999−00***	***2004−05***	***2009−10 ****
Rural	Kerala	1,559	1,884	1,965	1,982	2,014	1,964
	India	2,266	2,221	2,153	2,149	2,047	2,020
Urban	Kerala	1,723	2,049	1,966	1,995	1,996	1,941
	India	2,107	2,089	2,071	2,156	2,020	1,946
Protein (gram)							
Urban/Rur	***Geograp***	***1972−73***	***1983***	***1993−94***	***1999−00***	***2004−05***	***2009−10***

[30] This number may differ from the numbers using the Tendulkar methodology.

[31] P. Menon, A. Deolalikar and A. Bhaskar. 2009. India State HungerIindex: Comparisons of Hunger across States. *A report submitted to International Food Policy Research Institute*. Washington, D.C., Bonn, and Riverside. February.

al	***hy***						
Rural	Kerala	38	47	50.8	52.4	55.4	52.7
	India	62	62	60.2	59.1	57	55
Urban	Kerala	44	51	52.4	55.2	56.7	54
	India	56	57	57.2	58.5	57	53.5
	Fat (grams)						
Urban/Rural	***Geography***	***1972−73***	***1983***	***1993−94***	***1999−00***	***2004−05***	***2009−10***
Rural	Kerala	19	32	32.7	38.8	40.8	42.8
	India	24	27	31.4	36.1	35.5	38.3
Urban	Kerala	27	38	37	42.9	44.9	45.6
	-India	36	37	42	49.6	47.5	47.9

Note: *Based on different collecting methods, the NSSO has started reporting two types of estimate, Types I and II from the year 2009−10. This table only lists the Type I estimate because it is comparable to previous years' estimates.

Source: National Statistical Organisation. 2010. Nutritional Intake in India. Report No. 540.

1.6 Social capital

1.6.1 Social capital needs upgrading

1.6.1.1 Historically, Kerala has had strong linkages with international markets. The large scale emigration of people strengthened these linkages. With the opening up of the Indian economy, one would expect the state with its historic links with the outside world to profit from the new opportunities. But this did not happen. The flow of foreign investments, collaborations and technology in the wake of the liberalisation in the country are almost bypassing the state. This may partly be due to business environment in the state but partly also due to resistance towards foreign investors. This is a major challenge that needs to be overcome.

1.6.1.2 Further, even within contexts of strong overall social developmental progress, the issues of inequity and exclusion in development outcomes persist. Particular groups of people and individuals remain excluded from the resources, services and opportunities which could help them move out of poverty. The basis of this exclusion and inequity includes a complex range of political, social and economic factors. There have thus been issues pertaining to social justice. These are,

- **Gender issues:** The incidence of crimes against women, rape, sexual harassment is high in Kerala; autonomy of women in household matters and their participation in economic activities is also low.
- **Social exclusion:** Despite powerful social movements, there are caste-based

inequalities that have persisted over time and remain a source of social exclusion. In Kerala, despite a strongly egalitarian radical socio-political movement and high levels of literacy, caste awareness remains acute in the private sphere. Using field work conducted at the beginning of the 1950's, along with data from early twentieth century research, the anthropologist McKim Marriott (1965) examined variations in the rigidity of the caste system across five regions of India: Kerala, Coromandel, Upper Ganges, Middle Indus, and Bengal Delta[32]. He ranked Kerala at the top in terms of the degree of the hierarchy of castes, the extent of delineation of hierarchy by ritual, and the extent of limits on social interaction between high and low castes. One cannot say that the same situation prevails even now but a serious study is called for to assess the current situation.

1.7 Human development and Demographic challenges

1.7.1 Middle human development trap

1.7.1.1 Kerala's achievements in term of human development have been lauded internationally and are well documented. Human development is measured by Human Development Index (HDI) which captures three human dimensions: health, education and income. The first comprehensive state-wise Human Development Report published by the Planning Commission which provided human development indices for 1981 and 1991 for all Indian states and union territories ranked Kerala at the top in both the years[33] . Over time however, Kerala's relative ranking has worsened with other states fast catching up and even out-performing Kerala. Also, the gap is closing between the all India average and Kerala. The Ministry of Women and Child Development for example finds Kerala at the top in 1996 and 2006 in terms of HDI among major Indian states[34]. But it shows that the union territories of Delhi and Chandigarh have out-performed Kerala in terms of HDI over this period. The Human Development Index of the Institute of Manpower shows that Kerala slipped below Goa in 2007−08 when compared with 1999−2000 in terms of HDI[35]. Following the UNDP, the Ministry of Women and Child Development published two new measures in 1996 and 2006: a Gender-related Development Index (GDI) and Gender Empowerment Index along with the HDI[36]. The GDI adjusts the average achievements in the same three dimensions that

[32] McKim Marriott. 1965. *Caste Ranking and Community Structure in Five Regions of India and Pakistan*. Poona: Deccan College Postgraduate and Research Institute.
[33] Planning Commission, Government of India. 2001.*State of Human Development – Concept, Methodology and Core Indices*. www.planningcommission.nic.in.
[34] Ministry of Women and Child Development, Government of India. 2009. *Gendering Human Development Indices: Recasting the Gender Development Index and Gender Empowerment Measure for India*. Part 2. www.wcd.nic.in.
[35] Institute of Applied Manpower Research, Planning Commission, Government of India. 2011. *India Human Development Report*. 2011. Oxford University Press.
[36] See Foot note No. 35.

are captured in the HDI, namely income, education and health, to account for the inequalities between men and women. Kerala topped in terms of the GDI index in 1996 but it slipped below Goa and Delhi in 2006. The Gender Empowerment Index ranking also worsened for Kerala over time. While the value of the index improved from 0.48 to 0.52, the relative ranking of Kerala moved from 2nd position to the 9th position.

1.7.1.2 In its first-ever estimates of HDI for major Indian states, the UN report in 2010 places Kerala at the top in terms of HDI[37]. However, if Kerala is compared with the countries ,it shows that Kerala falls into the category of middle human development countries - below countries with very high and high HDI index, with an overall index of 0.625. When ranked according to global goalposts, Kerala's rank is 99 (between Philippines and the Republic of Moldova) among 192 countries across the world and its current index is smaller than even the 1980 index of top developed countries. It is thus a middle human development state which is two notches below the top countries (with very high and high HDI countries at the top).

1.7.1.3 The challenge is to pull the state out of the middle human development category and put it in the advanced human development category. There are issues of upgrading of education and health facilities and social justice. An increasingly larger number of persons from Kerala are migrating to other states in India for higher education. Since 2008, student migrants have become the number one group in the various employment categories among the out-migrants. There were 3.1 lakh students among the out-migrants from the state in 2011. The corresponding number was 2.4 lakh in 2008, 2.3 lakh in 2003, and 99,000 in 1998. Students were 30.5 per cent of the out-migrants in 2011 and 26.4 per cent in 2008. Student out-migrants out-numbered job-seeking out-migrants since 2008[38]. Students were 107 per cent of the job seekers among the out-migrants in 2011. They were only 32 per cent of the job seekers in 1998. As mentioned in a report on Migrants' Survey 2008, "in the past, the youth of Kerala used to get their education within the state and move out to other states for employment. Now, Kerala's youth move out to other states for education and to other countries for employment" [39]. A flip side of this trend is that many of the youth who get educated outside the state never come back. They tend to get employed outside Kerala, in other states or in other countries depleting valuable human capital. Financing human development is a crucial aspect for the sustenance of the high human development achievement of the state.

1.7.2 Ageing population at low levels of growth

1.7.2.1 Historically, Kerala had been one of the fastest growing states in India in terms of

[37] M.H. Suryanarayana, A. Agrawal and K.S. Prabhu. 2011. *Inequality-adjusted Human Development Index for India's States*. United Nations Development Programme, New Delhi, India.
[38] K.C. Zachariah . and S.I. Rajan. 2012. Inflexion in Kerala's Gulf Connection: Report on Kerala Migration Survey 2011. *CDS Working Paper 450*. Centre for Development Studies, Thiruvananthapuram.
[39] K.C. Zachariah and S.I. Rajan. 2008. Migration Monitoring Study, 2008: Emigration and Remittances in the context of Surge in Oil Prices. *CDS Working Paper 424*. Centre for Development Studies, Thiruvananthapuram

population growth. Until 1971, the rate of natural increase[40] was significantly higher in Kerala than in India. The difference was large enough to make the population of Kerala increase four-fold during 1901−81 when the population of India grew three-fold. The difference in the rate of natural increase had essentially arisen from a significantly lower death rate in Kerala due to health attainments in the state. As a matter of fact, the mortality transition in the state can be traced to the beginning of the 20th century which marked the transition from the first stage of demographic pattern to the second. As a result, despite significant out-migration, Kerala's population grew rapidly and the density of population increased sharply. According to the 1981 census, it was 654 persons per square km, nearly thrice that of all-India.

1.7.2.2 In the late 1980 however, Kerala entered the third phase of demographic transition when the fertility rate also started declining. An inevitable consequence was the age structure transition from children of less than five years to the working age population. The latter registered a phenomenal growth of around 4 per cent per annum. As per the 2001 Indian census data, the working age population of Kerala was around 64 per cent of the total, the highest among Indian states. This stage of age structure transition is highly conducive to growth due to low dependency rate and a large supply of labour. However, Kerala appears to have missed the opportunity of capturing the population dividend due to limited success in creating productive capacities in the state. It is facing a severe unemployment problem which arose due not so much to lack of employment opportunities but more due to the lack of quality employment generation. The consequence is migration from the state to other states and Gulf countries. Thus the state lost a sizeable productive population in the absence of quality growth.

1.7.2.3 Over the past decade, the state has entered the final stage of age structure transition with a shift in the age structure from a young to old population. Such changes have been associated with considerable economic prosperity in the case of many other countries. In the context of Kerala, the phenomenon has appeared in the setting of a relatively less developed economy. According to the projections, working age population is likely to fall further. The decrease in the proportion of population at younger ages would contribute to a decrease in the overall unemployment rate but it will also mean the decline in active workforce and excessive growth of aged population. This will have multidimensional effects on the economy which may be growth dampening due to:

- Decline in labour force
- Decline in migration and remittances
- Increase in social security expenditures
- Pressures for creating new infrastructure for looking after the aged, and
- Modifying the existing common infrastructure to facilitate their use by the aged.

[40] The rate of natural increase, computed from subtracting the rate of net migration from the inter-censal growth rate, reveals some interesting features of the demographic transition in Kerala vis-à-vis that of India.

1.7.3 Rapidly increasing urbanisation without commensurate increase in urban infrastructure

1.7.3.1 The 2011 Census figures state that Kerala is urbanised up to 47.7per cent. This is a quantum jump from the 26 per cent recorded in 2001. In 1981, only 18.74 per cent of Kerala's population was in the urban areas. Unlike the other parts of the country, urbanisation in Kerala is not limited to the designated cities and towns and is not the outcome of rural migration. The process of urbanisation has led to economic, social and environmental issues. From the economic perspective, there is or will be increasing demand for infrastructural facilities such as housing, water, electricity, drainage, roads and above all solid waste management in new census towns. Social issues arise as it transforms societal organisations, the role of the family, demographic structures, and the nature of work, inter-personal relationship, and societal networks. The outcome may be increasing social stress, crimes and gender-related problems. From environment perspective, the changing land use pattern may result in a loss of natural vegetation, agricultural lands, and open space due to commercial, industrial, and residential development having environmental implications. The challenge is to ensure sustainable development in these areas. The problem is compounded by the fact that the entire state is a rural urban continuum from north to south. This unique settlement pattern of Kerala has aggravates the problem by distributing limited resources across large areas.

1.7.4 Challenges posed by return migrants:

1.7.4.1 There are two categories of return migrants. The first is return emigrants i.e. members of those household who have returned to Kerala after living outside India for a year or more; or for a lesser period, if the stay outside was for the purpose of studies or looking for a job (REMs). The second is return out-migrants (ROMs) i.e. members of those households who have returned to Kerala after living outside Kerala but within India for a year or more. According to the Kerala Migration Survey (KMS) reports there has been a consistent decline in the number of return out-migrants (ROMs). It was 9.6 lakh in 1998. It increased somewhat to 9.,9 lakh in 2003 but then declined to 6.9 lakh in 2008. However, the number of REMs has been growing rapidly. REMs assumed large dimensions in Kerala in the early 1990's. In 2000, their number shot up to 7.5 lakh. The return migrants pose opportunities and challenges. The age distribution shows that at the time of return they are still young and are in the working age group and have a long active life ahead. Three fourths are below 40 years of age. Further, emigrants and return emigrants are believed to have acquired several skills while working abroad. These include various kinds of technical skills, marketing skills, managerial/supervisory skills, financial management skills and the like. Comparison of the educational levels of return emigrants with those of the emigrants who have not returned shows that those who came back are, on average, of lower educational levels and technical skills . However, it does not rule out the possibility that they have better skill acquisition than those who never migrated at all. With the financial resources at their disposal, the skills and disciplined work culture they have acquired, and the networks they have established, it is

expected that emigrants who returned to Kerala could make a significant contribution to the state's development. The challenges before the policy makers are therefore twofold: the rehabilitation of return emigrants and the use of their expertise and accumulated wealth for development activities.

1.7.5 Challenges of In-migration

In-migration is a new phenomenon emerging in the state. More specifically, it is reappearing after a gap of almost seven decades. The scarcity of unskilled and semi-skilled labour, coupled with a high wage rate regime, attracted migrants from other states in India to fill the gap, leading to `replacement migration' in Kerala. However, the replacement migrants are paid lower wages than those already in existence in Kerala and they are working under grossly inhospitable conditions devoid of any living facilities. They are housed in crowded settlements and unhealthy conditions posing a serious challenge for the state to provide suitable service delivery mechanisms to the replacement migrants.

1.8 Environment: Strengths and challenges

1.8.1 Increasing pressure on natural resources

1.8.1.1 While the rich natural capital presents opportunities for sustainable prosperity, there are also challenges. Urbanisation patterns, land use changes and the emerging 'consumer middle class', in the state is expected to result in continuous growth in demand for consumer goods and other resources. These markedly increase pressure on natural resources which are already under stress or scarce, and it may further put new stress on other resources. Wetlands for instance are an important part of the ecosystem of Kerala and are also the most threatened part of it. As mentioned above, they serve as buffer or food, water and drainage, function as groundwater recharge sites, offer habitat for a variety of plants and animals, breeding sites of several aquatic species, and help in maintaining the local microclimate and help in carbon sequestration. However this ecosystem is subjected to severe quality degradation in the state. Filling up wet-lands and paddy growing areas and converting them into built-up areas has become a practice since the late 1980's because of increased cash flow and economic development due to NRI remittances. Other activities that have contributed to the loss and degradation of wetlands of Kerala are the discharge of industrial effluents, dumping of municipal wastes in the absence of reuse, recycling and disposal facilities, and drainage of fertilizer-pesticide residues. Protecting this important ecosystem from further degradation will be a challenge for the government.

1.8.2 Degradation of water resources

1.8.2.1 The state of Kerala is uniquely placed in receiving annual rainfall of about 3,000 mm, which is about two and half times the national average. At the same time, the state is equally

uniquely placed in being able to retain only a minuscule of the total impacted rainfall for useful purposes. The rest of the water is lost to the sea, within a short time after its incidence, thereby rendering less time for water infiltration, percolation and storage. This leads to deficient water supply during summer months, from December to May, both for drinking and for irrigation purposes. Thus, Kerala paints a picture of abundance of rainfall co-existing with droughts of different magnitude. Per capita of water availability in water-rich Kerala is lower than even Rajasthan. The per capita water availability for India is about 15,600 litres per capita per day (lpcd), while for Kerala it is 1,250 and for Rajasthan 1,600[41] [42]. The per-capita water availability in 2011 in Australia was 22,039 cubic meter (m^3), USA 9,044 m^3,France is 3,059 and United Kindom is 2,311 m^3[43] . Water is a serious issue in Kerala and that has economic, social, and environmental implications. Importantly, it is directly linked with energy shortage in Kerala due to hydel energy being the major source of energy.

1.8.2.2 Degradation of water resources and water pollution pose further challenges in Kerala. Conversion of watershed areas has altered the hydrological regime while enhancing the silt movement – lowering water yield in the catchment affecting the groundwater recharge. Introduction of plantation crops in highlands replacing the natural vegetation reduced the storage capacity of soil and resulted in surface soil erosion in watersheds and sedimentation in rivers. This has affected summer flow in rivers. Sand quarrying in rivers and watersheds and agricultural practices in the riverbanks during non-rainy months, sand filling of ponds, farmlands, wetlands and other water bodies, conversion of vast areas of wetlands and paddy fields into settlement and industrial areas, and construction of new roads and buildings have compounded these problems.

1.8.3 Deterioration of water quality

1.8.3.1 In the absence of efficient water treatment systems and solid waste management systems, untreated domestic and industrial wastes, and agriculture-runoff flow in to the rivers polluting nearly all 44 rivers in Kerala. Further, there has been wide spread bacteriological contamination of faecal origin in ground and surface water which relate to close proximity of increasing numbers of leach pit latrines; leakages from septic tanks; washing, bathing and other domestic activities around the open dug well sources, especially among the low income communities; inadequate and irregular disinfection of drinking water supplies, including chlorination under Kerala Water Authority (KWA) schemes; and inadequate testing and irregular monitoring of drinking water quality. This poses a serious risk to public health.

[41] Planning Commission, Government of India. 2008. *Kerala Development Report*. Academic Foundation.
[42] The Census 2011 indicates that it India's per-capita water availability is 1,545 cubic meter. It was 1,816 cubic meter in 2001. (Press Information Bureau, Government of India. 2012. Per capita water Availability. http://pib.nic.in/newsite/erelease.aspx?relid=82676).
[43] World Bank. 2013. World Development Indicators.

1.8.4 Solid waste management

1.8.4.1 According to an estimate[44], about 960 million tonnes of solid waste was being generated annually in India in 2007 as by-products during industrial, mining, municipal, agricultural and other processes. Of this 350 million tonnes is organic waste from agricultural sources; 290 million tonnes was inorganic waste of industrial and mining sectors and 4.5 million tonnes are hazardous in nature. In Kerala, nearly 6,000 tonnes of solid waste is estimated to be generated per day[45], which turns out to be 2.2 milllion tonnes of solid waste per annum. It is 0.2 per cent of the Indian average. In 2002 government launched an initiative called Clean Kerala Mission. A primary objective of the mission was to create a garbage free Kerala. There were efforts to achieve this goal with the participation of NGOs, community organisations such as *Kudumbasree* across Kerala. The fact of the matter however is that solid waste management continues to pose a major challenge and health hazard in the state.

1.9 Summing up

1.9.1 The Kerala economy is on the threshold of a second transition in terms of the stage of its development from "take-off" to "drive to maturity". The old regime of low per capita income growth has given way to a regime of relatively high rate of growth with the service sector as the single largest provider of new employment. Kerala has been growing at an average annual rate of 6.3 per cent over the past two and a half decades. However, the BAU scenario is grim. It is now a well-known fact that growth may come about in a variety of ways and that different types of growth processes may have different effects on growth potential, employment, poverty, human resource development and environment. Kerala's growth process is also characterized by major fault lines. There is a need for improving the quality of growth in terms of the generation of productive capacity, structural transformation and the quality of human development. Job expectations, especially among the youth, have changed. The labour force is ready to move into more skilled, technologically superior, high value-adding occupations with better wages and conditions of employment. There is thus a need to look for new growth drivers. A shift in political underpinning is also discernible in recent times with deep concern for sustained growth. A major growth challenge is to pull the economy out of the vicious cycle of low productivity, poor quality, high unemployment and social and environmental degradation to a virtuous circle of high quality growth. The challenge is to increase competitiveness and productivity by reforming the investment climate through infrastructure reforms. Kerala needs to reconsider its development strategy in order to gain considerable autonomy in growth and become a major player in the national and global economy. This would call for a strategic policy intervention based on an understanding

[44] Asokan Pappua, Mohini Saxena and Shyam R. Asolekar Solid (2007) Wastes generation in India and their recycling potential in building materials. *Building and Environment*. 42(6). 2311-2320.
[45] Universal Eco Services website. http://www.universalecoservices.com/wastemanagement_in_kerala.cfm

of the growth drivers, strengths and challenges the region is facing. Growth policies need to be region specific, addressing the unique challenges each faces. Strategic planning is an essential first step to place a region on an upward trajectory.

*****

Appendix A1.1
Technical note on business-as-usual scenarios

A1.1.1 Introduction

A1.1.1.1 During the first decade of this century, GDP growth rate in Kerala has been impressive at about 7.4 per cent growth rate per annum. If Kerala can maintain this level of GDP growth for a generation (about 30 years) it would have by 2040, reached the per capita income level of developed countries today (2010). However, the structure of growth in the last decade has been highly unbalanced and sustained high growth over the next three decades may not be possible without some major restructuring of sources of growth.

A1.1.1.2 As noted in Table A1.1, during 2000−10 GDP in agriculture grew at only 0.5 per cent[46], and GDP in manufacturing also grew slowly at only 5.7 per cent per year. On the other hand, the service sector grew fast with a spectacular 29 per cent per year growth in communication and 12.6 per cent per year in banking and insurance. Construction sector also grew fast at 9.8 per cent per year. The spectacular growth rates in these selected service sub-sectors were due to some exceptional factors which are unlikely to continue in future. For example, the high growth rate of communication sector was largely due to the technological revolution in the sector and that growth rate in the sector is already coming down. Similarly, the high growth rate in construction and banking and insurance, was partly due to the heavy inflow of remittances, which may not continue at the similar rate in the future. Thus, a Perspective Plan in Kerala covering 2010−2030 has to assess the consequences of slowdown in these sectors. Moreover, as discussed in the chapter on vision for perspective plan, Kerala needs to improve growth performance of agriculture and manufacturing sector and identify new sources of growth which may come from human resource development. It is therefore necessary to see how the Kerala growth perspectives, will be with such restructuring of the economy

[46] In fact, became negative during 2005−10.

Table A1.1: Sectoral average growth rates (2000−10)

Industry of Origin /Year	*2000−10 (Average)*
Agriculture	0.49
Forestry & Logging	2.09
Fishing	0.45
Mining & Quarrying	8.83
Manufacturing	5.67
Electricity, Gas and Water supply	4.66
Construction	9.77
Railways	7.99
Transport by other means	9.9
Storage	6.35
Communication	28.99
Trade, Hotel & Restaurant	6.14
Banking & Insurance	12.6
Real estate ownership, Business, legal	10.14
Public Administration	8.62
Other Services	7.37
Gross Domestic Product	7.41

Source: Computations by NCAER

A1.1.1.The art of model-building lies in designing the model to tackle the issues under consideration. In this case, the issue is the growth consequences of slow down in the sources of growth of the past and the effect of new sources of growth in the economy. In order to address these issues we avoid using the standard macro-models and design a special purpose model for Kerala Perspective Plan.

A1.1.2 Analytical Framework

A1.1.2.1 The key point of departure in our analysis is to break down GDP sectors into two groups: growth drivers /exogenous and growth driven/endogenous sectors. Table A1.2 divides all the 16 sectors into these two types. For example: agriculture, forestry & logging, fishing, mining and quarrying, manufacturing, construction, communication, banking & Insurance and public administration are taken as drivers of growth. We classify communication sector as a driver of growth, because it is driven to a considerable extent by remittance which is an external factor. Similarly banking and insurance is taken as a driver partly because of the impact of remittances on the sector and partly because of the financial innovations that characterized this sector during 2000−2010. Public administration is

classified as a driver in so far as it reflects the views and actions of political leaders rather than being derived from other sectors of the economy.

Table A1.2: Sectoral division into "Driven" and "Drivers"

Drivers	Driven
1.Agriculture	10.Electricity, Gas and Water supply
2.Forestry & Logging	11.Railways
3.Fishing	12.Transport by other means
4.Mining & Quarrying	13.Storage
5.Manufacturing	14.Trade, Hotel & Restaurants
6.Construction	15.Real estate ownership, Business, legal
7.Communication	16.Other Services
8.Banking & Insurance	
9.Public Administration	

Source: NCAER

A1.1.2.2 On the other hand, electricity, gas & water supply, railways, transport by other means, storage, trade, hotel & restaurant, real estate ownership and other services are driven by growth in Kerala. Growth in goods producing sectors like agriculture and manufacturing contribute to the growth in related sectors of transport, storage, railway and electricity gas and water supply. Similarly, growth in trade hotel and restaurant, other services and real estate are dependent on growth in other sectors of the economy.

A1.1.2.3 In order to substantiate the long run relationship between growth drivers and growth driven sectors, granger causality test of total GDP in "Drivers" on total GDP of "Driven" sectors was performed. Drivers growth granger causes the growth in driven sector with P value = 0.08, which is significant at 10 per cent level of significance (Table A1.3). Furthermore we find that driven sectors (both individually and collectively) show a high degree of correlation with the sum of "drivers". The equation we choose for further analysis is:

Growth driven = 0.92 **Growth drivers** R-squared = 0.7483
[SE (.133), t Statistic = 6.90, P value = 0.00]

A1.1.2.4 Regressing growth in total GDP of drivers on total GDP growth of driven sectors, and suppressing the constant, we see that elasticity turns out to be 0.92. It means that a 1 per cent increase in growth of drivers leads to a 0.92 per cent increase in growth of driven sectors. Statistically R square turns out to 0.74, which means that 74 per cent growth in driven sectors

is explained by growth drivers. At 5 per cent level of significance (t value is 1.96) the calculated t value of 6.90 is greater than 1.96, which means we reject the null hypothesis that drivers and driven sectors are unrelated to each other, in fact drivers affect driven sectors positively and in a significant way.

Table A1.3: Granger Causality Wald Tests

Equation	*Excluded*	*Chi2*	*Df*	*Prob>chi2*
Driven	Drivers	4.91	2	0.086

Source: NCAER's Calculation

A1.1.2.5 After establishing the statistical relationship between growth drivers and growth driven sectors, we begin with alternative assumptions on growth in "drivers" and using the above equation, find total GDP growth.

A1.1.3 Business-as-usual Scenarios

A1.1.3.1 The recent growth trends are likely to suffer a serious drop in the future particularly in sectors such as communications, construction and banking. Using the model we assess the drop in GDP growth rate due to expected drop in growth rates of the above three sectors. Construction sector growth rate is expected to fall from current 9.8 per cent in 2010 to 5.8 per cent in next plan period of 2012−16 and then further falling to 4 per cent growth per annum from 2017 onwards till the end of perspective plan period. A fall in growth rate of construction will lead to a loss of growth rate by 0.6 percentage points of GDP in next plan period (2012−16) and 0.1 percentage points in 2027−31 (Table A1.4).

A1.1.3.2 Communication sector which has been driving the growth of Kerala's economy in a big way is assumed to slow down. Growth rate in this sector is assumed to slow down from currently 20 per cent to 8 per cent in coming plan (2012−16), with further falling to 7 per cent in next plan (2017−21) and subsequently down to 5 per cent from 2022 onwards till 2031 (Table A1.4). Assumptions regarding fall in communication will reduce Kerala's GDP by 2 percentage points during 2012−17.

A1.1.3.3 Banking sectors growth rate is assumed to fall from 10 per cent to 4 per cent, the related fall in GDP is represented in Table A1. 4. Overall loss of growth rate is presented in Table A1.4, a loss in GDP growth around 3 to 4 percentage points is estimated.

Table A1.4: Loss in Growth Rates

Year	*2012−16*	*2017−21*	*2022−26*	*2027−31*
Loss of Growth - Due to Fall in growth of Construction				
Plan Wise Growth Rate	0.60	0.38	0.15	0.10
Loss of Growth - Due to Fall in growth of Communication				
Plan Wise Growth Rate	2.06	2.44	1.69	1.87
Loss of Growth - Due to Fall in growth of Banking				
Plan Wise Growth Rate	0.21	0.60	0.70	0.76
Total Loss of Growth from banking ,Construction and Communication				
Plan Wise Growth Rate	2.87	3.42	2.54	2.73

Source: Computations by NCAER

Table A1.5: Plan Wise Growth after reduction in Banking, Communication and Construction growth

Year	*2012−16*	*2017−21*	*2022−26*	*2027−31*
Plan Wise Growth rate	5.1	4.8	4.5	4.6

Source: Computations by NCAER

A1.1.3.4 The overall growth rates in Kerala are expected to fall to 5.1 per cent in 2012−16, continuing this fall, growth rate reaches a new low of 4.6 per cent in 2027−31 (Table A1.5). However, growth scenario in Kerala is even grimmer, some more assumptions regarding fall in growth rates of all other sectors are as follows:

- It is possible that due to climate change, growth in agriculture and allied sectors may suffer. Agriculture and fishing growth is assumed to fall from 0.5 per cent from 2011 to 0.25 per cent in 2031. Similarly, forestry and logging growth rate is assumed to fall from 2 per cent to 1.5 per cent in 2031
- A fall by 2 percentage points from 7 per cent to 5 per cent, during 2012−16 in mining sectors, with further fall to 3 per cent and 2 per cent growth in 2017−21 and 2022−30 respectively is assumed. One of the plausible reasons for the fall in growth rate of mining sector can be depletion of resources in future.
- Manufacturing growth is expected to fall from 5.7 per cent to 4 per cent in 2012−16, and then falling to 3 per cent growth subsequently till 2031.
- Fall in GDP due to many other reasons as mentioned above, will cause a decline in growth rate of public administration. Public Administration growth is assumed

to fall from 8 per cent to 5 per cent in first plan period of 2012−16, then falling to 4 per cent in next plan 2017−21 and then to 3 per cent till 2031.

A1.1.3.5 Assumptions regarding fall in growth rates of all the above sectors, with banking, communication and construction can bring Kerala economy further down to a range of growth rate from 3−4 per cent.

Table A1.6: Plan Wise Growth rate After all the changes in growth rates in all sectors

Year	***2012−16***	***2017−21***	***2022−26***	***2027−31***
Plan Wise Growth rate	4.6	4.1	3.6	3.8

Source: NCAER's calculations

A1.1.4. *Impact of remittances on GDP growth*

A1.1.4.1 Remittances contributes to 15 per cent of GDP in Kerala's economy, however these are not included in estimates of state's income. In our modelling exercise in order to account for the impact of remittances, we project remittances. Remittances growth has been around 9 per cent in last decade, however due to global financial crisis growth of remittances in last few years, this growth has fallen down dramatically. Assuming remittances growth rate to fall from 7 per cent to 3 per cent in 2012−16 and then further reducing it to 2 per cent growth in 2017−21 and 1 per cent in 2022−26 and 0 per cent growth in 2027−31 due to crisis in Middle East, we obtain remittances projections.

A1.1.4.2 Addition of remittances with Business-as-Usual (BAU) GDP projections (after all shocks) provides rough projection of GSI (Gross State Income) which is a sum of GSDP and remittances. The Plan wise growth of GSI is presented in Table A1.7.Altogether in BAU scenario GSI growth may drop by about 4 per cent points to about 3 per cent per year, thus coming close to the dismal growth experience of Kerala in the 1970s and early 1980's , with its severe implications for unemployment and standards of living.

Table A1.7: Plan Wise Growth rate after falling growth of remittances

Year	***2012−16***	***2017−21***	***2022−26***	***2027−31***
Plan Wise Growth rate	4.4	3.8	3.3	3.3

Source: NCAER's calculations

Appendix A1.2
Basic Concepts of Important Labour Force Parameters

Labour force participation rate: - Labour force participation rate (LFPR) is defined as the number of persons in the labour force per 1000 persons.

*LFPR = ((no. of employed + no. of unemployed persons)/ Total Population) *1000*

Worker-population ratio: - Worker-population ratio (WPR) is defined as the number of persons employed per 1000 persons.

*WFPR= (Number of employed persons/ Total population)*1000*

Unemployment Rate: - Unemployment rate (UR) is defined as the number of persons unemployed per 1000 persons in the labour force (employed & unemployed).

*Unemployment rate= (Number of unemployed persons/ Labour Force)*1000*

Usual activity: The usual activity status relates to the activity status (employed/unemployed) of a person during the reference period of 365 days preceding the date of survey.

Usual subsidiary economic activity status: A person whose usual principal status was determined on the basis of the major time criterion could have pursued some economic activity for a shorter time throughout the reference year of 365 days preceding the date of survey or for a minor period, which is not less than 30 days, during the reference year.

Usual activity status considering principal and subsidiary status taken together: The usual status, determined on the basis of the usual principal activity and usual subsidiary economic activity of a person taken together, is considered as the usual activity status of the person and is written as usual status (ps+ss).

Current weekly activity status: The current weekly activity status of a person is the activity status obtaining for a person during a reference period of 7 days preceding the date of survey.

Current daily activity status: The activity pattern of the population, particularly in the informal sector, is such that during a week, and sometimes, even during a day, a person could pursue more than one activity.

Self-employed: Persons who operated their own farm or non-farm enterprises or were engaged independently in a profession or trade on own-account or with one or a few partners were treated as self-employed in household enterprises.

Regular wage/salaried employee: These were persons who worked in others' farm or non-farm enterprises (both household and non-household) and, in return, received salary or wages on a regular basis (i.e. not on the basis of daily or periodic renewal of work contract).

Casual wage labourer: A person who was casually engaged in others' farm or nonfarm enterprises (both household and non-household) and, in return, received wages according to the terms of the daily or periodic work contract, was a casual wage labourer.

CHAPTER 2

THE STRATEGIC FRAMEWORK

A prosperous, knowledge-driven and competitive economy, which optimises the use of resources and reduces environmental impact while ensuring high living standards for all is the vision. The mission to achieve sustainable prosperity rests on four pillars including economic, human, social and green. To attain quality growth benchmarking will be the central instrument for monitoring and improving the performance of the economy. Overall Kerala will be benchmarked against the Nordic countries. Education and health, the traditional strengths of Kerala will be the driving force of the new development strategy. Therefore, upgrading the quality of education and health to international standards, developing knowledge nodes within the state, promoting knowledge creation and diffusion are some key directions. The higher education system will create learning students and simultaneously create, disseminate and diffuse knowledge. Education and health will be inter-linked with all other sectors like agriculture, industry, tourism etc. Development of infrastructure is a crucial element and ICT is the lynchpin of a knowledge economy. Private investment and entrepreneurship will be encouraged. Social and environmental development will be mainstreamed. A systems approach to planning i.e. a coordinated effort of all the government departments, production systems, communities, NGOs and people will be adopted to implement this new development strategy. However, one has to strengthen institutions, improve governance and address factor market rigidities to create the enabling conditions for the new development strategy. A robust monitoring and evaluation system which promotes transparency and accountability and facilitates regular tracking of physical and financial performance of the plan will be created.

2.1 Vision

2.1.1 Kerala will be a prosperous, knowledge-driven, competitive, and eco-efficient economy[1] in the distinguished league of the world's advanced economies with a spirit of entrepreneurship, innovation, social inclusion, and tolerance and diversity which ensures

- High living standards for all;
- Cleaner, safer, and healthier environment for both present and future generations.

2.1.2 The state will be economically prosperous in the sense that the people of Kerala will enjoy a high level of income and living standards. Economic prosperity is necessary because it is a key element in providing means to meet basic needs, to generate employment and reduce poverty. It will be driven by knowledge and entrepreneurship with a new focus on the role of information technology, innovations and learning in economic performance.

2.1.3 It is also envisaged that Kerala will be a globally-oriented knowledge hub, in the league of the world's leading knowledge hubs. A key node in global knowledge networks, it will

[1] The World Business Council for Sustainable Development (WBCSD) describes eco-efficiency as a management strategy of doing more with less. In practice, eco-efficiency is achieved through the pursuit of three core objectives: (i) increasing product or service value; (ii) optimising the use of resources; and, (iii) reducing environmental impact. (Industry Canada website: http://www.ic.gc.ca/eic/site/ee-ee.nsf/eng/h_ef00010.html)

have distinctive expertise in the education sector, health care, bio technology, information and communication technology (ICT), bio-diversity and environment related areas. Its success will lie in its ability to produce higher value enabling knowledge intensive goods and services to move up the value chain and compete globally in the same product space as advanced countries.

2.1.4 Economic efficiency will be combined with ecological efficiency to ensure that more value is added with ever less use of resources, waste and pollution. Eco-efficiency will both enhance the efficiency of production processes and create new & better goods and services. In the process, it will be using fewer resources and generating less pollution along the entire value chain. Eco-efficiency will be reached by the delivery of competitively priced goods and services that satisfy human needs and bring quality of life while progressively reducing the ecological impact and resource intensity throughout the life cycle to a level at least in line with the land's carrying capacity.

2.1.5 Kerala's vision of prosperity moves beyond accumulation of material wealth measured traditionally in terms of Gross State Domestic Product (GSDP) or GSDP per capita. The policies of the state will be inclusive and socially just, aimed at eliminating most social and economic inequities. This will mean broader access to equal opportunities to all to ensure that members of society can participate and benefit from growth.

2.1.6 Kerala will be a more diverse society in terms of culture and religion. Increased diversity will be linked with increased tolerance, creativity, knowledge, and dynamism.

2.1.7 Finally, Kerala will aim at prosperity for the present without compromising the prosperity of future generations. Keralites will be living in perfect harmony with nature.

2.2 Mission

2.2.1 The mission is to achieve "Sustainable Prosperity" benchmarked with the Nordic Region comprising of Finland, Norway, Denmark and Sweden. Sustainable prosperity comprises of four elements.

- **Economic prosperity:** Economic prosperity is measured by the GSDP per capita. Standards of living of the people in a country are closely linked with per capita income.
- **Human prosperity:** Quality of life will be shaped by access to, quality and affordability of services namely, health, education and effective & clean governance.
- **Social prosperity:** Equal opportunity will be ensured to every person residing in Kerala irrespective of gender, religion, caste and origin for intellectual, personal and professional growth determined social prosperity. The emphasis will be on promoting human capacities through improvements in infrastructure, market access, education, health and financial intermediation. Social safety nets and redistribution will be limited to the prevention of extreme deprivation, and to the protection of socially marginal and vulnerable groups.
- **Green prosperity:** The natural wealth of Kerala will be preserved for future generations to reduce environmental risks and ecological scarcities.

2.2.2 While economic prosperity is measured by the income per capita, assessing other elements of sustainable prosperity will require some specific measurement tools. Since the early 1990s, there has been proliferation of initiatives at the national and international levels to develop specific indices which provide descriptive measures of different aspect of economy's performance with the indicators covering a large number of domains. While some initiatives focus on individual countries (and to localities within them), as developed either by citizen and research groups or as part of the official statistical system; other initiatives are international, typically used to monitor how a range of political commitments are followed through with specific actions. Some of these international indices are provided in Appendix A2.1. These indices cover different aspects of sustainable prosperity and are specifically tailored to the needs of policy makers. The tables 2A.1 to 2A.5 present selected international indices covering all the four aspects of sustainable prosperity with the ranking and scores of Nordic countries and India. Tables 2A.6 to 2A.8 show other dimensions of development including gender, environment and ICT capacity. The objective is to depict that the Nordic countries are topping the global ranking in terms of all aspects of sustainable prosperity. The Mission of the Kerala Perspective Plan 2030 (KPP 2030) will be to achieve the standards of these countries and share the space with them in these indices.

2.2.3 Notably, the primary characteristics of Nordic countries can be closely compared with those of Kerala's economy[2]. The main characteristics of the "Scandinavian" or "Nordic model" include:

- A comprehensive welfare state with an emphasis on transfers to households and publicly provided social services financed by taxes, which are high notably for wage income and consumption;
- A large amount of public and/or private spending on investment in human capital, including child care and education as well as research and development (R&D); and
- A set of labour market institutions that include strong labour unions and employer associations, significant elements of wage coordination, relatively generous unemployment benefits and a prominent role for active labour market policies.

2.2.4 With the economic structure which is similar to that of Kerala, these economies have been at the top not only in terms of per capita income but also in terms of social, human and environmental performance. In its mission to achieve the standards set by Nordic Countries in all these segments of sustainable prosperity, Kerala will draw on the best regional, national and international practices and experiences. Benchmarking is a central instrument for improving the performance of the economy. The underlying assumption is that comparison can be an important driver of performance.

2.2.5 Mission statement

- Quantity is not enough—quality matters.

[2] There are of course many differences between the Nordic countries and Kerala such as the geography, density of population, resources etc. However, the Nordic countries have been able to grow in a competitive manner keeping in their socialist ideals and that is the framework Kerala needs to follow over the next two years to achieve sustainable inclusive economic growth.

2.3 Goals

2.3.1 Goals will be as follows:

❖ **Economic prosperity:**

- To achieve a compound annual growth rate of 7.5 per cent in GSDP per capita for the next 20 years.
- Increase per capita income from the current US$ 4,763 (in terms of purchasing power parity of 2005[3]) to US$19,000 and then to US$36,000 by 2040.
- Achieve sectoral growth rates of
  - ✓ 2 per cent in agriculture
  - ✓ 9 per cent in manufacturing
  - ✓ 9 per cent in construction
  - ✓ 7.5 per cent in communication
  - ✓ 10 per cent in education and health sectors

  (see Box 2.1 for plan-wise and sector wise growth targets; Appendix A2.2)
- Brand Kerala as 'global education and health hub' driving India's exports in education and health care services.

❖ **High quality of life**

- Increase the share of education and health sectors in GSDP to 15 of GSDP from the current 11 per cent by 2030;
- Increase enrolment ratio in higher education to 48 per cent by 2030;
- Health security for all;
- Upgrade to the highest category of UNDP human development index.
- High standards of living with a focus on
  - ✓ The growth of smart urban and rural areas.
  - ✓ Transforming Kochi into a global city to bring it into A.T. Kearney index

❖ **Just and equal society:**

- Reduction in
  - ✓ Unemployment rate from 9.9 per cent in 2011−12 to 2 per cent in 2031; reduction in female unemployment rate from 26.2 per cent to 5 per cent
  - ✓ Gini coefficient of economic inequality from around 45 per cent in 2009−10 to 23 per cent in 2031
  - ✓ Poverty rates from 7.1 per cent in 2011−12 to 1 per cent in 2031
- Culturally diverse, safe and just society

❖ **Clean and safe Environment**

- Upgrade ecosystems, biodiversity, and resources, through sustainable production systems and consumption;
- Protect wetlands;

[3] Purchasing power parities (PPPs) are indicators of price level differences across countries. They indicate how many currency units a particular quantity of goods and services costs in different countries (http://epp.eurostat.ec.europa.eu/portal/page/portal/purchasing_power_parities/introduction).

- Conserve the World Heritage bio-diversity of Western Ghats;
- Increase energy efficiency to save 20 per cent of Kerala's energy and water consumption by 2030
- Recycle targets of 60-75 of waste generation depending on the type of waste.
- Identify and maximise the use of sustainable resources

Box 2.1 Plan wise and Sector wise target GSDP and Growth Rates

As growth in fastest growing sectors slows down in future, growth in overall GSDP will also slowdown. It is showed in the previous chapter that the GSDP growth rate can decline sharply to 3.8 per cent. In the preferred scenario rate of growth in GSDP has to be on an average 7.5 per cent over the next 20 years. Table 2.1 shows plan wise and sector wise growth rates in the preferred scenario.

Table 2.1: Plan-wise and sector-wise target growth rates, 2011−2031 (CAGR %))

Year	2011	2012−16	2017−21	2022−26	2027−31
Agriculture	0.5	1.5	2.0	2.0	2.0
Forestry & Logging	3.5	4.0	3.5	3.0	2.0
Fishing	3.5	3.5	3.5	2.5	1.5
Mining & Quarrying	7.0	6.0	5.0	4.0	3.0
Manufacturing	6.0	8.0	10.0	9.5	8.5
Construction	5.0	8.0	10.0	9.5	8.5
Communication	10.0	9.0	8.0	7.0	6.0
Banking & Insurance	6.0	8.0	9.0	9.0	8.0
Public Administration	9.0	8.0	7.0	6.0	5.0
Other Services	10.0	11.0	11.0	9.0	9.0
Electricity, Gas and Water supply	3.2	3.9	4.3	4.1	3.8
Railways	7.7	9.3	10.4	9.7	9.1
Transport by other means	6.4	7.8	8.7	8.1	7.6
Storage	6.4	7.8	8.7	8.1	7.6
Trade, Hotel & Restaurant	6.4	7.8	8.7	8.1	7.6
Real estate ownership, Business, legal	6.4	7.8	8.7	8.1	7.6
Target Growth Rate	**6.4**	**7.6**	**8.5**	**7.9**	**7.4**

Note: CAGR is the Compound Annual Growth rate

2.3.2 It may be observed that the growth rates will be sustained in all the sectors over the next 20 years with the exception of communication, mining and public administration which will slow down over time. This growth can be sustained in the long run only if there is substantial restructuring of economic activities in each sector. The targets set by the KPP 2030 are thus ambitious, and require a new development strategy with significant amount of policy support. It calls for a paradigm shift from a consumption driven growth trajectory with low investment and productive capacity, and low value added and low technology intensive economic activities to knowledge and information technology driven sustainable development trajectory. The new development strategy proposed in this document builds on the core strengths of Kerala economy, namely, education and health. In the current growth strategy these are non-tradable social sectors with considerable redistributive effects. They also contribute to growth indirectly by driving up consumption and upgrading human capital. In the new development strategy, these sectors will be assigned a key role in the growth process and will be transformed into competitive strengths of Kerala.

2.4 The Knowledge-driven Sustainable Economic Development Strategy: A New Development Strategy

2.4.1 Key principles

2.4.1.1 The Perspective Plan of Kerala sets the target of leapfrogging the high-middle-income threshold within the next 15 years and the high income threshold in the subsequent 15 years. It also seeks Kerala to be in the league of Nordic countries in terms of human capital, and social and environmental indices. The underlying principle of leapfrogging is to give a major push to the economy in which all sectors and stakeholders participate. It will require massive improvement in the competitiveness and structural transformation of the economy. This is not impossible. Income transitions (i.e., for the countries that make them) today are significantly faster than those in the past. The process of globalisation and digital revolution offer an opportunity to leapfrog to development faster to catch up with the developed nations. Netherlands (the first country to become lower-middle-income, in 1827) took 128 years to graduate to upper-middle-income in 1955. China on the other hand started the growth process in 1979 and became a lower-middle-income country in 1992. It graduated to upper-middle-income within 17 years in 2009. Kerala can repeat this feat, if there is a course correction in its growth process.

2.4.1.2 A central plank of Kerala's sustainable prosperity will be the development of a knowledge economy embedded within the sustainable development framework. Two principles of this strategy are Knowledge economy and Sustainable development

a) Knowledge Economy

(i) A knowledge economy is an economy where knowledge is acquired, created, disseminated and used effectively to enhance economic development. In a knowledge economy, "knowledge capital" lies at the core of economic growth. It contributes to growth not only directly but also indirectly by augmenting the existing physical capital and labour as factors of production. Knowledge capital is an intangible asset that comprises the know-how of a workforce, innovative ideas, professional skills, intellectual property, enterprise processes, and information technologies. A successful transition to the knowledge economy includes four elements:

- Long-term investments in education and human development: Investment in human development builds an educated and skilled workforce who can continuously upgrade and adapt their skills to efficiently create and use knowledge.
- Development of innovation capability: An effective innovation system of firms, research centres, universities, consultants and other organisations can keep up with the knowledge revolution, tap into the growing stock of global knowledge and, assimilate and adapt it to local needs.
- Modernisation of the information infrastructure: Promotion of a modern and adequate ICT infrastructure can facilitate the effective communication, dissemination and processing of information and knowledge across all the sectors.
- Structural transformation of the economy from low to high value added products and services: The transformation does not merely mean transformation of education and health systems. For economic transformation

to materialise there needs to be a dramatic shift from low value added, low technology intensive activities to high value added and high knowledge intensive products and services. It is the use of knowledge capital that transforms the economic structure by allowing for innovation of products, services and processes to take place.

(ii) The knowledge economy will require an increase in the quantity and quality of the pool of knowledge available for economic production in any country. A successful transition to the knowledge economy often includes four elements: long-term investments in education, the development of innovation capability, the modernisation of the information infrastructure and the creation of a favourable economic environment. The World Bank has set these elements as the four pillars of the knowledge economy within the Knowledge Economy Framework. These pillars are:

- An economic and institutional regime: Economic incentives need to be created for the efficient use of existing and new knowledge and the flourishing of entrepreneurship;
- Education: An educated and skilled population is necessary to create, share, and use knowledge well;
- Innovation: An efficient innovation system of firms, research centres, universities, consultants and other organisations is crucial to tap into the growing stock of global knowledge, assimilate and adapt it to local needs, and create new technology;
- Information and communication technology: ICT facilitates the effective creation, dissemination, and processing of information.

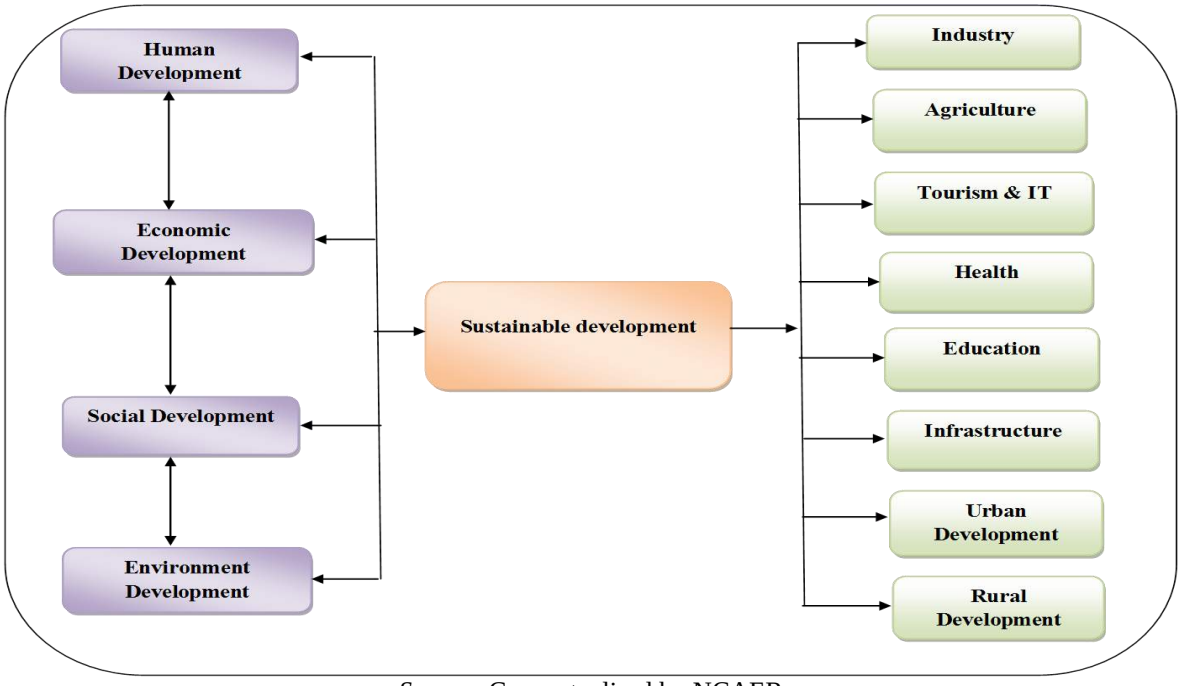
(iii) The World Bank Institute has developed a Knowledge Assessment Methodology (KAM) to measure the transition to the knowledge-based economy. The KAM is designed to assess a country's preparedness to compete in the knowledge economy using 148 structural and qualitative variables (see, Appendix A2.3). The Knowledge Economy Framework postulates that the amount of knowledge and how it is used are key determinants of total factor productivity (TFP). Strengthening the four pillars of knowledge will increase knowledge intensity of production of goods and services and will in turn increase productivity and, thus, economic growth.

(iv) Knowledge economy with heavy emphasis on human skills and intellectual capabilities, however, can also have negative externalities in terms of its impact on inter-personal, inter-regional and social inequities, gender insensitivity, and availability of opportunities. Further, in the process of transformation of the economy, natural capital may also be adversely affected and urbanisation related issues such as congestion, pollution, and depletion of natural resources start emerging. These externalities deplete social and natural capital and may slow down the process of economic growth in the long run. There can be some difficult trade-offs between quantity and quality. Managing this qualitative aspect becomes essential for achieving sustainable improvements in welfare. Integrating them is technically and politically complex. It requires mutually supportive approaches whenever possible, and making trade-offs where necessary. The pursuit of sustainable development thus requires improving the coherence and complementarity of policies across wide ranging sectors.

b) Sustainable development:

(i) Sustainable development is defined as a process of growth in which the capital investments, the orientation of knowledge creation and technological development; and institutional changes are all directed towards enhancing physical, natural, human and social capital to ensure development. Acceleration in physical investment is only a necessary and not a sufficient condition for sustainable growth. It needs to be matched by commensurate growth in human, social and natural capital as well. All policies would be judged by how they contribute to the four pillars of sustainable development: economic, human, social and environmental. This means that sustainable development will become the central objective of all sectors and policies (Figure 2.1).

Figure 2.1: The Sustainable Development Framework



Source: Conceptualised by NCAER

(ii) Historically, developed countries sequenced the economic, social and environmental goals in three stages:

- Second half of the 19th century to beginning of the 20th century: Industrial revolution with "rapid" economic growth;
- Beginning of the 20th century to 1970: Set up of the welfare state;
- 1970 to till today: Increasing attention to environmental problems.

(iii)With better management of resources and emerging technologies, however, mutually supportive approaches are becoming increasingly feasible. Managing this qualitative aspect will be central for achieving sustainable improvements in the economy's performance. In other words, the new development strategy will integrate the principles of social justice and environmental protection such that the human, social and environment capital complement physical capital to push the economy to the virtuous circle of **knowledge-driven sustainable development** process. Economic,

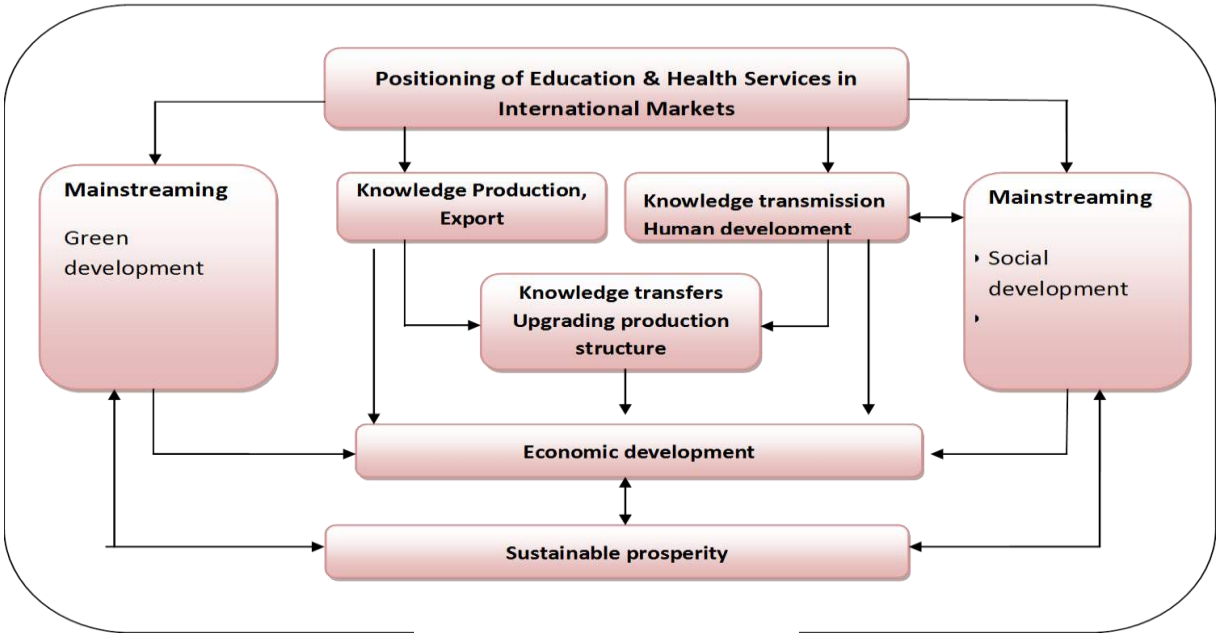
social, human and environmental aspects will be recast such that various aspects of development interact dynamically to reinforce each other

(iv) There are thus four pillars of the "New development strategy" proposed for Kerala:

- Building human capacity to meet the demands of a knowledge society through knowledge creation and dissemination;
- Creating conducive business environment for utilising knowledge;
- Social development dimensions;
- Mainstreaming environment considerations in the growth process.

(v) The strategic elements of this new development strategy for Kerala are illustrated in Figure 2.2.

Figure 2.2: The strategic elements of development framework



Source: Conceptualised by NCAER

2.4.2 Key directions of the new development strategy

2.4.2.1 *Upgrade the quality of education and health to international standards*

a) Constructing a knowledge-driven economy requires new skills, new ideas and a heightened level of creativity from a highly-trained, flexible and adaptable workforce. This requires massive push not only to education, Research and Development (R&D) and ICT, but also health services in the economy. In new strategic framework, education, health and ICT sectors will be placed at the core of the Kerala economy through to 2030. Some specialised services, such as R&D will be directly covered under these sectors. Kerala already has a comparative advantage in education and health sectors given its history as discussed in the previous chapter. But in the current set up both education and health are viewed as non-tradable low value-adding social

sectors essentially based on public spending. Hence the focus has been only on the quantitative aspect of health and education attainment. Their quality is not at all comparable with the advanced countries.

b) The new development strategy for Kerala proposed here emphasises that Kerala upgrades education and health services to international levels, bundles them into product and service offerings, and positions itself in the Indian and global markets of these services[4]. Essentially, this means that the state will strive to build a global reputation in the production, consumption and export of knowledge. The quality of services offered in these sectors will be enhanced by developing strong regulatory and efficient international accreditation mechanisms. The set of performance indicators suggested in the knowledge economy framework (above) will be employed to measure its ability to generate, adopt and diffuse knowledge. It may be augmented to incorporate health indicators as well to indicate the overall potential for knowledge development in the state.

c) Importantly, long-term investments in the proposed sectors will not only build human capacities for knowledge creation and dissemination but will also stimulate growth by encouraging productive capacities in other knowledge intensive sectors.

2.4.2.2 Promote service trade in education and health

a) Following WTO, there is increasing recognition of the potential of these sectors as drivers of growth through trade and investment. These services are increasingly internationalised the world over. According to an estimate for 2013, the market size for medical tourism is US $24−40 billion, based on approximately eight million cross-border patients worldwide spending an average of USD 3,000-5,000 per visit, including all medically-related costs, cross-border and local transport, inpatient stay and accommodations[5]. There has been phenomenal growth in the global education markets as well. In 2008, about 3 million students were studying in countries other than their own[6]. The fast growth in this number can be attributed to several factors: high rates of return to students for investment in foreign education; global competition for skilled labour; the emergence of wealthy middle and upper classes in some of the dynamic, high-growth developing countries like China, South Africa, and India, who are able to pay high fees and to incur travel and living costs abroad; and lastly, but not of least importance, low educational quality in their home countries.

b) A major push to the education, health and ICT sectors as part of the new strategy can be leveraged to harness the trade opportunities created by the process of globalisation and ICT explosion. Service exports, both inter-state and international will receive a major push from all the four modes of trade generating income and investment in the state:

---

[4] Development of the new model will upgrade the quality of education and health being provided to people living in Kerala. For example, domestic students by staying in Kerala will get exposure to best of minds from around the world. Further development of knowledge inside the state may help in coming up with innovative solutions for both the emerging problems and future challenges. Therefore, the new model is not exclusive but expansionary.

[5] http://www.patientsbeyondborders.com/medical-tourism-statistics-facts

[6] B.G. Tilak. 2011. Trade in Higher Education: The role of General Agreement on Trade in Services. UNESCO International Institute for Education Planning, Paris.

- One, cross border (state and India) export of services through ICT resulting into income from knowledge and business processing in health and education related sectors;
- Two, export of services through consumption of these services by non Keralite and foreign nationals in Kerala generating income stream from education and health tourism;
- Three, commercial presence of outside-the-state service providers bringing investment in the state;
- Four, movement of natural persons resulting into income from remittances generated by the temporary and permanent emigrants in the areas of education and health care.

2.4.2.3 Create key knowledge infrastructure: Develop knowledge nodes as key structuring elements of the strategy

a) Setting up of global cities of education and health care will be used as the building blocks to transform the economy into a knowledge-based economy. As producer and exporter of knowledge the state will implement knowledge architecture as well as an epistemic landscape by creating universities, research institutes and centres of applied research and development to provide access to high-quality education and training for both international and domestic students, and attract foreign investment in different branches of knowledge. Tacit knowledge will be imported through immigration of foreign talent and overseas training schemes. The state will lower barriers to knowledge flows (with the help of the central government support), build an ICT backbone, increase knowledge assets, close knowledge gaps and develop a legal infrastructure that allows and encourages creative and diverse knowledge production. Key action plans will be as follows.

(i) Promote 5 global cities within the state over the period of next 20 years: These global knowledge and medical hubs will attract both domestic and foreign reputed service providers and universities to start campuses, research organisation and start up firms. These hubs may be benchmarked against some of the well known education cities in UAE, Singapore, Hong Kong, Malaysia, Qatar, Bahrain, and South Korea; and medical hubs of Thailand, the Gulf region and Korea. The chapters on education and health (3 and 4) will discuss in detail. . These will be knowledge hubs (not merely clusters)7 with universities and colleges, research institutions, think tanks, government research agencies and knowledge-intensive firms in specified areas of knowledge. The knowledge-intensive firms will be characterised by high connectedness, high internal & external networking and knowledge sharing capabilities.

Knowledge hubs fulfil five major functions: (i) to generate knowledge and create skilled labour force; (ii) to attract young population from other Indian states and countries in particular developing countries; (iii) to train skilled labour force ready to exploit job markets in other countries; (iv) to transfer knowledge to sites of application; and (v) to transmit knowledge to other people through education

7 A cluster is characterised by geographic proximity of firms, and research and academic institutions. The hub is a cluster along with with networking and knowledge sharing capabilities of the institutions.

and training. These cities will be leaders in knowledge dissemination and creation in the State and will attract students and experts not only from the state but also from outside the state and other countries. Their locations will be in Kozhikode (education), Thrissur (education), Thiruvanthapuram (education), Pallakad (technical education) and Malappuram (health). The rationale of these locations and further details are provided in respective chapters (3 and 4).

(ii) Promoting specialised knowledge clusters in each district: Each district will have a small hub in specialised knowledge and will be connected with the proposed global cities. The knowledge clusters will be based on the specialised knowledge that is the competitive strength of that area. For instance, Ernakulam is the industrial and business centre and can be a hub of business studies and industrial R&D. Similarly, Alappuzha is known for its Ayurvedic centres; Idukki has a Veterinary and Animal Sciences University; and the Western Ghats are rich in bio diversity and plantation crops. Further, there are seven District Institutes of Education and Training (DIETs). The best performing DIETs may be identified and promoted as centres of excellence in teachers' training. Similar exercise will be done to identify the best institutions in other education branches. The objective will be to promote the host districts as centres of excellence in the respective branch of knowledge.

(iii) Develop world class urban centres around the knowledge infrastructure: Historically, educational institutions and hospitals are recognised as key infrastructure in the social and economic life of the city in Kerala. Following this Kerala tradition, government will promote smart urbanisation surrounding its global cities and district hubs. Education and health facilities can make a major contribution to urban sustainability by virtue of their location, their interrelationships, and their coordination with business investment, knowledge exchange, cultural diversity and political engagement. Further, the development of urban centres around the knowledge infrastructure would have design qualities and infrastructure associated with world class cities. The strategic placement and development of universities, hospitals and associated facilities can focus on urban development in a way that mitigates climate change pressures and underpins the social and economic sustainability of the developing urbanisation (Urbanisation strategy has been discussed in detail in Chapter 13).

2.4.2.4 Promote knowledge creation and diffusion

a) The proposed transformation of the economy requires sound economic policies and institutions to encourage efficient mobilization and allocation of resources, stimulate creativity and incentives for the efficient creation of existing knowledge.

(i) Introduce paradigm shift in higher education services: Traditionally, higher education is a process of imparting knowledge through lectures. This makes universities knowledge disseminating centres and not knowledge creating centres. In order for an economic entity to survive in the increasingly competitive knowledge economy, it must continually create knowledge. Universities cannot be an exception. They need to be production centres of ideas and intellectual property and not passive learning. For the strategy to be successful, students should be developed as future professionals. The prevailing "Instruction Paradigm" should

be supplanted by a new "Learning Paradigm." In the Instruction Paradigm, the mission of the university is to instruct students; in the Learning Paradigm, its mission is to produce learning in students (Chapter 3 for more discussion and action plan).

(ii) Ensure quality hospitals and facilities: The focus will be on providing quality hospitals and medical facilities with a focus on patient oriented research and satisfaction not only in the health city but also across the state to ensure high health standards which may be key element in promoting knowledge economy (Chapter 4). Medical facilities means the totality of the physical environment; the processes and practices of providing care; the diagnostic, treatment, and other technologies used; the adequacy, expertise, and morale of the staff; and the organisational culture. The health department will need to define specifications for a detailed yardstick for assessing a health care organisation's claim of providing quality and satisfactory health care, as well as a strategic framework for those aspiring to achieve this level of excellence. These will be strictly adhered to through strict legal enforcements[8]. International accreditations alone will not suffice.

(iii)Innovations and R&D: The knowledge-based economy places great emphasis on the creation, dissemination and diffusion of information and knowledge[9]. Intense global competition demands constant innovation. Kerala will be strongly committed to the strengthening of research and development through increased national, international, and private sector investments with emphasis on leading competencies in agriculture, industry, transport and services. Universities, research institutes and private enterprises all have an essential role to play in promoting research that supports efforts to ensure that economic and social growth and environmental protection reinforce each other. Kerala will strengthen its base in Science and Technology (S&T) and R&D and become a competitive knowledge-based economy using an integrated approach of infusing greater awareness and fostering greater appreciation for science and the teaching of science in schools and higher education; increasing S&T and R&D manpower; improving related infrastructure; strengthening existing mechanisms for supporting R&D and technology development; and diffusing and enhancing S&T management. The promotion of outcome oriented R&D and commercially viable innovations will help Kerala economy improve efficiency and competitiveness,

---

[8] Kizer., K.W(2010).. "What Is a World-Class Medical Facility?" *American Journal of Medical Quality*. Online. First, published on February 9, 2010.

[9] Focus on S&T does not mean that social sciences or humanities will be ignored. Rather innovative skills of S&T students will be enhanced by taking classes from other disciplines. A great example is of Steve Jobs, founder of Apple computers. "Steve Jobs, who was neither a computer programmer nor a hardware engineer, famously told graduates of Stanford University in 2005 that one of the most influential and lasting experiences in his brief tenure at Reed College was his dabbling in calligraphy. "It was beautiful, historical, artistically subtle in a way that science can't capture, and I found it fascinating," Jobs said. "None of this had even a hope of any practical application in my life." Ten years later, his knowledge of serif and sans serif typefaces came rushing back to him as he designed the first Mac. If he had never dropped in on that calligraphy class, Jobs said, "personal computers might not have the wonderful typography that they do. Knowledge of history, literature, music, philosophy teaches students to be creative, critical thinkers gives them a broad base of historical knowledge to rely upon when solving problems and equips them with the tools to continue assimilating new knowledge throughout the courses of their lives."
Gentile, S.N.(. 2011), ". Is a liberal arts degree worth it?"., October 27.Can be assessed on www.pbs.org

move up the value chain and compete effectively in the same product space as advanced economies. Accelerate product and process innovations not only through own research and development but also by participating in global research and development networks. The state has already introduced a range of initiatives in establishing a R&D infrastructure and schemes. Its priority going forward needs to increase the quality of research and development, rather than just quantity. Initiate schemes to financially support highly innovative start-up ventures (R&D strategy has been discussed in Chapter 18).

(iv) Promotion of ICT: The last twenty years have seen an explosion in the application of computing and communication technologies in all areas of business and community life. The central feature of the ICT revolution is its ability to store and transmit large quantities of information at very low cost and its ability to reduce asymmetries in information. An equally important feature of these technologies is their pervasiveness. Information technology is generic. It impacts on every element of the economy, on both goods and services; and on every element of the value chain, from research and development to production, marketing and distribution. The State will take initiatives to promote the use and development of ICT in the state (Chapter 12).

2.4.2.5 Increase knowledge intensity of economic activity across all sectors

a) Another key element of the strategy will be to create a framework for policies to support the use of knowledge or science and technology as a factor playing a leading role in the process of growth of all the sectors. Increasing knowledge intensity involves both, the increasing knowledge intensity of all economic activities, and the growing importance of knowledge intensive goods and services in the economy. The strategy of focusing on knowledge intensive production will call for:

- Developing hi-tech industries (both in the industry and service sectors) vigorously,
- Increasing knowledge content of all activities (including in the primary & traditional industries and service sectors).

b) This means that the strategy will be to move each sector up from low value added activity to high value added activity by identifying the scope and areas. The focus should be on knowledge, technology and intangible assets. The shift of the economy towards high value adding sectors and activities will be instrumental in raising productivity within the economy which will generate higher wages and have poverty reducing effects (Chapters 5 to 11 for the sectoral strategic frameworks). Two key policy elements will be as follows.

(i) Regional innovations systems: As production become more science-based, advantages such as, developed research infrastructure, a highly qualified workforce and an innovative culture become more important than natural resources. This means that a supportive environment for innovative companies will need to be created. This calls for promotion of regional innovative clusters. Regional authorities will identify their present industrial strengths and develop a strategy to develop regional innovation networks for promoting clusters. Regional networks comprise of many innovative firms cooperating and

interacting not only with other firms such as suppliers, clients and competitors, but also with research and technology resource organisations, innovation support agencies, venture capital funds, private and public consultancy firms and local & regional government bodies. Knowledge hubs will offer the platform of promoting regional innovation systems, knowledge intensive productive capacities and high value added tourism in these services.

(ii) Organisational innovation: A critical element of this strategy is organisational transformation in all the sectors. Entrepreneurial approach will be promoted to organise, create and manage a venture to achieve economic and social change. An entrepreneurial approach means identifying opportunities to transform challenges into opportunities through creativity, innovation and market understanding via the effective management of risk to optimise outcomes for the economy. Establishment and promotion of entrepreneurial approaches will be promoted not only within industry but also for the strengthening of primary, tertiary and social sectors' competitiveness and innovation. Following the current global patterns, for instance, there has already been a move to corporatise cooperative societies in the form of "Producers companies" (see, Chapter 5). In future, the government will have to bring all semi-skilled services within the folds of the "Producer Companies". Corporatisation does not mean privatisation. It means change in the organisational form with emphasis on efficiency and competitiveness.

(iii) Introduction of new courses: From a broader developmental point of view, Kerala has reached a stage, where the labour force is ready to move into more skilled, technologically superior, and high value-adding occupations with better wages and conditions of employment. New types of jobs will be created. Further, increasing knowledge content will change the social status of all those occupations that are not acceptable to young educated work force. In the knowledge economy they will attract the young generation to them. Plumbing for instance, is regarded as a semi-skilled low status service. However, of late it has been recognised that the value addition done by this service can increase manifold through increased training and knowledge content. Thus newer branches of knowledge need to be identified and promoted with rigorous courses and training. Education needs to be imparted to train the students as professionals and not merely degree holders.

2.4.2.6 Promote private investment and entrepreneurship

a) The private sector will continue to be the engine of growth in a knowledge-based economy. Government will promote investment, in particular in the private sector, for the acceleration of productive sector. This is an essential condition for building productive capacities. This will in turn require enabling conditions and focused approach to promote start-up and small businesses. Chapter 19 is devoted to the strategic directions to promote entrepreneurship. Chapter 9 also discusses the contribution of small businesses to growth.

(i) **Enabling business conditions:** For promoting private investment, the policy makers need to examine whether the domestic economic, legal and regulatory

regime create an appropriate environment to attract private investment. For this, five interlinked and mutually reinforcing factors need to be in place:

- Providing incentives for entrepreneurship and investment;
- Ensuring policy stability to reduce risk and vulnerability;
- Stable political, legal and economic institutions creating an environment where different actors involved in production work in harmony;
- Providing good physical and social infrastructure; and
- Transparent rules and regulations and simple governance.

(ii) **Promotion of small businesses and start ups:** In an entrepreneurial economy new and small enterprises are critical components. Kerala will need to be benefitted from building vibrant entrepreneurship environments and promote micro, small and start-up businesses by young entrepreneurs. In order to marshal the private sector to respond with urgency, the government will create greater awareness of the opportunities that will be generated through better dissemination of information. Government will provide the conditions and enabling infrastructures for these changes through appropriate a well-designed set-aside policy for this segment of the business. Incentive structure will be redesigned to target innovative activities.

b) To succeed and stay ahead, the private sector will have to adopt best practices and benchmark themselves at a higher level than the best firms in their respective industries (Details are provided in the sectoral chapters).

2.4.2.7 Infrastructure

Good quality infrastructure is a key ingredient for sustainable development. Kerala will need efficient transport, water and sanitation, energy, and urban (and rural) development if it is to prosper, attract private investment, and provide a decent standard of living for their populations (see, Chapters 13 to 16 for detailed strategies on various aspects of infrastructure). Weaknesses in this area can limit growth and drive economic activities. Kerala will also upgrade its ICT infrastructure (Chapter 12 for ICT strategy) to be world-class so that it can support the rapid flow and accessibility of information within the country and across countries at competitive prices. A longer term perspective will be taken in the planning and implementation of this facility to ensure that such communications and multimedia infrastructure is state-of-the-art and will be able to keep pace with the rapid advances expected in ICT. Strategic directions for creating good infrastructure have been provided in the respective chapters.

2.4.2.8 Social inclusion and justice

a) Increasing evidence shows that social cohesion and development are critical for societies to prosper economically and for development to be sustainable. According to these studies, social capital contributes to efficiency and growth by facilitating collaboration between individual conflicting interests towards the achievement of increased output and equitable distribution. In general, there are many technical and political difficulties in integrating social and economic objectives of sustainable growth and in adequately addressing the intergenerational dimension of sustainable development. But, it is expected that the knowledge-driven strategy will minimise the

social and political costs of growth and will be in agreement with the socio-historical-political contexts of the state. It will reinforce social capital by enriching the intellectual diversity and the overall learning environment within the state. The presence of students from various regions and countries broadens the international perspective of local students and faculty, and the knowledge of other countries' cultures, and people, which are crucial for building trust and social networks. This will also increase diversity, increase individual choice in education, break monopolies, increase competition, and even mentor local institutions, all of which will result in overall improvement in the quality and efficiency of education in the country. Faculty and student exchange programmes and movements across borders will improve the quality of higher education institutions. Further, when trained teachers and skilled personnel move to other countries for employment, remittances will flow in. These remittances will be more stable than the remittances based on the movement of unskilled workers.

b) However, there may be negative spillovers and rising inequities due to excessive emphasis on skills and human tacit capabilities. Evidence suggests that the potential costs of increased inequalities can be very high and manifest themselves in social and political tensions, riots, and the inability of societies to mobilize all available productive resources. Apart from the ethical questions involved, economic and social inequities can dampen economic growth by reducing efficiency in the use of human and physical capital. Further, knowledge driven strategy may not automatically ensure social inclusiveness. Tracing the history of state-society relations in Kerala, one finds that the state has achieved high human development by creating the conditions that enabled subordinate social groups to organise within their collective interest. Despite the historical factors, Kerala has been hostile to investment, entrepreneurship and maintenance of infrastructure, which has made it difficult for the state to transfer its healthy and well-educated human capital to greater economic prosperity. The government will therefore ensure that the objectives of social development are integrated within the growth strategy (see, Chapters 22 and 23 for detailed strategic directions). We propose two pronged strategic actions

   (i) Targeted action: Targeted policies as well as action focused on particularly vulnerable or marginalised groups are required. The state will provide them equal access to opportunities for prosperity across regions and ensure employment, social mobility, access to sanitation facilities, access to health care facilities, access to improved drinking water, a caring and integrated system of social services that address development related social stress, and comprehensive social security systems.

   (ii) **Mainstreaming social dimensions:** A new understanding is emerging that to address the issues of social justice and inclusion successfully, all development policies **should** have social dimensions. This is known as mainstreaming social inclusion. More specifically, mainstreaming social inclusion is a process which policy-makers at all levels of government and administration incorporate into the design, implementation and evaluation of all public policies. It is promoted through the participation of public bodies, social partners, NGOs and other relevant actors. Thus every sectoral plan strategy proposed in this document has "social dimension" as its integral element.

2.4.2.9 Mainstreaming Environment

a) The vision is to achieve economic prosperity which is characterised by eco-efficiency and ecosystem resilience for the benefit of future generations**.** Eco-efficiency means achieving economic efficiency with ecological efficiency in terms of the use of resources and generation of pollution. This has direct implication for ecosystem resilience which can be defined as the capacity of an ecosystem to tolerate disturbance without destabilising the environmental conditions and to adapt when necessary. The strategy of promoting a knowledge-based economy is expected to minimize the effects on environment. However, environment challenges are inevitable even in the case of knowledge driven growth. It will indeed accelerate land and construction activities on the one hand and demand for other non-renewable resources on the other. The environmental impact can be minimised using a well framed policy which will further reinforce growth. Mainstreaming environment means that environment policies will be integrated into economic and sectoral policies to promote sustainable consumption and production patterns with an objective of reducing resource (input) use while generating greater returns from raw materials. Each sectoral strategy therefore has an action plan for addressing environment issues specific to that sector. In what follows we briefly summarise the major recommendations. Detailed strategic directions are provided in each chapter with an overview in Chapter 21).

(i) Clean production systems: Mainstreaming of environment into economic growth will result into a shift in the economy to clean technology paradigm to ensure sustainability of growth. Clean production is a strategy that protects environment by reducing waste at source and reducing the use of raw materials as a more sustainable practice for the limited natural resources. For production processes, cleaner production includes

- conserving raw materials and energy and eliminating toxic raw materials;
- reducing the quantity and toxicity of all emissions and wastes before they leave a process;
- recycling of waste to recover the useful materials and/ or convert it into reusable products.

For services, it incorporates environmental concerns in designing and delivering services. In agriculture, this means adoption of "integrated farming systems" (Chapter 5). The concept of a shift to cleaner production is thus a way forward to achieve sustainable development.

(ii) Encourage the use of green technologies: Encourage the use of environment friendly technologies to promote low-pollution, energy- and resource-efficient production methods that would lead to greener development. Accelerating the development of green infrastructure and strengthening institutions are crucial for this. Reliable, relevant, targeted and timely environmental information is an essential element in implementing environmental policy.

(iii)Expansion of green economy: The aim should be to encourage new investments in a range of environment related industries. Green economy is one where policies and innovations are directed to promote green investment, production and trade. A green economy can create new opportunities for investment, employment and

trade in industries that produce goods and services in green sectors such as manufacturing of equipment and machines, and those that rely on renewable resources (such as recycling industries). Promote social and commercial enterprises to collect, sort, refurbish and recycle the waste. This will generate employment and combine social and economic objectives. The strategy should be to build international competitive advantage in a global sunrise industry.

(iv) Promotion of sustainable consumption patterns: Sustainable production must also be matched by sustainable consumption patterns. Sustainable consumption means "the use of services and related products, which are environment friendly, use fewer resources, generate less toxic elements, and bring better quality of life. The government will take necessary measures to set performance standards and labelling for consumption products. Some of the good practices adopted in developed countries have been: setting performance standards for products, mandatory energy efficiency rating labels, organic food labels, statutory warning on tobacco products, labelling on all pre-packaged foods in the form of a "nutrition facts panels, organic labelling, campaigns, advertising, and education at the school levels.

2.4.3 The upshot is that the government will emerge as a major contributor to the knowledge economy. This will mean an expanded role of the government. It should however withdraw from direct production of private goods and services and focus on the provision of public goods and services.

2.5 Implementing strategy

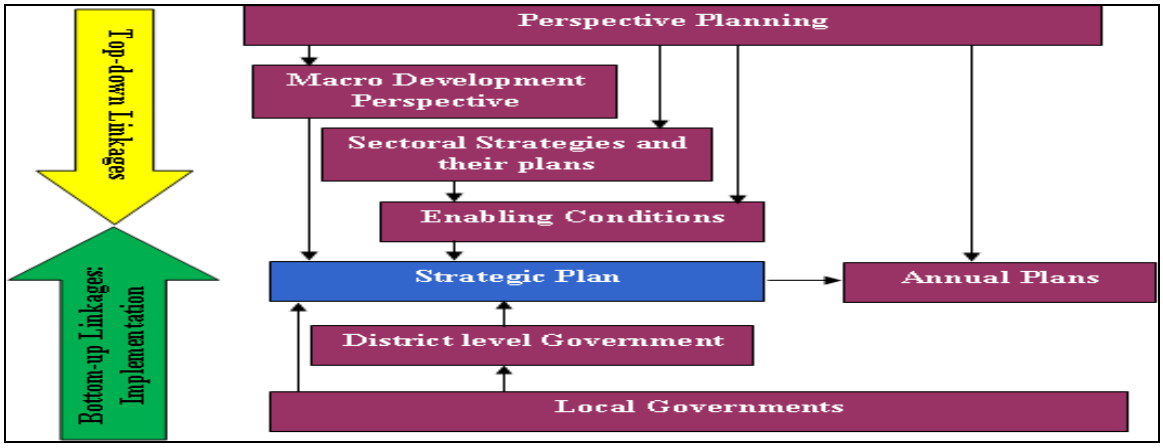
2.5.1 Sustainable development is a complex task. Its implementation requires a pluralistic approach that can deal with multiple actors and multiple levels, and that is able to help create a common vision on sustainable development and to resolve trade-offs. Its implantation strategy will thus be subject to *the adoption of key principles and Creation of enabling conditions.*

2.5.2 The key principles

a) Systems approach to planning: The new approach will be a departure from the original one. Too often, policies of each department are drawn independently of each other. Each state department has its own wide ranging policies and targets without enough co-ordination with others. As a result, actions undertaken in one policy area hinder progress in the other or do not facilitate it. A comprehensive, cross-sectoral approach is needed to address these challenges. The new strategy proposed here is based on the "systems approach to planning". This approach would require coordinated efforts of all the government departments, production systems, communities, NGOs and people to achieve certain goals. Under this approach, no part of the system can be considered in isolation. The "Systems Approach" is needed because of the complexity of the issues and opportunities facing the state. This will be a significant departure from the traditional policy framework where various strategic platforms are treated as separate domains with their own targets and strategic frameworks in isolation. In this system all the actors will have to coordinate their efforts with a smooth information flow across them.

b) Coordinated action taken at all levels of government: In general, there is a lack of effective co-ordination across the various levels of government. As a result, coherence is lacking between the key choices made at different levels of governments. An important principle of the Perspective Plan is "complementarity in policies at all levels of government". Implementation of this plan requires a bottom up approach with local governments playing a key role in grass-root planning and its implementation. Local governments will be assuming a greater share of financial responsibility for basic infrastructure and services.

Figure 2.3: Links to planning frameworks and other plans



Source: Conceptualised by NCAER

c) Participation by all: Implementation of this strategy requires the participation of the various players that have a direct or indirect influence on the economic development process. Achievement of these objectives depends not only on the government of Kerala, but also on the active involvement of other stakeholders.

2.5.3 Enabling conditions for the success of strategy

a) **Governance for sustainability:** Good governance is a prerequisite for sustainability. In general good governance is understood to consist of openness and participation, accountability, effective coherence, efficiency (proportionality) and regulated flexibility. For sustainability, it also needs to ensure integration of policy considerations, evaluation of options and dealing with trade-offs. It requires political will power and strong commitment. In this context, we propose a well specified set of action plans.

(i) Define the role of the government: The role of the government will be to propel the development of the knowledge-based economy. It will play both facilitative and interventionist roles. As facilitator Governance structures organise negotiation processes, determine objectives, influence motivations, set standards, perform allocation functions, monitor compliance, impose penalties, initiate and/or reduce conflict, and resolve disputes among actors. It will also provide the appropriate environment and more importantly act as a catalyst for the private sector to spearhead the development of the knowledge-based economy. On the other hand, it will have to be directly engaged in ensuring the continued achievement of social and distributional objectives, including the critical responsibility of implementing strategies to narrow the knowledge gap. It will be responsible for better implementation and coherent integration of all three considerations across sectoral policy domains.

(ii) Strengthen institutions: Under the new paradigm of qualitative growth, the essential factors of production are new ideas, transformational innovations, and state-of-the-art technology focusing on the development of knowledge intensive activities across all the sectors. Appropriate conditions should be created to facilitate shift to this growth paradigm. A more integrated and comprehensive approach will be taken in developing the institutional framework to create a conducive environment for the proliferation of knowledge activities and knowledge-driven economic prosperity. Since Kerala is a state, its manoeuvrability in adjusting institutions is limited. Yet, there is a substantial scope for it to strengthen its institutions. This can be achieved by redefining the role of government, reforming and restructuring state enterprises, developing the private sector, promoting competition, and deepening reforms in the land, labour, and financial markets. The government will need to withdraw from directly providing the tangible goods to focus on improving systems, rules, regulations and policies, which increase efficiency, promote competition, facilitate specialization, enhance the efficiency of resource allocation, protect the environment, and reduce risks and uncertainties. In the enterprise sector, the focus will need to be on reforms of state enterprises (including measures to recalibrate the role of public resources, and introduce modern corporate governance practices), and private sector development by changing the image of the state to an investor-friendly one with increased competition in all sectors.

(iii) ***Create a well defined administrative set up to implement the strategy:*** It is proposed to create a dedicated government agency to implement the Plan, This will be an inter-departmental inter-governmental "Coordinating Committee" led by the education and health Ministries with participation from

- Private sector and social organisations
- Central Ministries of Commerce and External Affairs

b) ***Address Factor Market Rigidities:*** Well-functioning factor markets are a crucial condition for the competitiveness and growth of the economy. These markets cannot function well without proper institutions because they are not, by their nature, perfectly competitive. However, regulations and institutions affecting land, labour and capital markets may cause rigidities in the factor markets, which may have adverse effects on the implementation of the development projects. In the labour market, for instance, Kerala needs to do away with certain past practices which are no longer relevant in the current realities being faced by the state to ensure that investment is attracted to the state and employment is generated for the vast unemployed labour force. It also needs to introduce reforms in social security instruments commensurate with new practices adopted internationally. Further, land markets need to be overhauled to increase efficiency of land use, and policies for acquisition of rural land for urban use must be thoroughly overhauled to facilitate investment and prevent urban sprawl. Finally, implementation of the Plan will require access to adequate levels of finance. This means that innovative ways to raise capital will need to be devised to enlarge resource base. Chapter 17 provides a detailed analysis and a strategic framework to address the issues of factor markets.

c) Engage Diaspora: Engage diaspora as development partners. The state will identify and engage diaspora organisations in development strategies, and set up databases where members of diasporas can register voluntarily, and promote the building of partnerships

and capacity building and the sharing of best practices at all levels. We have discussed the strategic framework to engage diaspora in Chapter 20.

d) ***Promote entrepreneurship:*** Kerala's economy will be an entrepreneurial economy which will depend on entrepreneurial initiative to address contemporary economic problems associated with structural change, economic growth and unemployment. Entrepreneurial and managerial skills must be sharpened to handle new challenges. In this economy, the encouragement of knowledge-based entrepreneurship should be a policy objective. Efforts will be made to develop a sufficient number of high quality technopreneurs to drive firms. In this economy, the private sector must be more willing to take risk and venture into new areas and opportunities that will be generated by the knowledge-based economy. They must identify niche areas in which they have potential and build their competency to world-class standards. The private sector including the SMEs, will have to redefine their production processes by applying appropriate and cost-efficient technology. They must also take a global view as markets will become virtual and borderless. Traditional modes of sourcing inputs and marketing products will have to be complemented by the greater use of e-trading and e-business tools. In addition, the private sector will need to create new value by developing capacity to undertake R&D, product development and innovation, as well as package, market and distribute their products efficiently and speedily (see, Chapter 19 for a detailed analysis).

2.6 Monitoring and evaluation

2.6.1 A critical success factor for any planning exercise is a robust monitoring and evaluation system. Towards this end, there is a need for a strong monitoring system to promote transparency and accountability and facilitate regular tracking of physical and financial performance of the plan implementation. This requires performance indicators with clearly defined targets, and institutional mechanisms in place.

a) ***Develop performance indicators supported by database:*** Inadequacy of a dedicated data base for the sector is a major drawback in Kerala, which adversely affects policy formulation and review. Its absence also hinders attempts at inter-sectoral comparisons with related departments. Currently, several agencies have been generating data bases which are poor in quality and lack consistency in over-time comparisons. It is proposed that the state will have a dedicated data agency under the Planning Board which will be accountable for all the information required for monitoring and evaluating the plan performance.

b) ***Evaluation and monitoring mechanism:*** Evaluation is the systematic collection and analysis of evidence on the outcomes of programs to make judgments about their relevance, performance and alternative ways to deliver them or to achieve the same results. It supports accountability of the government to Parliament and the public in general. It informs government about whether their programs are producing the outcomes that they were designed to produce, at an affordable cost; and supports policy and program improvements by helping to identify lessons learned and best practices.

2.6.2 It is proposed here that the government devises a well designed "Evaluation Policy". This will require the government to produce and table an Annual Performance Plan including forward projections for a further two years, consistent with the medium-term expenditure framework period, with annual and quarterly performance targets. It will

- Develop a framework of rules to conduct effective evaluation across state government departments and agencies;
- Identify a core set of indicators needed to monitor the performance of the Plan;
- Adopt a quarterly reporting system by public and private agencies;
- Ensure that there is alignment of reporting between the Strategic Plans, Annual Performance Plans, budget documents and annual and quarterly reports; and
- Adopt a system of penalties for non-accountability.

2.6.3 It is proposed that an autonomous body should be set up for implementation and evaluation of the Perspective Plan. This will ensure transparent, independent and effective evaluation.

2.7 Conclusion

2.7.1 The Kerala Perspective Plan 2030 envisions that Kerala will cross the threshold income levels of upper-middle-income countries by 2030 and will be on its way to achieve the economic standards of Nordic countries. It envisages that this prosperity will be driven by sustained growth in Kerala's knowledge economy with continuous growth in the stock of useful knowledge and the extension of its application. Further, knowledge and information will be well integrated into the production processes by well-educated skilled workers who are the main source of economic prosperity and wealth. The new strategic directions provided in this chapter ensure an internally coherent policy framework for the development plan, its implementation, and monitoring and evaluation. It must be observed that the sectoral growth targets set in the document will not bring about drastic change in the broad sectoral distribution of GDP over the period of 20 years (Appendix A2.2). Two major changes at the broad sectoral levels will be

- A sharp increase in the share of "Other Services" (which includes health and education services) by over 4 percentage point from 10 per cent to over 15 per cent. This reflects the re-orientation that the new development strategy proposed here will entail.
- An increase in the share of manufacturing by 2 percentage points from 8 to 10 per cent.

2.7.2 This is because the knowledge driven sustainable development strategy proposed here aims at achieving coordinated growth process across all sectors in which each sector of the economy is upgraded in terms of value addition and knowledge content. This growth process will thus have a tremendous implication for intra-sectoral transformation of the economy and will push the economy to a new knowledge paradigm.

2.7.3 They form the key pillars of the proposed development strategy for the next two decades. To some extent, Kerala has already begun to move in the direction of knowledge economy. A new policy direction for the next five years has been elaborated in Approach Paper to the State's 12th Five Year Plan and other policy documents. The Perspective Plan is the first step in a longer-term shift in Kerala's development strategy and will strengthen the state government's broader policy approach. Volume II and III will discuss the strategic directions in greater detail.

******

APPENDIX A2.1

International indicators of sustainable developments

A2.1.1 Global Competitiveness Index (GCI)

a) Since 2005, the World Economic Forum has based its competitiveness analysis on the Global Competitiveness Index (GCI), a comprehensive tool that measures the microeconomic and macroeconomic foundations of national competitiveness.

b) They define competitiveness as the set of institutions, policies, and factors that determine the level of productivity of a country. The level of productivity, in turn, sets the level of prosperity that can be earned by an economy. The productivity level also determines the rates of return obtained by investments in an economy, which in turn are the fundamental drivers of its growth rates. In other words, a more competitive economy is one that is likely to sustain growth.

c) The components of the GCI are grouped into 12 pillars of competitiveness (Figure A2.1). The rankings of Nordic countries and India are shown in Table A2.1.

Figure A2.1: Global Competitiveness Index

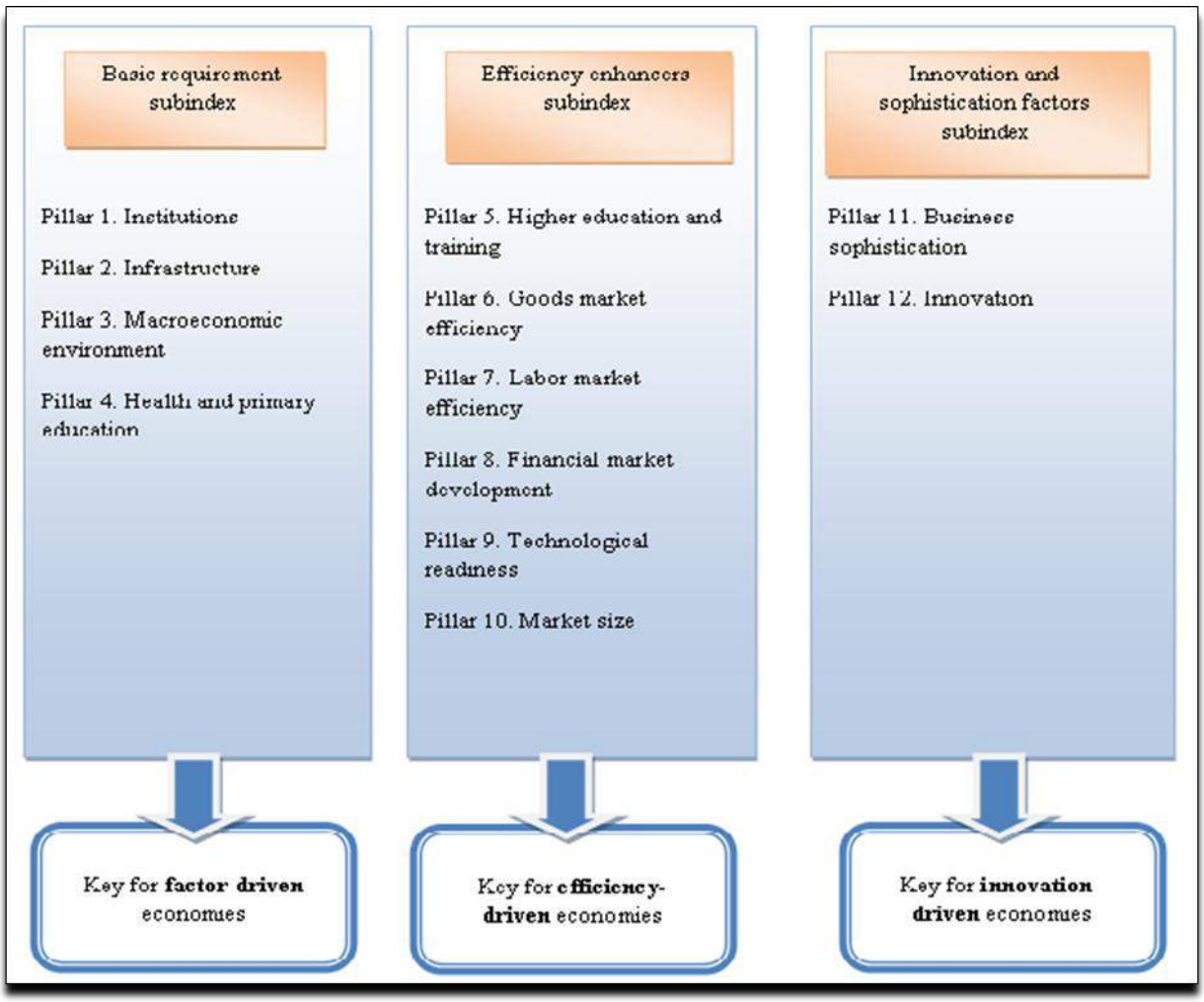


Table A2.1: The Global Competitiveness Index 2012–2013 Rankings

Countries	*Rank*	*Score*
Finland	3	5.55
Sweden	4	5.53
Denmark	12	5.29
Norway	15	5.27
Iceland	30	4.74
India	59	4.32

Source: The Global Competitiveness Report 2012–2013

A2.1.2 Knowledge Economy Index (KEI)

a) The KEI is based on a simple average of four sub-indices, which represent the four pillars of the knowledge economy:

- Incentive and Institutional Regime (EIR)
- Innovation and Technological Adoption
- Education and Training
- Information and Communications Technologies (ICT) Infrastructure

b) Among 146 countries, Sweden retains its first-place position as the world's most advanced knowledge economy, with a 2012 KEI of 9.43. Sweden is especially strong in innovation and ICT, ranking second for both pillars. In the education pillar, however, it falls to sixth place from third place in 2000 (Table A2.2). Sweden's competitiveness in the ICT pillar is largely attributable to an increase in Internet users. Sweden is also remarkably strong in all the innovation indicators: royalty payments and receipts, science and engineering (S&E) journal articles, and patents. Compared to 2000, Finland jumped six positions to second place in 2012 (KEI 9.33) because of improvements in the EIR, education, and ICT pillars. Its strongest performance was in innovation and EIR, for which it ranks in the top three. Denmark made impressive improvement in the EIR pillar, rising eight positions to third place between 2000 and 2012. However, its ICT pillar ranking dropped 10 places to 13, because of a relatively weak showing in telephone and computer penetration. Norway rose by two places in the KEI, which is attributable to its progress in the EIR pillar, up five positions from 2000; but its innovation and ICT pillar ranking of 17th is the weakest among the Nordic countries.

Table A2.2: Knowledge Economy Index 2012 Rankings

Countries	*Rank*	*Score*
Sweden	1	9.43
Finland	2	9.33
Denmark	3	9.16
Norway	5	9.11
Iceland	16	8.62
India	110	3.06

Source : KAM 2012 (www.worldbank.org/kam)

A2.1.3 Corruption Perceptions Index/ Transparency Index 2012

Corruption destroys lives and communities, and undermines countries and institutions. It generates popular movements that threaten to further destabilise societies and exacerbate violent conflicts. The Corruption Perceptions Index (TI) scores countries on a scale from 0 (highly corrupt) to 100 (very clean). While no country has a perfect score, two-thirds of 176 countries score below 50, indicating a serious corruption problem (Table A2.3). The TI results demonstrate that there are still many societies and governments that need to give a much higher priority to this issue.

Table A2.3: The Corruption Perceptions Index/ Transparency Index 2012

Countries	***Rank***	***Score***
Denmark	1	90
Finland	1	90
Sweden	4	88
Norway	7	85
Iceland	11	82
India	94	36

Source: Transparency International website
http://www.transparency.org/cpi2012/results

A2.1. 4 The Human Development Index

One of the oldest indices, first calculated in 1990, the Human Development Index (HDI), calculated by the United Nations Development Programme (UNDP), is a comparative measure of three dimensions – health, education and living standards.. Over the past decades, countries across the world have been converging towards higher levels of human development. The index covers 186 countries. Table A2.4 shows the top ranking of the Nordic countries. There are various forms of this index like the inequality adjusted HDI, Gender inequality index to capture other dimensions of the quality of life not captured by the standard HDI (discussed next). The 2013 Report identifies four specific areas of focus for sustaining development momentum: enhancing equity, including on the gender dimension; enabling greater voice and participation of citizens, including youth; confronting environmental pressures; and managing demographic change.

Table A2.4: Human Development Index 2012

Countries	***Score***	***Rank***
Norway	0.955	1
Sweden	0.916	7
Iceland	0.906	13
Denmark	0.901	15
Finland	0.892	21
India	0.554	136

Source: Human Development Report 2013, UNDP

A2.1.5 The Gender Inequality Index

The Gender Inequality Index (GII) is a new index for measurement of gender disparity that was introduced in the 2010 Human Development Report 20th anniversary edition by the UNDP. According to the UNDP, this index is a composite measure which captures the loss of achievement, within a country, due to gender inequality, and uses three dimensions to do so: reproductive health, empowerment, and labor market participation. Table A2.5 shows the top rankings of the Nordic countries.

Table A2.5: The Gender Inequality Index 2012

Countries	***Score***	***Rank***
Sweden	0.055	2
Denmark	0.057	3
Norway	0.065	5
Finland	0.075	6
Iceland	0.089	10
India	0.61	132

Source: Human Development Report 2013, UNDP

A2.1.6 The Environment Performance Index (EPI)

The 2012 EPI and Pilot Trend EPI build on a historical time series that for the first time allows countries to track environmental performance over the past decade. For each country and indicator, a proximity-to-target value is calculated based on the gap between a country's current results and the policy target. Nordic countries score at the top in this index (Table A2.6).

Table A2. 6: Environment Performance Index

Country	***EPI Rank***
Norway	3
Sweden	9
Iceland	13
Finland	19
Denmark	21
India	125

Source: http://epi.yale.edu/downloads, Accessed on 2nd June, 2013

A2.1.7 The Prosperity Index

The Prosperity Index is the only global measurement of national success based on both income and wellbeing. Their econometric analysis has identified 89 variables, which are spread across eight sub-indices. By measuring prosperity holistically they are able to identify and analyse the specific factors that contribute to the success of a country (Table A2.7).

Table A2.7: The Legatum Prosperity Index, 2012

Country	*Legatum Prosperity Index*
Norway	1
Denmark	2
Sweden	3
Finland	7
Iceland	15
India	101

Source: www.prosperity.com, Legatum Institute

A2.1.8 The Networked Readiness Index

a) The Networked Readiness Index, calculated by the World Economic Forum, and INSEAD, ranks 144 economies based on their capacity to exploit the opportunities offered by the digital age. This capacity is determined by the quality of the regulatory, business and innovation environments, the degree of preparedness, the actual usage of ICTs, as well as the societal and economic impacts of ICTs. The assessment is based on a broad range of indicators from Internet access and adult literacy to mobile phone subscriptions and the availability of venture capital. In addition, indicators such as patent applications and e-government services gauge the social and economic impact of digitisation.

b) The Nordic countries and the so-called Asian Tigers – Singapore; Taiwan (China); South Korea; and Hong Kong SAR – dominate this year's index thanks to their business-friendly approach, highly skilled populations and investments in infrastructure, among other strengths (Table A2.8).

Table A2.8: The Networked Readiness Index 2013

Countries	*Score*	*Rank*
Finland	5.98	1
Sweden	5.91	3
Norway	5.66	5
Denmark	5.58	8
Iceland	5.31	17
India	3.88	68

Source: The Global Information Technology Report 2013

APPENDIX A2.2

Economic growth in Kerala: The Perspective Plan scenario

A2.2.1 Perspective Plan is intended to design strategies which will enable Kerala to sustain its growth trajectory of 7−8 per cent per year over the period 2010−2030. The principal components of such plan are as follows:

A2.2.2 **First**, new growth drivers must be found in health, education and innovation. Consequently, the "other services" sector which is a "driven" sector must become a "driver" with the share of GDP in the sector growing to match that of the developed countries by 2040. This would translate into GDP in this sector growing at about 10 per cent per year. **Secondly**, goods producing sectors (agriculture, forestry, fisheries and manufacturing) cannot be allowed to languish and by measures elaborated in sector chapters, they must achieve decent growth rates. **Thirdly**, construction sector will be re-oriented towards infrastructure, in particular urban infrastructure and will maintain a rapid rate of growth even with decline in growth rate of remittances. **Fourthly**, migration and tourism sector will maintain robustness by going up in value chain and becoming more diversified geographically.

A2.2.3 Sector specific chapter will mention the specific measures that are required to be taken up in order to achieve high growth rates. However, our model building exercise helps in articulating the implications of the Perspective Plan strategy in terms of GDP growth, sectoral shares in GDP, employment level and its sectoral shares, investment requirements and their sectoral distribution.

A2.2.4 The model building exercise in this context first required assumptions regarding the growth rate of "drivers". In preferred/perspective plan scenario we expect all the drivers to grow at rapid rate (Table A2.9). Agriculture and allied sectors are expected to grow on an average of 2.6 per cent throughout the perspective plan period (2012−30). Similarly manufacturing and construction are expected to grow at an average growth of around 9 per cent during the same period. Furthermore, in this perspective plan, with sector specific measures, communication is expected to grow at around 7.5 percent, banking at 8.5 per cent, public administration at 6.5 percent during perspective plan period.

Table A2.9: Preferred Scenario Driver's Assumptions, 2012−2031 – CAGR (%) of GDP

Year	***2012−16***	***2017−21***	***2022−26***	***2027−31***
Agriculture, Forestry and Fishing	3.0	3.0	2.5	1.8
Mining & Quarrying	6.0	5.0	4.0	3.0
Manufacturing	8.0	10.0	9.5	8.5
Construction	8.0	10.0	9.5	8.5
Communication	9.0	8.0	7.0	6.0
Banking & Insurance	8.0	9.0	9.0	8.0
Public Administration	8.0	7.0	6.0	5.0
Other Services	11.0	11.0	9.0	9.0

Note: CAGR is the Compound Annual Growth rate
Source: NCAER

A2.2.5 It is to be noted, as provided in the mission of the perspective plan, health and education will be growth drivers for Kerala economy. "Other Services" (which includes health and education services), that were previously included in growth driven sectors are now included in growth drivers. Other services are expected to grow at around 10 per cenet throughout the perspective plan. This reflects the re-orientation that a switch to knowledge economy will entail.

A2.2.6 The revised regression with other services as drivers is as follows:

Growth driven = 0.93 **Growth drivers** R-squared = 0.76
[SE (.13), t Statistic = 7.0, P value = 0.00]

A2.2.7 The elasticity of GDP growth of driven on drivers has increased by 0.1 i.e. from 0.92 to 0.93.

A2.2.8 It means that one percent increase in growth of drivers leads to 0.93 percent of growth in driven sector. R square has increased to 0.76 per cent, which validates the new relationship between driven and drivers. These regression results are further used to make GDP projections for perspective plan scenario. Hence, the resultant GDP growth scenario in sectors and in total are presented in Tables A2.10 & A2.11 respectively.

Table A2.10: Sectoral shares – Perspective Plan Scenario, 2012−2031 (%)

Industry of Origin /Year	*2012*	*2016*	*2021*	*2026*	*2031*
Agriculture	7.43	5.84	4.25	3.18	2.44
Forestry & Logging	1.21	1.05	0.82	0.65	0.50
Fishing	0.91	0.78	0.61	0.47	0.35
Mining & Quarrying	0.47	0.44	0.37	0.30	0.24
Manufacturing	8.28	8.35	8.87	9.47	9.88
Construction	10.70	10.79	11.47	12.24	12.77
Communication	7.89	8.25	8.00	7.61	7.06
Banking & Insurance	7.22	7.28	7.39	7.71	7.86
Public Administration	4.48	4.52	4.18	3.79	3.36
Other Services	11.05	12.43	13.82	14.41	15.39
Electricity, Gas and Water supply	0.98	0.85	0.69	0.57	0.48
Railways	0.48	0.51	0.55	0.60	0.64
Transport by other means	7.69	7.70	7.70	7.71	7.71
Storage	0.05	0.05	0.05	0.05	0.05
Trade, Hotel & Restaurant	18.96	18.98	19.00	19.02	19.03

Industry of Origin /Year	*2012*	*2016*	*2021*	*2026*	*2031*
Real estate ownership, Business, legal	12.20	12.21	12.23	12.24	12.24

Source: NCAER

Table A2.11: CAGR of GDP in Perspective Plan Scenario, 2012−16 to 2027−2031 (%)

Year	2012−16	2017−21	2022−26	2027−31	2012−2030
Plan Wise Growth rate (Average)	7.6	8.5	7.9	7.4	7.8

Source: NCAER

A2.2.9 Some noteworthy observations regarding the sectoral changes during 2012−31 are to be emphasised:

a) **Firstly**, despite the proposed promotion of agricultural sector, the share of agriculture goes down from about 7.5 per cent in 2012 to about 2.4 per cent in 2031, which is close to what obtains in most developed countries. This has important implication about the pace of urbanisation in Kerala.

b) **Secondly,** with the benefit of promotional measures share of manufacturing increases from about 8 per cent in 2012 to 10 per cent in 2031. This will be close to the present day developed countries' shares. However the share of goods sector remains low. Kerala becomes a service economy more than ever.

c) **Thirdly**, the share of other services which include health & education increases from about 11 per cent in 2012 to 15 per cent in 2031**.**

d) **Fourthly**, the shares of trade, hotel & restaurants, as well as real estate etc remain large and stable at about 31per cent.Tourism perhaps combined with medical tourism remains an important source of income.

e) Overall, due to acceleration provided in each of the sectors, the aggregate GDP growth will increase from 7.6 per cent in next plan period to 8.5 per cent in 2017−21. On an average, GDP growth will revolve around 7.8 per cent in whole perspective plan period (2012−30).

APPENDIX A2.3

Indicators of a Knowledge Economy

Category	***Indicators***
OVERALL PERFORMANCE OF THE ECONOMY	Average Annual Gross Domestic Product (GDP) Growth, Gross Domestic Product (GDP) Per Capita Gross Domestic Product (GDP) Human Development Index (HDI), Multidimensional Poverty Index, Gender Inequality Index, Seats in Parliament Held by Women (as % of total), Composite Risk Rating.
THE ECONOMIC REGIME	Gross Capital Formation as % of GDP (Average), Trade as % of GDP, Tariff & Nontariff Barriers, Soundness of Banks, Exports of Goods and Services as % of GDP, Interest Rate Spread (lending rate minus deposit rate), Intensity of Local Competition, Domestic Credit to Private Sector (% of GDP), Cost to Register a Business (% of GNI per capita), Days Required to Start a Business, Cost to Enforce a Contract (% of debt).
GOVERNANCE	Regulatory Quality, Rule of Law, Government Effectiveness, Voice and Accountability, Political Stability, Control of Corruption, Press Freedom.
THE INNOVATION SYSTEM	FDI Outflows as % of GDP, FDI Inflows as % of GDP Royalty and License Fees Payments, Royalty and License Fees Payments Per Million population, Royalty and License Fees Receipts Royalty and License Fees Receipts Per Million Population, Royalty and License Fees Payments and Receipts Royalty and License Fees Payments and Receipts Per Million Population, Science and Engineering Enrollment Ratio, Researchers in R&D, Researchers in R&D Per Million Population, Total Expenditure for R&D as % of GDP, Manufacturing Trade as Percentage of GDP, University-Company Research Collaboration, Scientific and Technical Journal Articles, Scientific and Technical Journal Articles Per Million Population, Availability of Venture Capital. Patent Applications Granted by the United States Patent Trade Offic (USPTO), Patent Applications Granted by the USPTO Per Million People, High-Technology Exports as % of Manufactured Exports, Private Sector Spending on R&D, Firm-Level Technology Absorption,

Category	*Indicators*
	Value Chain Breadth, Capital Goods Gross Imports (% of GDP), Capital Goods Gross Exports (% of GDP), S&E articles with foreign co-authorship (%), Average number of citations per Science and Engineering (S&E) article, Intellectual Property Protection.
EDUCATION	Adult Literacy Rate (% age 15 and above), Average Years of Schooling, Average Years of Schooling, female Secondary Enrolment (% gross), Tertiary Enrolment (% gross), Life Expectancy at Birth, Internet Access in Schools, Public Spending on Education as % of GDP, 4th Grade Achievement in Mathematics, 4th Grade Achievement in Science, 8th Grade Achievement in Mathematics, 8th Grade Achievement in Science, Quality of Science and Math Education, Quality of Management Education, 15-year-olds' math literacy, . 15-year-olds'science literacy, School Enrolment, Secondary, Female (% gross), School Enrolment, Tertiary, Female (% gross), No Schooling, total, No Schooling, female, Secondary School completion, total (% of pop 15+), Secondary School completion, female (% of pop 15+), Tertiary School completion ,total (% of pop 15+), Tertiary School completion , female(% of pop 15+),
LABOUR	Unemployment Rate (% of total labour force), Unemployment Rate, male (% of male labour force), Unemployment Rate, female (% of female labour force), Employment in Industry (% of total employment), Employment in Services (% of total employment), Professional and Technical Workers as % of the Labour Force, Extent of Staff Training, Brain Drain, Cooperation in labour-employer relations, Flexibility of wage determination, Pay and productivity, Reliance on professional management, Local availability of specialized research and training services. Difficulty of hiring index, Rigidity of hours index, Difficulty of Redundancy index, Redundancy costs, Labour tax and contributions (%), Employment to population ratio, 15+, total (%), Employment to population ratio, 15+, male (%), Employment to population ratio, 15+, female (%), Employment to population ratio, ages 15−24, total (%), Employment to population ratio, ages 15−24, male (%),

Category	*Indicators*
	Employment to population ratio, ages 15−24, female (%), Employment to population ratio, Total, 25+ (%) Employment to population ratio, Male, 25+ (%) Employment to population ratio, Female, 25+ (%) Unemployment with tertiary education, total (% of total unemployment), Unemployment with secondary education, total (% of total unemployment), Labour force participation rate, 15+, Labour force participation rate, Male, 15+, Labour force participation rate, Female, 15+, Labour force participation rate,total, 15-24, Labour force participation rate, Male, 15-24, Labour force participation rate, Female, 15-24, Labour force participation rate, total 15-64, Labour force participation rate, Male, 15-64, Labour force participation rate, Female, 15-64, Labour force participation rate, total, 65+, Labour force participation rate, Male, 65+, Labour force participation rate, Female, 65+, Youth unemployment rate, total, Youth unemployment rate, Male, Youth unemployment rate, Female, Adult unemployment rate, total, Adult unemployment rate, Male, Adult unemployment rate, Female Share of youth unemployment in total unemployment, total, Share of youth unemployment in total unemployment, Male, Share of youth unemployment in total unemployment, Female, Long-term unemployment, total, 25+, Long-term unemployment, Male, 25+, Long-term unemployment, Female, 25+, Labour force with tertiary education (% of total), Labour force with secondary education (% of total), Firms offering formal training (% of firms) , Females in Labour Force (% of total labour force).
INFORMATION AND COMMUNICATION TECHNOLOGY	Telephones Per 1,000 People, Telephone Mainlines Per 1,000 People, Mobile Phones Per 1,000 People, Computers Per 1,000 Persons, TV Households with Television, Daily Newspapers Per 1,000 People, International Internet Bandwidth (bits per person), Internet Users Per 1,000 people, Fixed broadband internet access tariff (US$ per month), Availability of e-Government Services, Government Online Service Index, ICT Expenditure as % of GDP.

*****

CHAPTER 3

EDUCATION STRATEGY: LEARNING BEYOND SCHOOLING

The Perspective Plan proposes a shift from knowledge disseminating approach to knowledge creating approach. More specifically, this requires a shift from "instruction mode" to "learning mode. Kerala will be a key node to global knowledge network by 2030. It will be in the league of the top ranked countries in terms of efficiency, competitiveness, services and market delivery in education. It will be recognised for academic excellence and innovation. The KPP 2030 focuses on improving the educational quality at all levels.

3.1 The Setting

3.1.1. Knowledge-driven growth requires education systems that cultivate the highly skilled, flexible human capital needed to compete in global markets. The conventional approach to education for policy makers is driven by the view of social welfare. According to this view, education is directly linked to human well-being and social development. It facilitates individuals' access to productive employment and enables them to live a respectable life. By doing this, it contributes substantially to the welfare of a society. It eliminates inequities and poverty and fosters peace. Kerala—having made a mark globally for its better demographic, educational and health outcomes than most other states—is a vivid example of the social benefits that accrue to an educated society. Improvements in education have played an important role in creating a vibrant society in Kerala.

3.1.2 The concept of a knowledge economy, is based on the view that education is at the core of economic prosperity. Knowledge in this paradigm has superseded the physical factors as the fundamental sources of production. The education landscape in this economy is dominated by higher education, lifelong learning and scientific knowledge.

- **Higher education**: Three particular aspects of learning are – professional, vocational and workplace learning. These forms of learning are central to the transformation of the economy in a way that primary and secondary educations are not. According to Sundać and Krympotić (2011)[1], a unit increase in the share of tertiary enrollment would on average increase GDP per capita from 95.81 to 145.98 US$.
- **Lifelong learning:** There has been rapid proliferation of scientific and practical knowledge due to continuous production of new knowledge. This requires continuous upgrading of

[1] Sundać, D. and Krmpotić, I.F. 2011. Knowledge Economy Factors and the Development of Knowledge-based Economy. *Croatian Economic Survey*. 13(1). 105–141. April

knowledge. Knowledge-driven growth therefore requires education systems that ensure lifelong learning, particularly among existing workers.

- **Scientific knowledge**: Technological change and innovation drive the development of the knowledge-based economy through their effects on production methods, consumption patterns and the structure of economies. Scientific knowledge thus determines the economic competitiveness of a knowledge economy.

3.1.3 The Education Perspective Plan has been developed in this backdrop. Kerala's education has seen exceptional development over the years since the early 19th Century– moving from a system that was confined to social elite to one of widespread participation. The present education strategy is framed against a range of new challenges that the state is likely to face in the process of building a knowledge based economy. Higher education will need to be improved to enhance quality and relevance, and connect better with the wider needs of society and the economy, while operating in a more competitive globalised environment.

3.2 Education in Kerala: An Overview

3.2.1 A historical perspective

3.2.1.1 Kerala has been internationally acclaimed for its attainment of educational indicators. Its success in education is an outcome of a mix of historical, social and political factors. Historically, it was aided by,

- A progressive outlook of the government of the princely states;
- The presence of the Church and missionary institutions;
- Emergence of powerful social and religious reform movements; and
- Commercialisation of agriculture which increased incomes and hence demand for education.

3.2.1.2 Historical evidence[2] suggests that public support for collective welfare served as an important impetus for the introduction of a range of education and health care policies in the renaissance period of the late 19th century and early 20th century. The Travancore government's expenditures on education and health increased sharply[3]. The number of state educational institutions also increased steadily from the late 19th century onward. In contrast to the primarily elitist state initiatives of the 19th century, mass education and health programs were introduced

[2] Singh, P. 2011. We-ness and Welfare: A Longitudinal Analysis of Social Development in Kerala, India. *World Development.* 39 (2). 282–293.

[3] Ramachandran V.K. 1997. On Kerala's Development Achievements in J. Dreze and A. Sen eds *Indian Development: Selected regional perspectives*, New York : Oxford University Press.

beginning in the early 20th Century. In 1904 the government accepted in principle that the education of all children in the state, irrespective of caste, creed, or race, was its responsibility and declared that it would defray the entire cost of primary education in the state. In 1911, the restrictions on the admission of untouchable children to departmental schools were removed and through the 1920s–30s the princely states introduced a range of affirmative action policies for lower castes, such as fee concessions and scholarships. It is widely acknowledged that the state had progressed far in the field of education decades before the attainment of national independence. Social and political factors (including land reforms) in the post–1956 period reinforced these patterns.

3.2.2 Education: After formation of the state in 1956

3.2.2.1After the formation of the state in 1956, the successive governments continued to support education directly by spending heavily on creating and supporting infrastructure and indirectly by introducing reforms and encouraging private initiatives in this sector. By the 1980s, Kerala was spending more than six per cent of its GSDP on education[4], the only state to meet the norm recommended by the Education Commission (1964–65). Kerala's expenditure on education ranged from 30 per cent to 40 per cent of its total revenue receipts.

3.2.2.2 Social organisations such as Nair Service Society (NSS), SNDP Yogam, Christian denominations, and the Muslim Education Society also made notable contribution to the implementation of government policies in education by setting up a chain of educational institutions throughout the state at all levels. After the 1990s, the share of education in total government expenditure declined continuously due to fiscal crisis. However, the private sector continues to invest heavily in this sector, ensuring that this sector continues to expand.

Expansion in school education

3.2.2.3 It is a well-known fact that the government of India adopted an inverted education paradigm after independence where education expenditures were targeted toward secondary or higher education. In marked contrast to this, successive state governments in Kerala have focused their attention overwhelmingly on the provision of primary education. Several initiatives have been taken to continuously improve the educational attainment of the state's population, to reduce disparity across different socioeconomic groups, and to reorient the educational curriculum with changing needs of the time. In the 1980s, Kerala was among the first states to implement the Mid Day Meal programme with a view to enhance enrolment, retention, and attendance and also improve the nutritional status among the primary school children. Among

[4]The share of public investment in the education sector has been higher in Kerala than the national average and is remarkable by international standards also.

other major schemes, Sarva Shiksha Abhiyan and District Primary Education Programme have made a significant contribution to the spread of education.

3.2.2.4 Further, the equitable provisioning of services in the state played a major role in attainment of education. For instance, the Departments of Scheduled Caste Development and Scheduled Tribe Development have initiated various schemes for the children belonging to the Scheduled Castes and Scheduled Tribes. These departments

- run schools, hostels, and training centres;
- offer scholarships and grants to students at all levels of education and subsidies for travel, boarding and lodging, and on school uniforms; and
- make arrangements for assistance/training especially for failed students in these social classes.

3.2.2.5 These efforts are further supplemented by the Department of Social Welfare Department. It also runs a scheme – Integrated Education of Disabled Children (IEDC) – to take care of the needs of the children with disabilities and special needs. It has been in operation since 1974–75. In 1998, the scheme was merged with District Primary Education Programme.

3.2.2.6 On the demand side, factors such as improved physical accessibility to schools, redistributive policies, and remittance from abroad and public-private partnerships in education contributed significantly to the expansion in demand for school education in Kerala.

Expansion in higher education

3.2.2.7 In the initial years of state formation, school education monopolised the concerns of educationists and policymakers in the state. The great expansion in college education in Kerala began in the 1960s when in response to organised demands from various constituencies of the state, government began to build or sanction the establishment of colleges. Since the 1990s, higher education in Kerala has been subject to significant policy shifts. At least four sets of policy moves altered the higher education scenario in the state.

- **First,** the opening of the doors to self-financing colleges initiated full-fledged private participation in the sector. Previously private participation had been through private-aided colleges, which received public funds but were managed by private establishments mostly of the nature of voluntary or charitable trusts. In the year 2000, the government decided to "grant 'no objection certificates' to any private agency that approached it for permission to start an unaided professional college". This decision evidently evoked a huge response (Government of Kerala. 2006. State Human Development Report 2005. Thirvanthapuram.

Prepared by Centre for Development Studies. , p. 93)[5]. Privatisation of higher education has given a major thrust to professional and technical education in the state.

- **Second,** since 1998 the pre-degree courses have been delinked from Universities and are brought under higher secondary schools as 10+2 courses, a process that was completed in 2001. It narrowed the social base of arts and science colleges.
- **Third,** in 2007, the Kerala State Higher Education Council (KSHEC) was constituted to initiate reforms in higher education, which envisaged a radical overhauling of the existing structure and practices. The Committee, has proposed several reforms pertaining to infrastructure, connectivity, research, faculty recruitment and training, industry linkages, accreditation and autonomy. Initiatives have been introduced to reform post-graduate programmes, teachers' training and teaching methods, and to review university Acts.
- **Fourth,** several new institutions, including central universities, Indian Institutes of Management, Indian Institute of Science Education and Research(IISER), Indian Institute of Science & Technology (IIST) and Indian Institutes of Technology, are either planned or have been set up. Besides, allocations to universities have been substantially increased with the aim to raise the quality of education to global standards.

3.3 Achievements in Education

3.3.1 School education

Good school infrastructure

3.3.1.1 The State Development Report (2005) mentions that almost 100 per cent schools in the state are housed in *pucca*[6] buildings. Other facilities, namely, drinking water and sanitation too are adequate and relatively equally distributed across the regions. The availability of infrastructure in schools – both physical and human – is relatively better in Kerala, at least in quantitative terms. The latest report of District Information System for Education (DISE, 2010–11)[7] and Annual status of education report (ASER, 2012) confirm this observation[8].

[5] Government of Kerala 2006,"Population Projections for India and States 2001–2026, Report of the Technical Group on Population Projections Constituted By the National Commission on Population." Office of the Registrar General & Census Commissioner, India: New Delhi.

[6] The Census 2011 defines a pucca building in the following manner: "Pucca building may be treated as one which has its walls and roof made of the following materials : Wall material : Stones (duly packed with lime or cement mortar), G.I/metal/asbestos sheets, Burnt bricks, Cement bricks, Concrete, Roof material : Machine-made tiles, Cement tiles, Burnt bricks, Cement bricks, Stones, Slate, G.I./Metal/Asbestos sheets, Concrete.

[7] *Source*: District Information System for Education. 2012. *Flash Statistics 2011–12*. National University of Educational Planning and Administration (NUEPA), New Delhi

[8] ASER. 2013. *Annual Status of Education Report (Rural) 2012*. ASER Centre, New Delhi.

3.3.1.2 Table 3.1 shows education level-wise profile of number of teachers per school and pupil-teacher ratio in the state for 2007–08, besides providing a similar profile for India. On average there were 6, 15, and 34 teachers respectively for each primary, middle, and high school in the state. These numbers are much better than the national average. Kerala also performs better than All-India in terms of the number of pupils per teacher at all levels of school education (Table 3.1).

Table 3.1: Teachers per School and Pupil-Teacher Ratio, 2007–08

	Teachers per school		***Pupil-teacher ratio***	
Education level	***Kerala***	***India***	***Kerala***	***India***
Primary (I–V)	6.02	2.94	27.65	46.56
Middle (VI–VIII)	15.1	5.47	25.02	34.91
High School (IX–X)	33.76	10.32	23.71	32.67
Higher Secondary (XI–XII)	13.03	16.09	27.32	37.18

Source: Author's computations based on Government of India (2011[9])

High literacy

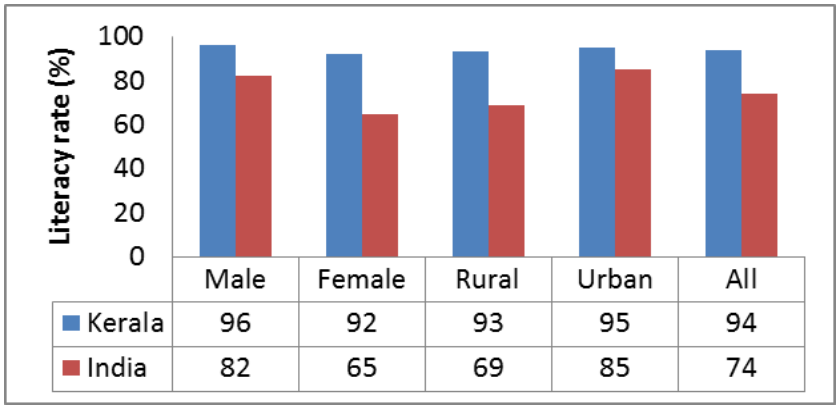
3.3.1.3 As regards literacy, the state has achieved spectacular success. Since pre-independence years, Kerala has a literacy rate much above the national level. In 1901, the literacy rate in Kerala stood at 11.14 per cent compared to 5.35 per cent in India[10]. The progress continued after independence, and since 1991, Kerala has been recognized as a totally literate state.

3.3.1.4 According to the 2011 Census, the literacy rate in the state is 94 per cent, which is 20 percentage points higher than the national average. As Figure 3.1 depicts the gap between the literacy rates of males and females and between rural and urban areas is only marginal.

[9] Government of India. 2011. *Selected Educational Statistics 2007–08*. Ministry of Human Resources Development: New Delhi.

[10] George, K.K., Zachariah, G. and N.A. Kumar. 2002. Grants in Aid Policies and Practices towards Secondary Education in Kerala. *Submitted to National Institute of Educational Planning and Administration*. Centre for Socio-economic and Environmental Studies, Kochi. July.

Figure 3.1: Literacy Rate by Gender and Residence: 2011

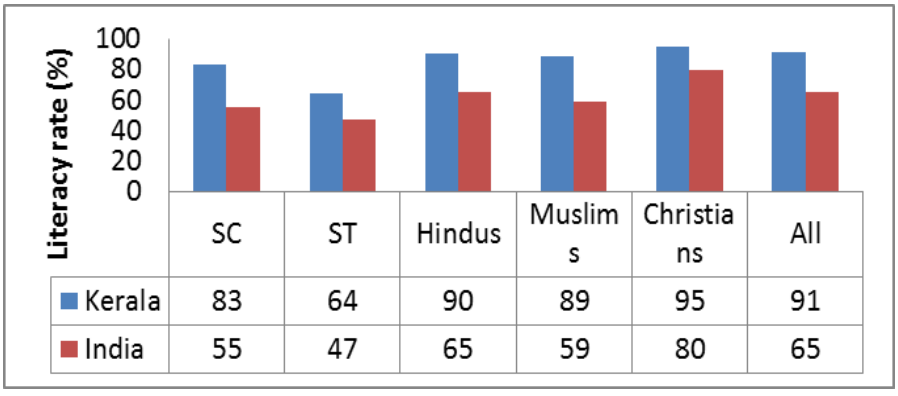


	Male	Female	Rural	Urban	All
Kerala	96	92	93	95	94
India	82	65	69	85	74

Source: Government of India. 2011 "Census of India 2011, Provisional Population Totals, Paper 1 of 2011, Series 33 Kerala." Directorate of Census Operations Kerala

3.3.1.5 Figure 3.2 shows that the literacy level does not differ perceptibly across the major religious groups.[11] However, there are gaps in the level of literacy across social groups. While both the Scheduled Caste (SC) and Scheduled Tribe (ST) groups in Kerala have done better than their counterparts in the country, the same cannot be said about their performance vis-à-vis other social and religious groups in the state (Figure 3.2)[12]. The 2001 Census showed that the STs in the state significantly lag behind in literacy than the other social groups (Figure 3.2). As a result, Palakkad, Wayanad, and Idukki, which are dominated by STs and are located in the hinterland of the state, have literacy level lower than the state average at least since 1981 (Figure 3.3).

Figure 3.2: Literacy Rate by Social and Religious Group: 2001



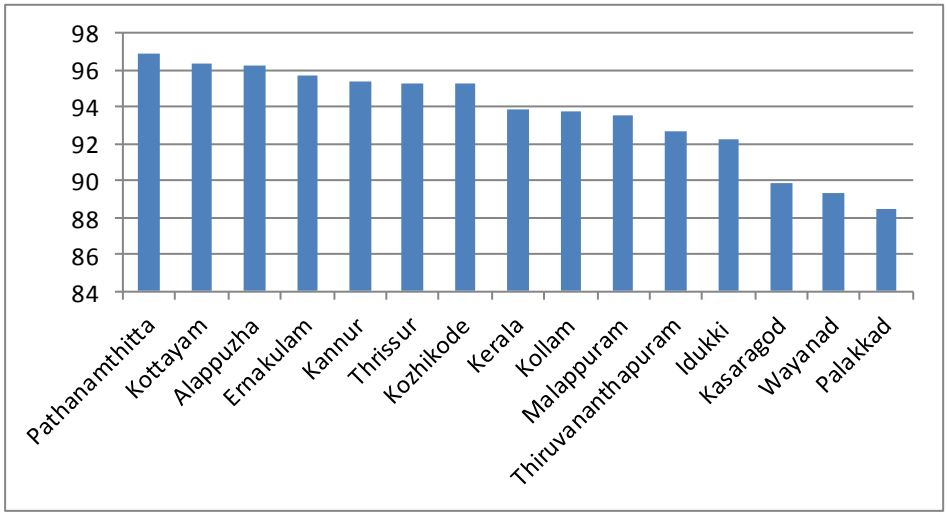
	SC	ST	Hindus	Muslims	Christians	All
Kerala	83	64	90	89	95	91
India	55	47	65	59	80	65

Source: Census 2001. http://www.censusindia.gov.in/default.aspx.

[11] The data on religion and social groups is not yet available from the 2011 Census; hence for these groups inferences are based on the 2001 Census.

[12] Besides the SC and ST groups, the fishing community in the state too is among the most vulnerable sections of society.

Figure 3.3: Literacy Rate (in %) by District: 2011



Note: Districts are arranged in descending order of the literacy rate.
Source: Government of India. 2011 "Census of India 2011, Provisional Population Totals, Paper 1 of 2011, Series 33 Kerala." Directorate of Census Operations Kerala

High enrolment ratios

3.3.1.6 The enrolment ratio is also high in Kerala. According to the Statistics of School Education 2010–11, the gross enrolment ratio (GER) in the state was 91.5 for class 1 to 5; 103.9 for class 6 to 8, 100.6 in class 9 and 68 in class 11 and 12. Overall, The GER for class 1 to 12 in 2010–11 was 92.2 in Kerala. This was higher than most other states in the country[13].

Low drop-out rates

3.3.1.7 The dropout rate for standards I–X was nearly zero in Kerala, whereas the nationwide figure was 57 per cent (Table 3.2). The problem of dropout is noticed only at the secondary school stage in Kerala. Further, there is low gender disparity in the state and in fact girls have lower dropout rates than boys (Govt of Kerala 2006)[14]. However, among the ST group in the state, the dropout rate is 39, which is a matter of concern.

[13] The Gross Enrollment Ratio (GER) or Gross Enrollment Index (GEI) is a statistical measure used in the education sector to determine the number of students enrolled in school at several different grade levels (like elementary, middle school and high school), and examine it to analyze the ratio of the number of students who live in that country to those who qualify for the particular grade level.
The Net Enrolment Ratio (NER) is defined by the UNESCO Institute for Statistics as enrolment of the official age-group for a given level of education expressed as a percentage of the corresponding population.
[14] Government of Kerala 2006,"Population Projections for India and States 2001–2026, Report of the Technical Group on Population Projections Constituted By the National Commission on Population." Office of the Registrar General & Census Commissioner, India: New Delhi.

Table 3.2: Dropout Rates by Standard and Population Sub-group: 2007–08 (%)

Population sub-group	*Standard*		
	I–V	*I–VIII*	*I–X*
Kerala			
All	0	0	0
SC	0	0	9
ST	3	0	39
India			
All	25	43	57
SC	30	52	68
ST	31	62	77

Source: SES (2007–08), Government of India
http://mhrd.gov.in/sites/upload_files/mhrd/files/SES-School-2007–08.pdf

3.3.2 Higher education

Proliferation of institutions of professional and technical education

3.3.2.1 In response to the government policy of encouraging private participation in education, the number of institutes of higher education, especially the technical and professional education, has increased substantially in Kerala. The high growth in technical education is guided by changes in the labour market conditions and increasing preference for technical courses. The number of self-financing colleges in the state increased from 33 in 1996 to 186 in 2003. Similarly, the number of institutes offering technical education has grown steadily. For instance, the number of engineering colleges increased from 16 in 1995 to 142 in 2011. The number of technical and medical institutes per million population, is higher in Kerala than India. The number of technical institutes outnumber medical institutes in Kerala. A sharp increase in availability (per million population) of the engineering/ technical institutes between the two periods is due to government's liberal approach towards allowing opening of the new institutes by private sector[15]. But, the increase in the number of seats is largely confined to the bachelor and master level courses to a relative neglect of doctoral students. As a result while the supply of

[15] Government of Kerala. 2006. "Population Projections for India and States 2001–2026, Report of the Technical Group on Population Projections Constituted By the National Commission on Population." Office of the Registrar General & Census Commissioner, India: New Delhi.

engineers does not seem to be a matter of concern in the state, that of the doctoral students is faculty concern. Nevertheless, the number of arts, commerce and general science institutes is much less in Kerala vis-à-vis India. Their growth between the periods 1998–99 and 2004–05 has been lower in Kerala compared to India. This is also true about the universities.

Table 3.3: Institutions of Higher Education (per million population)

Type of educational institution	***1998–99***		***2004–05***	
	Kerala	***India***	***Kerala***	***India***
Universities	0.28	0.31	0.25	0.36
Research Institutions	Na	na	0.03	0.12
Arts, Commerce and Science	5.7	7.46	5.73	9.45
Engineering/ Technical	0.77	0.54	2.03	1.19
Medical	0.64	0.75	1.23	0.74
Polytechnics	Na	na	1.73	1.07

*Notes: '*na' indicates not available. Population for 2004–05 has been arrived at by interpolation using the growth rate between 2001 and 2011.

Source: Tilak (2001)[16] for 1998–99 and computations based on Govt of India (2007, 2011, nd1)[17]

3.3.2.2 Zachariah (2010) shows that in 1991, there except for one private unaided Ayurveda college, every college was either public or aided. In 2007−08, this situation had reversed with the following numbers[18]:

- Arts and Science Colleges: 44.1 per cent
- Polytechnics: 15.5 per cent
- Engineering Colleges: 83.7 per cent
- Medical Colleges: 61.5 per cent
- Ayurveda Colleges: 61.5 per cent
- Dental Colleges: 66.7 per cent
- Homeo Colleges: 0 per cent
- Nursing Colleges: 89.4 per cent
- Pharmacy Colleges: 89.5 per cent

[16]Tilak, Jandhyala B. G. 2001. "Higher Education and Development in Kerala." *Working Paper No. 5*. Centre for Socio-economic & Environmental Studies.

[17] Government of India. 2007. "Selected Educational Statistics 2004–05." Ministry of Human Resources Development: New Delhi.

Government of India. 2011 "Census of India 2011, Provisional Population Totals, Paper 1 of 2011, Series 33 Kerala." Directorate of Census Operations Kerala.

Government of India. nd1. "Census of India 2001, Provisional Population Totals for India and Nagaland, Series C" Database available as CD

[18] Zachariah, G. 2010. Changing Enrolment Patterns in Arts and Science Colleges in Kerala. Submitted to the Kerala State Higher Education Council, Government of Kerala. Centre for Socio-economic and Environmental Studies, Thiruvanthapuram.

3.3.2.3 Further the Directorate of College Education gives the break-up of students enrolled across various type of colleges. This data shows that only 18.6 per cent of colleges are enrolled in government colleges and 80.8 percent students are enrolled in privately aided colleges[19].

Vocational education

3.3.2.4 Vocational education was formally introduced in Kerala in 1983–84 at the Higher Secondary level[20]. There were 389 Vocational Higher Secondary schools and 593 Industrial Training Institutes (ITIs)/ Industrial Training Centres (ITCs) in 2010–11 in the state (Table 3.4). Population served per ITI/ ITC in the state was about 1.24 lakh in 1991 which reduced to 56,000 in 2010 (Table 3.4). These figures are much lower than the corresponding national averages, 6.66 and 1.75 lakh, respectively for 1991 and 2010. This suggests that vocational education infrastructure is better in Kerala than the national level. But according to the Govt of India (2008)[21] report the performance of students has been poor. The failure rate is as high as 50 per cent in many of the courses.

Table 3.4: Number of ITI/ITCs and Population per ITI/ITC

Year	***No of ITI/ITCs***		***Population per ITI/ITC***	
	Kerala	***India***	***Kerala***	***India***
1991	233	1,259	1,24,886	6,66,059
1996	381	3,083	79,892	3,01,264
2001	535	4,499	59,516	2,28,659
2006	549	5,114	59,390	2,18,182
2011*	593	6,906	56,303	1,75,238

Note: *The data on number of ITI/ITCs in the year 2011 corresponds to the year 2009 for India and 2010 for Kerala.

Source: Annual Report, Ministry of Labour and Employment (various issues) and computations there from

Relatively higher gross enrolment ratio in higher education

3.3.2.5 GER is estimated based on one of these three sources: 1) Data collected by UGC from educational institutions and published as the Selected Education Statistics (SES); 2) Data from

[19] Since the breakup of the students for BBA and Bachelors library across government and privately aided colleges are not given, this number is left out of the analysis. This will not change results as it forms only 0.01 per cent of students enrolled.

[20] Government of Kerala. 2012. "Kerala Economic Review 2011." State Planning Board: Thiruvananthapuram.

[21] Government of India. 2008. "Kerala Development Report." Academic Foundation and Planning Commission: New Delhi.

the National Sample Survey (NSS); and 3) Population Census data. There are differences in the figures obtained from each of these sources. According to the UGC report, 'Higher Education in India' published in 2008, the NSS being a household survey covers all public and private institutions as well as distance education, and also includes certificate and diploma holders and is most reliable. According to this data, GER in Kerala was around 24.96 per cent in 2004–05 as compared with the national average of 13.59 per cent. Clearly, Kerala is much ahead of the All India average. According to the latest data 2010–11, the GER at the All India level has increased to over 17 per cent but it still remains below the Kerala level of 2004–05. However, Kerala lags far behind the developed countries. In Nordic countries for instance, it is as high as 94 per cent in Finland, and 74 per cent in Denmark, Sweden and Norway.

3.4 Overall Educational Attainment

Average years of schooling (AYS) is high

3.4.1. Table 3.5 shows the estimates of average years of schooling for Delhi, Kerala and India during the last two decades. Delhi is included in the table because it has the highest AYS in India followed by Kerala. Kerala is well ahead of the national average though. In 2009–10, an individual in Kerala had on average 7.72 years of schooling, whereas the figures for Delhi and India were 9.29 and 5.61 years respectively. While Kerala's performance is better than the average for the developing countries, it falls quite short of advanced economies. According to a study, in 2010, the AYS was about seven years for developing countries and about 11 for the advanced economies.

Table 3.5: Average Years of Schooling

	1993–94	***1999–2000***	***2004–05***	***2009–10***
Total				
Delhi	7.63	8.29	8.54	9.29
Kerala	6.04	6.33	6.84	7.72
India	3.69	4.24	4.71	5.61
Rural				
Delhi	5.89	6.33	7.28	6.95
Kerala	5.76	6.02	6.54	7.44
India	2.77	3.26	3.73	4.59
Urban				
Delhi	7.83	8.79	8.63	9.43
Kerala	6.83	7.19	7.79	8.52
India	6.29	6.89	7.3	8.11

Note: The above figures correspond to the population aged 15 years and above.

Source: Agrawal (2012a)[22]

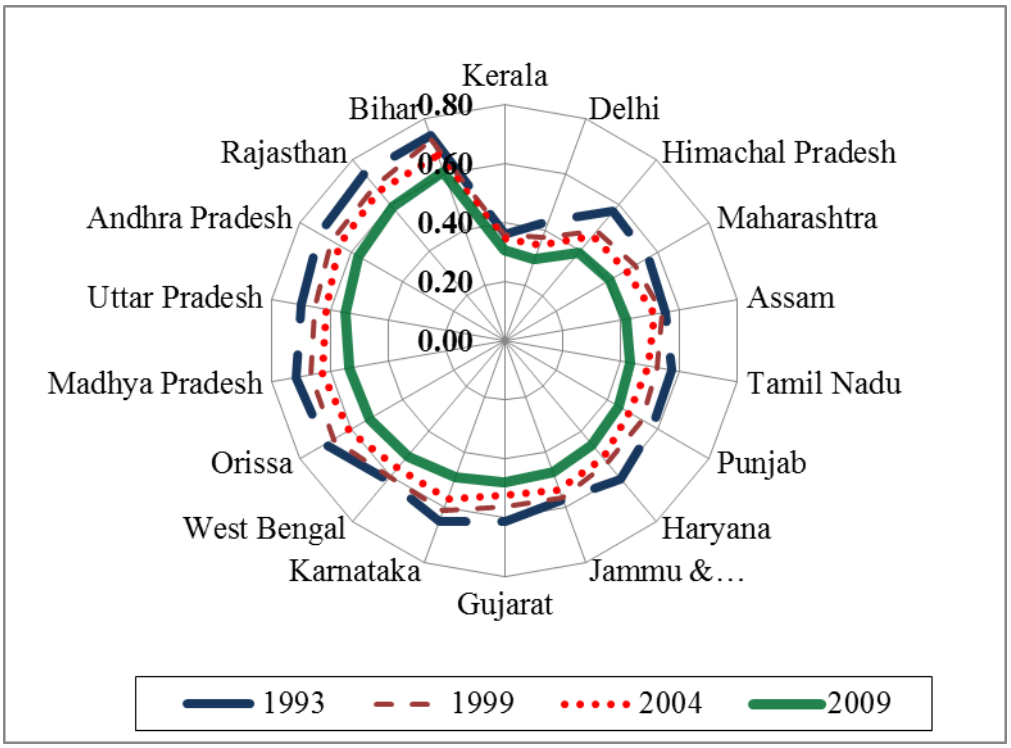
[22] Agrawal, T. 2012a. "Educational Inequality in Rural and Urban India." Paper presented at the *'4th Development Conference of the GREThA/GRES'*, University of Bordeaux IV, France

3.4.2. If we examine the AYS separately for rural and urban areas, the rural-urban disparity is very low in Kerala. In fact, Kerala is ranked best among the Indian states if only rural areas are considered. However, in urban areas, Kerala is behind many states and is close to the national average.

Inequality in attainment of education is low

3.4.3. Inequality in distribution of educational attainment (viz., years of education) across individuals can be measured using the Education Gini Index. The Education Gini Index is one of the best measures of inequality in education. Figure 3.4 shows the Radar plot for estimates of the Education Gini Index for major Indian states since 1993–94. Until 2004–05, Kerala had the lowest inequality among the major Indian states. But Delhi toppled it in 2009–10. In 2009–10 the value of the Education Gini Index was 0.29 for Delhi, 0.31 for Kerala, and 0.51 for India as a whole.

Figure 3.4: Inequality in Educational Attainment: Radar Plot



Source: Agrawal (2012a)[23]

[23] Agrawal, T. 2012a. "Educational Inequality in Rural and Urban India." Paper presented at the *'4th Development Conference of the GREThA/GRES'*, University of Bordeaux IV, France.

3.4.4 Further, Kerala has the lowest rural-urban differential in terms of the Education Gini Index. While for Kerala the values of the Education Gini Index were 0.31 and 0.29 respectively for rural and urban areas in 2009–10, the corresponding values were 0.55 and 0.39 for India.

Returns to education

3.4.5. Usefulness of the estimates of returns to education lies in that they are an important yardstick in determining the decision of individuals to continue education beyond a certain level or to enter the labour market.[24] The returns also indicate the productivity of education. Table 3.6 provides estimates of the returns to education for Kerala and India.[25] These are based on one of the most recent nationally representative household data, viz., 66th round of the Survey on Employment and Unemployment, conducted by the National Sample Survey Organisation during 2009–10. The following two features emerge from the table. First, while the average returns peak at the higher secondary level of education in the country as a whole, the same is not true of Kerala where we observe that the returns increase monotonically across the education ladder.

Table 3.6: Returns to Education (%), 2009–10

Education level	***Kerala***	***India***
Primary	2.63	5.35
Middle	2.97	4.96
Secondary	4.03	11.65
Higher secondary	9.42	16.1
Graduation & above	19.11	13.71

Source: Author's computations

3.4.6 Two, the average returns up to the higher secondary level is higher in the country as a whole than in Kerala; this is not true in the case of graduation and above level of education. This simply reflects the fact that a larger proportion of students go for higher studies. In other words, the GER is higher in higher education in Kerala vis-à-vis in the rest of India. It also means that only those who enrol into higher education[26] are able to get high-paying jobs in Kerala.

[24]An individual would prefer to attend school only if present value of the expected benefits from schooling exceeds that of the expected costs (Becker 1993).

[25]It may be noted that education results in many such benefits as better health and social status that cannot always be quantified in monetary terms. Such non-monetary benefits of education are not accounted for in these estimates.

[26] Indicating that the "the drop-outs [in the higher technical education] come exclusively from the most deprived sections of society", the Kerala Human Development Report 2005 (Government of Kerala. 2006. State Human Development Report 2005. Thirvanthapuram. Prepared by Centre for Development Studies. , p. 97) mentions, "[o]nly those without family academic support or the benefit of expensive private tuition fail in these examinations. It is common knowledge in Kerala that if you want a 'good' pass, classroom learning is not enough and you have to go for private tuition".

3.5 Challenges

3.5.1 While educational attainments in physical terms are impressive, the deterioration in the quality of education being imparted at various levels in the state has been a concern.

Deteriorating quality of school education

3.5.2 The quality of education has been on decline in both government and private schools. A comparative analysis of annual surveys of education in rural areas by "Pratham" over 2009 and 2012 reveals the following[27]:

- Percentage of children in Standard (std) V who CAN READ Std II level text declined from above 60 to below 60 in government schools and from 80 to 70 in private schools between 2009 and 2012. The results are not very different for children in Std III who CAN READ Std I level text. Percentage of children in Std III who CAN DO SUBTRACTION or more declined from 57 to 42 in government schools and 70 to 60 in private schools over the same period.
- Percentage of children in Std V who CAN DO DIVISION remained almost at 35 in government schools; the figure declined from 57 to 52 in private schools.

3.5.3 Two things need to be observed: One, the quality of education is better in private schools; two, the quality of education in private schools has also been deteriorating over time. However, considering that the quality of private schools is better than their government counterparts, there has been a shift from government to private schools. Between 1990–91 and 2002–03, the enrolment (standards I–X) in the government and aided schools fell by 26 per cent whereas that of private unaided schools increased by 79 per cent (Government of Kerala 2006). Kerala and Manipur are the only two states where 60 per cent students are enrolled in private schools. The national average is 40 per cent[28].

3.5.4 This competition between private unaided and rest of the schools in the state together with declining fertility has rendered many government and private aided schools economically unviable. The *Kerala Education Rules* stipulate a minimum average strength of 25 per batch for lower primary, upper primary, and high schools. The schools with average batch size below 25

[27] ASER. 2013 and previous reports. *Annual Status of Education Report (Rural) 2012*. ASER Centre, New Delhi.

[28] The Department of Education is in the process of collecting an unique dataset of school students which are linked to their Unique ID (UID). Provisional data from 2013−14 show that the breakup of government, aided and unaided schools in Kerala are 30.4, 60.1 and 9.5 per cent data, respectively. Only systematic data collection over the years will be able to inform about the trends as has been discussed in the earlier paragraph. Maintaining educational quality in schools which match international standards and result in innovative and creative entrepreneurs and thinkers should always remain a top priority of the policymakers.

have been termed as 'uneconomic'. The number of uneconomic schools in the state is increasing over time. In 1990, there were 964 such schools but this number gradually increased to 2,244 by 2000 and to 4,280 by 2010[29]. Most of the uneconomic schools are at the lower primary (class I–IV) level.

Decentralisation of education in the state has not been so successful[30].

3.5.5 Recently, several initiatives have been taken to improve the quality of education. These include the following.

- A scheme 'Improvement of Science Education in Schools' has been in operation since 1987–88 with the objective of promoting scientific temper among children.
- In 2001, a project, IT@School, was set up to strengthen computer education in schools. It is being implemented in about 8,000 schools in the state in standards V–XII with a long-term aim of providing ICT–enabled education in the state. The project won the 'National e–governance Award for the Best Project' in 2008.
- The *Kerala Right of Children to Free and Compulsory Education Rules, 2010* provides for constitution of a management committee in all government and aided schools and preparation of a school development plan by each committee, and discusses the accountability and responsibilities of various stakeholders[31]. In 2011, the state government approved a comprehensive general education reform package for the schools.

Notwithstanding, the outcome seems to be elusive and poor quality remains a serious challenge.

Poor quality of higher education

3.5.6 The poor quality of higher education institutions across all sectors, public, private aided and self-financing is a more serious problem than that of school education. According to a report of the Kerala State Higher Education Council[32], there are issues pertaining to infrastructure, appointment, availability of teachers, course structures, course content, social inclusion, autonomy, and accountability. The result is migration of students to other states and countries for higher studies. This is despite the fact that seats in professional colleges in Kerala are lying vacant (as reported in the State Development Report). Since 2008, student migrants have become

[29]Government of Kerala. 1991. "Kerala Economic Review 1990." State Planning Board: Thiruvananthapuram . Government of Kerala. 2001. "Kerala Economic Review 2000." State Planning Board: Thiruvananthapuram Government of Kerala. 2012b. "Kerala Economic Review 2011." State Planning Board: Thiruvananthapuram

[30] Mukundan, M. and M. Bray. 2004. The Decentralisation Of Education In Kerala State, India: Rhetoric And Reality. International Review of Education. 50(3/4). 223−243. July.

[31] Commission for RTE Act. 2010. "The Right of Children to Free and Compulsory Education Kerala Rules 2010." Commission for Right to Education Act

[32] Kerala State Higher Education Council website. http://www.kshec.kerala.gov.in/index.php?option=com_content&view=article&id=75&Itemid=68

the number one group in the various employment categories among the out-migrants. There were 3,11,000 students among the out-migrants from the state in 2011 (Chapter 1, P. 39). They even outnumbered the job seeker-out migrants.

Large out-of-pocket expenses

3.5.7 Another indicator of poor quality of education is the presence of so-called 'parallel colleges' operated by private players. These colleges coach the private candidates appearing in university examinations and have witnessed phenomenal growth over the years. While the higher educational system in Kerala is characterised by low tuition fee, students end up paying a much larger amount to private tutors. It has been found that the out-of-pocket expenditure on higher education by the students is quite high in Kerala. A survey of 500 college students conducted in Thiruvanathapuram way back in 1992 revealed that the out-of-pocket expenditure incurred on private tuitions by the students was 18 per cent of total expenditure compared to 4 per cent on college fee.

Educated unemployment

3.5.8 For many decades, the unemployment rate in Kerala is among the highest in India. With regard to higher technical education, Kerala Human Development Report 2005 mentions that there is a heavy concentration of matriculates (standard X) among the educated unemployed. According to a government report (2006)[33] there were about 100,000 unemployed certificate holders – without any skill acquisition in 2003. This is at the core of the unemployment problem, which has to be addressed and given serious attention".

3.5.9 An unintended consequence of the high level of unemployment and the competition for various examinations in the state has been "rote learning by students and examination-oriented coaching by the teachers" because of which co-curricular activities have been neglected.

Dearth of research institutes

3.5.10 With regard to the availability of research institutes, Kerala is far behind India and if the availability at the national level is something to go by there is scope for increasing the number of research institutes in the state (see, Chapter on R&D in Volume III). The Department of Industrial Policy and Promotion's annual report on patents shows that in 2009–10, Kerala ranked 9th out of 20 states in terms of the number of patents. It filed 288 patents. These formed 0.01 patents per 1000 population as compared with 0.02 in Delhi and 0.05 in Maharashtra. Thus although Kerala leads India in the availability of technical and medical institutes, R&D activities seem to lag behind in the state. This is further elaborated in the R&D chapter in Volume III.

[33] Government of Kerala. 2006. *State Human Development Report 2005*. Thirvanthapuram. Prepared by Centre for Development Studies. pp. 94.

3.6 Vision, Mission and Goals

Vision 2030

3.6.1 Kerala will be a key node to global knowledge network by 2030. It will be in the league of the top ranked countries in terms of efficiency, competitiveness, services and market delivery in education. It will be recognised for academic excellence and innovation.

3.6.2 Students will have a strong engagement with communities, society and enterprises which will give students a sense of pride and identity, and will equip them with the skills to make significant contribution to the region, nation and global communities.

3.6.3 Further, Higher education institutions will be the engine for new ideas through research, and many of these ideas will translate into the sustaining innovative enterprises of the future.

3.6.4 Kerala higher education will have a strong international presence, will be attractive to overseas students and will engage in high-quality research that will have a vital impact on regional, national and global needs. Kerala will be a part of the global hub of knowledge. The state is expected to achieve a significant share of global market trade in education.

Mission

- To make quality education affordable to all
- To create a global brand name in education by 2030

Goals

- 100 per cent enrolment in primary schools
- 95 per cent of all young people shall complete general or vocational upper secondary education by 2015;
- 50 per cent of all young people shall complete a higher education programme by 2015 (GER will be 50 per cent).
- GER of SC/ST will be comparable with that of general population.
- Everyone shall engage in lifelong learning.
- Kerala will account for 50 per cent of India's export in these services by 2030.
- 6 per cent of the GSDP should be spent on education, of which 1.5 per cent to 2 per cent should be set aside for higher education.

3.7. Strategic Framework

3.7.1 A well-qualified labour force is a prerequisite for the shift to a new paradigm of knowledge-based economy. This means that the demands for the general and vocational skills of

the labour force will grow, while the demand for low skilled labour will decline. Therefore, the skills of the labour force must be increased at all levels. This will require extensive reforms in education and research programmes at all levels.

3.7.2 Kerala's education sector would be required to focus on access, quality and equity in order to achieve "sustainable prosperity" for the state. These objectives are intertwined. A comprehensive strategy needs to be developed with quality (competitiveness) and social inclusion as two key components. As a matter of fact, a comprehensive scheme for expansion of facilities with equitable sharing of opportunities for the SC/ST/OBC/minorities/physically challenged/women/the poor is a pre-requisite for quality in this critical sector of development. Improved quality will work as an incentive system to attract the disadvantaged to the education system.

3.7.3 Further, the government should aim to showcase Kerala as one of the most attractive places in the world where everyone has the best opportunities to unfold their abilities and create prosperity for themselves and for others. This will require creation of a dynamic world class education system benchmarked against the best countries.

3.7.4 Finally, the constant changes in technologies and economic structures create new demands for skills and adaptability of individuals. From the social perspective, continuing training helps individuals participate actively in the labour market throughout their lives. From the economic perspective, the competitiveness of enterprises and the quality of services is largely dependent on investment in continuing training and competence development. An increased effort in continuing training at all levels, promoting lifelong skills upgrading for all, is therefore necessary for the development of Kerala as a leading knowledge society.

3.7.5 For the growth and prosperity of Kerala with social equity in the years to come, therefore, the comprehensive education strategy should be based on two fundamental principles:

- To create a world-class education system ensuring improved quality, equity and cohesion in education and training with emphasis on scientific knowledge – from preschool to higher education and in adult education, and
- To provide opportunities for life-long skills upgrading to all.
- To promote ICT enhanced programmes in education

3.7.1 Create a world-class education system

3.7.1.1 Higher Education

3.7.1.1 Higher education is placed at the core of knowledge economy. Workforce with higher education is critical for technological change and also for the creation of knowledge economy. To realise this aim, the state needs to go beyond the comparisons involving the average attainment at the national level and the relative standing among the Indian states or even among the developing countries. These should no longer be a benchmark for Kerala and the state should be looking forward to the developed world. Sweeping reforms have been proposed by the "State Higher Education Council" in the draft higher education policy. According to the proposed policy by the Council, "higher education should aim at inculcating in the learner certain core competencies and skills that would promote lifelong learning, living together and living productively, both in society and within the self. This in turn would require the cultivation of critical, creative and communicative competence, in short, the creation of qualities that go into the making of a well-rounded personality" (p. 4). It also agrees that the society needs not only knowledge workers who would perform a variety of tasks, but also the creators of knowledge. It has suggested several reforms to achieve these objectives:

- Creating adequate space in higher education for multi-disciplinary and interdisciplinary explorations.
- Curricular and pedagogical reforms.
- Setting up of Internal Quality Assurance Cells (IQAC) to create a balance between three key functions: 1) Teaching, 2) Research and 3) Extension.
- Democratization of the governance structures of higher education at all levels — from universities to individual institutions to ensure an accountable autonomy.
- A system of academic audit and compulsory disclosures should be put in place through Social Accountability Cells (SAC).
- Regulation of aided and privately funded institutions to ensure minimum infrastructure, a well-designed criteria-based admission of students and recruitment of teachers, ceiling on fee, and cross-subsidisation of poor students
- Setting up of higher education scholarships
- At least 6 per cent of the GDP should be spent on education, of which 1.5 per cent to 2 per cent should be set aside for higher education.
- Reforms in the criteria of central assistance
- In-service training of teachers at regular intervals

3.7.1.2 While building on these basic principles, the Perspective Plan envisages a paradigm shift in the education sector and proposes to move away from a gradualist approach to a big push to

the education sector in terms of structural change by benchmarking it with the top higher education countries with the following action plan.

Element 1: International Benchmarking

3.7.1.3 *Universities 21*, a leading global network of research universities, has developed the higher education ranking as a benchmark for governments, educational institutions and individuals. In its 2012 report it shows that the top five countries are: the United States, Sweden, Canada, Finland and Denmark. Clearly, the Nordic region dominates the top 5 ranks. Norway and Iceland are not far behind at 7th and 16th rank. Kerala government can draw useful lessons from the Nordic countries. Government funding of higher education as a percentage of GDP is highest in Finland, Norway and Denmark, but when private expenditure is added, total education funding is highest in the United States, Korea, Canada and Chile. Investment in R&D is highest in Denmark, Sweden and Switzerland. The United States dominates the total output of research journal articles, but Sweden is the biggest producer of articles per head of population. The top-ranked education institutions are in the US and the UK.
The education system of Kerala needs to move up the ladder to match the standards of these countries.

Element 2: Structural shift in higher education paradigm

3.7.1.4 The Perspective Plan proposes **a shift from knowledge disseminating approach to knowledge creating approach,** which can set the tone for administrative and academic reforms in higher education as proposed by the state higher education council. More specifically, this requires a shift from **"instruction mode"** to **"learning mode"**.

3.7.1.5 As mentioned above, the "Draft Education Policy" of the State Council of Higher Education proposes a shift in focus from merely imparting education to creating knowledge in the context of higher education. But it remains silent on how to achieve this goal. Achieving this goal will mean a complete transformation of the existing structure of higher education. It will mean paradigm shift where universities will be driven to become more enterprising for enhancing the national competitiveness in innovation, R&D and technological advancement. There will be significant transformations with a heavy emphasis on R&D, innovations and academic entrepreneurship. In the pursuit of academic entrepreneurship, universities will establish linkages with the industry sector, through:

- licensing activities and contract research,
- consulting services, and
- the setting up of university spin-off and start-up companies to themselves exploit their innovations

3.7.1.6 Top universities across the world are becoming more proactive in promoting innovation, economic development and academic wealth. Universities' quest for becoming entrepreneurial has inevitably changed the role of the university sector and its relationship with the state, the market and the industry. Best-known universities in the world currently are top entrepreneurial universities. They are creating technologies and commercializing them. The role of the state is to facilitate the process by creating an appropriate legal framework and giving incentives. In most developed countries seed funds have been set up to promote spin offs and startups of the universities.

Table 3.7: Structure of spin offs and start-ups

	Spin offs	**Start ups**
Created by	University	Outside University
Technologies	Owned by University	Licensed by University
Funded by	University	Outside University Funders
Managed by	University Staff	Outside University

Source: http://www.wipo.int/edocs/mdocs/aspac/en/wipo_ip_han_11/wipo_ip_han_11_ref_t7b.pdf

The new approach replaces

- Knowledge dissemination by knowledge production,
- Commercialisation of education by commercialization of knowledge produced, and
- High tuition fee for self-funding by entrepreneurial incomes**.**

3.7.1.7 This structural shift will not only contribute to knowledge creation through R&D and entrepreneurship, but will generate incomes for self-financing. World over there has been a change in the university governance structure with increasing privatisation. One way of funding this education is commercialising education itself by charging capitation fee and high tuition fee. That cannot be allowed due to public good nature of education. This route needs to be replaced by the route of entrepreneurship in the university. Further merit based scholarships can be introduced for students from weaker economic sections. Also students unprepared for colleges may take up remedial courses in community colleges to prepare them for success in higher education.

Element 3: Promote Science, Technology, Engineering, and Mathematics (STEM) programmes

3.7.1.8 Kerala must provide students with a strong education in science, technology, engineering, and mathematics (STEM), and prepare them to succeed in the global economy and to ensure the culture of knowledge creation. State government must initiate STEM education programs across

selected institutions with a high quality delivery, impact, and visibility. These programmes need to fully funded and highly competitive.

3.7.1.9 Alternatively, a state STEM Teachers' Corps may be created by identifying the best teachers. A STEM Virtual Learning Network (STEM-VLN) may be created for imparting education primarily but not exclusively online. This will enable STEM educators to share innovative STEM content benefitting a larger segment of students.

Element 4: Improve Quality

- National and international accreditation systems will be adopted to ensure quality of general education. This can be achieved by allowing flexibility in the choice of subjects (multi-disciplinary education and training) and periodically updating the curriculum.
- The information and communications technology (ICT) will be harnessed to improve the quality of training being imparted in the higher educational institutes.
- Initiatives will have to be taken to improve infrastructure, content, training and capacity building.

Element 5: Internationalise higher education

3.7.1.10 More and more countries are seizing the opportunities of making higher education more international, affordable and accessible by creating global education hubs. Competition amongst countries set on establishing global education hubs is fierce and Asia seems to be leading the movement. Despite a long tradition of education (Kodungalloor Gurukulam, Takshila, Nalanda universities), India's absence in this area is conspicuous. Further, India, along with China and Korea, ranks as one of the top three nations sending the highest number of students to the advanced nations to study at universities. This opportunity can be afforded only by the top segment of population. To make it affordable to the wider sections of the society, these facilities may be provided within India where living expenses are cheaper, but the quality of education equals their campuses in developed countries. Kerala will take a lead in this for the advantages that it has acquired over the years.

Why Kerala?

- Kerala is relatively better positioned vis-à-vis other states in terms of educational attainment. It could potentially be an example for the other states.

- As early as 1984, a High Level Committee on Education and Employment also advocated setting up of autonomous 'Centres of Excellence' in the fields of arts and science (Govt of Kerala 1984)[34].
- The state higher education council has already proposed to set up a cluster of colleges. The principle underlying these clusters is that of sharing and cooperation as opposed to exclusion and competition. The operational strategy is for neighbouring institutions to come together on the basis of a MoU. The governance of such clusters could be entrusted with bodies constituted with representatives drawn from all institutions that join together, the representatives of the university and the local body concerned. The programmes that would be undertaken by the clusters could vary from cluster to cluster, depending on the needs and facilities available or proposed to be set up. It has been proposed by the Council that the state may set up as many viable clusters as possible within the next few years. Networking is an important element of the knowledge hubs. A similar principle underlies the proposed knowledge hubs. As discussed in Chapter 2, these cities will be closely-knit networks of organisations.
- Finally, Kerala has already established itself as a favourite tourist spot with its natural wonders, mild weather and convenient access from neighbouring countries. This be an important locational advantages of Kerala in attracting international students.

3.7.1.11 Against that backdrop, Kerala is likely to promote these global hubs more successfully than other Indian states. The proposed concept is much broader and global. It will take the "cluster of college" concept to the next level.

3.7.1.12 International colleges and universities have been collaborating with Indian educational institutions since the early 1990s. These collaborations have facilitated foreign institutes market their programs in India through a local partner, participate in student and faculty exchanges as well as lend their expertise. Collaborations ranged from twinning agreements, joint faculty and staff exchange programs to support in curriculum design and pedagogy. The objective is to contribute to world-class education in India, and create opportunities for the foreign faculty and students to work with local faculty and students here in India. Kerala will need to be more proactive to promote such collaborations.

Element 6: Adopt a hub-and-spoke model:

3.7.1.13 This report proposes to develop five global knowledge cities in Kerala over the next 20 years. These will be in Kozhikode, Thrissur, Thiruvananthapuram, Pallakad and Malappuram. The locations are proposed based on three criteria:

[34] Government of Kerala. 1984. *Report of the Sub-committee on Education, State Planning Board*. Trivandrum.

- Thiruvananthapuram, Thrissur, and Kozhikode already have clusters of educational institutions.
- Pallakkad may get an IIT during the 12th Plan period. This will provide a platform for a technical hub.
- A health city is being planned in Mallapuram creating a base for medical education.

3.7.1.14 These designated regions are intended to build global reputation by providing access to high-quality education and training for both international and domestic students. While the existing institutions will be upgraded to international standards, new domestic/international institutions, partnerships and branch campuses will also be attracted. These will be centres of excellence. Some of the characteristics of this model are as follows.

3.7.1.15 **Hub-and spoke model:** The global education cities will be connected with knowledge spokes in each district based on its competitive advantages in specialised branch of knowledge and activity. For instance, Idduki may be developed for veterinary sciences; Alapuzha in Ayurvedic preparations; Kannur in textiles sciences; Ernakulam for industrial training and research; Western Ghats in biodiversity (as suggested in Chapter 2). Alternatively, identify the centres of excellence in each district and create a network of institutions around them; and connect with the proposed global cities.

3.7.1.16 **Institutional framework:** These hubs will be developed as integrated townships along the lines of National Investment and Manufacturing Zones (NIMZs). While NIMZs are for manufacturing sectors only, these knowledge cities will be the concentration of knowledge producing, exporting and using institutions including the enterprises, start ups and spin offs. These will be governed by a Special Overriding Act. An Inter-departmental committee will be constituted with participation from national and international advisors, local governments and the private sector to implement the projects. The development of these cities will essentially be the responsibility of a Special Purpose Vehicle (SPV) with representation from the government and the private sectors.

3.7.1.17 **Service providers:** The service providers will be from the public, private and foreign sectors. There will be a possibility of higher education institutes being sponsored by industrial houses. All the facilities will be internationally and nationally accredited. Efforts will be made to promote newer branches of knowledge and modernisation of traditional knowledge.

3.7.1.18 **Benchmarking:** These hubs will seek to rival Hong Kong, Korea and Singapore as Asia's centre of international education. These hubs will have world-class educational environment for both local and foreign students (children of expatriate and other foreign nationals) through international partnerships and a high-end learning environment with state-of-the-art facilities.

Box 3.1 Dubai Knowledge Village/Dubai International Academic City (built by a private developer)

Launched in 2003, Dubai Knowledge Village (DKV) is owned by TECOM Investments, which is a subsidiary of Dubai Holding, and is one of TECOM's many business parks. This education hub is set up to complement TECOM's other business parks, including, Dubai Internet City and Dubai Media City. DKV has attracted 15 international universities from Australia, India, Pakistan, Iran, Russia, Belgium, UK, Ireland, and Canada. It is also home to approximately 150 training institutes and learning centres, HR development centres, professional training institutes, R&D organisations, and e-learning companies. To account for the need to provide more campus facilities due to the rapid expansion of higher education in DKV, TECOM created Dubai International Academic City (DIAC). Approximately one square mile in area, DIAC is located in Dubai Academic City, and is set up as a free zone for higher education. Currently home to over 20 international universities, including Cambridge College International Dubai, University of Phoenix Dubai, and University of Exeter, among others, DIAC caters to over 4,000 students.

Songdo Education City, Incheon

The Songdo city is part of the Incheon Free Economic Zone. It has attracted branches of several international universities and R&D centres like Gent of Belgium, Lawrence-Berkerly National Laboratory of USA, St.Petersburg of Russia and Plymouth of the UK. It has business centers, financial services, residences, **schools** and hospitals, and shopping and entertainment centres. To provide better living conditions for the foreign workforce in the international business district, the Incheon metropolitan government introduced a concept of Smart City. Under the plan, the city is building an urban space that has it all for its dwellers. All activities of residents take place within a five-minute drive. All buildings are accredited by the US Green Building Council's Leadership in Energy and Environment (LEED) ratings.

Source: http://www.tecom.ae/dubai-knowledge-village/; http://www.fez.go.kr/en/incheon-fez.jsp

Element 6: Evaluation and monitoring of higher education

3.7.1.19 There is a need to build a reliable database on higher education. This has been pointed out by several studies. The recently launched All India Survey on Higher Education is a welcome step in this direction. The state has to ensure candid and timely collection of data. While

designing the policy, it is important to monitor its outcome through annual evaluation using the following criteria.

Table 3.8: Criteria and indicators of the performance of higher education

Criteria	***Indicators***
Resources	R1: Government expenditure on tertiary education institutions as a percentage of GDP R2: Total expenditure on tertiary education institutions as a percentage of GDP R3: Annual expenditure per student (full-time equivalent) by tertiary education institutions R4: Expenditure in tertiary education institutions for research and development as a percentage of GDP R5: Expenditure in tertiary education institutions for research and development per head of population
Connectivity	Q1: Number of scholarly publications produced by higher education institutions, O2: Total articles produced by higher education institutions per head of population O4: A measure of the depth of good universities in a country. O5: A measure of the research excellence of a nation's best universities. O6: Enrolments in tertiary education as a percentage of the eligible population, defined as the five-year age group following on from secondary education, 2009. O7: Percentage of the population aged over 24 with a tertiary qualification, O8: Number of researchers (full-time equivalent) in the nation per head of population
Environment	E1: Proportion of female students in tertiary education E2: Proportion of academic staff in tertiary institutions who are female E3: A rating for data quality. E4: Qualitative measure of the policy and regulatory environment.
Connectivity	C1: Proportion of international students in tertiary education C2: Proportion of articles co-authored with international collaborators C3: Export revenue for different modes of education.

Note: The measure can be thought of as a rough indicator of the probability of a person in a country attending a university ranked among the top 500 in the world

Source: Universities Network website. http://www.universitas21.com/article/collaborations/details/105/measure-4-output

3.7.1.2 Vocational Education: *Development of a "Kerala System of Vocational Education"*

3.7.1.2.1 In Kerala, workforce participation rates are rather low. It is expected to decline further with a deceleration in the population growth rate and ageing. In this scenario, the aim of promoting vocational training will be:

- To raise productivity by increasing skills and avoiding future skills shortages;
- To increase the workforce participation rate to 69 per cent by 2025 to provide the required workforce and improve social cohesion;

3.7.1.2.2 The vocational education is fraught with several such problems as poor quality, poor academic performance of students and unemployment. Kerala is no exception. To strengthen vocational education in the state, the Department of Education will develop a "Kerala System of Vocational Education. It will have four components: 1) legislative framework, 2) participating institutions, 3) a well-developed structure of education and 4) linkages between the industry and participating institutions.

Element 1: A legislative framework

3.7.1.2.3 **An Act on vocational education:** The proposed Act will be developed within the National Vocational Education Qualifications Framework (NVEQF), which the Ministry of Human Resource Development (HRD) plans to introduce across the country from 2014. The central government's National Skill Development Mission aims at creating a 50 crore-strong skilled workforce by 2022. It will cover quality assurance, accountability and improving outcomes; new methodologies and building bridges to higher education; and pedagogical developments. This system draws on the systems followed in Australia, the UK and New Zealand. Kerala can seize this opportunity to develop have its own Act on vocational education within the overall national framework.

3.7.1.2.4 **An administrative framework:** There will be a provision for a separate "Board for Vocational Studies" along the lines of the Council of Higher education which will be accountable for the sweeping reforms in vocational education.

Element 2: Create a well-developed structure of education

3.7.1.2.5 **Matching skill formation with future skill needs:** There has been a serious mismatch between the skills being imparted in vocational institutes and the skills demanded by the industry. This is likely to increase with the emergence of new economic activities. The Council for Vocational Education will identify the relevant courses and drop the obsolete ones. The course structure will be revised annually according to changes in work life and the feedback

obtained from the world of business. Matching skills formation through the vocational education sector with future skills needs and complementing this with improved skills utilisation are key strategies for growth. In Finland, there are 358 qualifications included in the structure. Kerala may draw on the experience of Finland and identify newer skills.

3.7.1.2.6 **Participating institutions:** The system will relate to all three education sectors: schools, training institutions and higher education. More specifically, the participating institutions will be schools, polytechnics, universities and colleges for seamless vertical pathways. The NVEQF framework provides a 10-level structure of competency-based courses, which will have an equivalence to the certification by the school boards as well as diploma, degrees and doctorates offered by the universities. All these layers may be included within the proposed system.

Element 3: Create strong links between vocational and higher education.

3.7.1.2.7 One of the problems faced by the vocationally trained graduates is that they are unable to further continue their education because the vocational courses are not recognised by the general education system. Therefore, to bring them into the mainstream, the options must be explored to properly certify the vocational courses. The vocational upper secondary education system will give eligibility to university studies as well. Also, the way into tertiary education will be totally open to veterinary students. To improve the labour market outcomes of the vocational graduates, career counselling can be provided to them.

Element 4: Partnership with industry:

3.7.1.2.8 MoUs may be signed with relevant industries for exposure, placement and scholarship provisions. Eminent persons from the industry could be appointed to the advisory bodies of the vocational education institutes. Similarly, the options should be explored to include teachers and administrators from these institutes at suitable positions in the industry so as to enable better industry-institute interface. This would help in (i) addressing the demand-supply mismatch, (ii) continuous updating of the curriculum, (iii) placements, and (iv) reducing (avoiding) the need of in-service training by the industries. Vocational education systems in Germany and Finland are among the most successful in the world. In Germany, the training is tied up with industry. It imparted by expert workers and instructors directly to the students that leads to a reduction in on-the-job training. Further, the certificate is valid for a lot of occupational categories. In Finland, on the other hand, vocational education is organised independently. The scope of vocational training is quite wide and training is imparted even in the areas like air traffic control.

Element 5: Mainstreaming vocational education: An alternative approach

3.7.1.2.9 In most developed countries, however there has been a shift away from competency-based system to the inclusion of components of vocational training in higher education. Boundaries are blurring between vocational and higher education with a single authority overseeing both of them. Mainstreaming with university education will be the way forward for promoting vocational education in the country. It will meet the demands of skilled knowledge workers and ultimately increase the number of college graduates. The US model of community colleges is under consideration at the central Ministry of Human Resources now. In the US, community colleges are a link between high school and university education. They offer classes to prepare students for college-level math and English, and career training to enter the workforce quickly and affordably, and complete lower division courses that are transferable to a college or university. Vocational training is provided in hundreds of areas. Community college is also a good option for those who are unemployed or under-employed and want to be retrained to work in emerging and in-demand industries such as health care and green jobs. India has now broadly accepted this mezzanine level in higher education – between high schools and universities – similar to the US community college model. This initiative will be an attempt to bridge the gap.

Box 3.2 : Community colleges in India: Past experience

The Community College scheme was launched by the Ministry of HRD in 1995. The community colleges in this scheme were to be established by not-for-profit, non-commercial and community-based organisations to provide training to the economically and socially disadvantaged groups of population. However, the scheme could not pick up due to the lack of recognition by the ministry itself. The lack of good infrastructure, rigour in curriculum and weak financial viability also affected the performance of the scheme. In 2009, the scheme was institutionalised after IGNOU launched it following tie-ups with colleges and institutes all over the country. Under the scheme, these community colleges provide a two-year associate degree in various skill-based fields after which students can join the formal degree course. The community colleges also provide diploma and certificate courses in various fields. In a community college, students can choose from multiple vocational and technical fields of study, which will be enabling mechanism for them to join a regular college or university for completion of a three-year degree. The only university that recognised these courses is IGNOU. There are 500 community colleges operating in India with 150,000 students. Kerala has 57 such

community colleges. However, in 2012, IGNOU suspended all actions and decided that the community college scheme be subjected to a thorough time-bound review before any future course of action.

Source: The impact and prospects of the community college system in India, A report submitted to the Planning Commission by the Madras Research Centre for Community Education, August 2003.

Element 5: Popularising vocational studies: Service producers' companies

3.7.1.2.10 Vocational education will be popularised by improving the reputation and social status of career-oriented vocational education. This can be done by encouraging "Service Producers' Companies" in the country. In 2002, through an amendment to the Indian Companies Act 1956, the government enacted the Producer Companies Act by incorporating Chapter IXA in the Indian Companies Act 1956. The objective was to formulate a legislation that would enable incorporation of cooperatives as companies and conversion of the existing ones. A producer company as an organisation provides an appropriate framework for owning the company by the producers themselves. Along this line, "Service Producer Companies" may be promoted to enhance the social status of vocational training. Convenience-craving consumers are always looking for a way to do things better, faster and cheaper. Often, that means turning to a speciality-services entrepreneur who knows how to get the job done right. This means huge opportunities for promoting service producers companies. Currently, labour agencies have occupied this space. These agencies will be replaced by direct service producer companies managed by the tech-voc graduates. This will require provision of entrepreneurship skills and support for self-employment in any skill development programme.
The number of practical training places in vocational education and training shall be increased in both private and public enterprises through, among other things, a national campaign for cooperation with business and organisations.

3.7.3 Schooling

3.7.3.1 Primary and secondary sector enrolment ratios are rather high in Kerala and the dropout rate is almost zero at this level. However, a major challenge is that the quality is deteriorating and school fee is going up due to increasing privatisation of education. It will be the government's aim that all pupils have excellent academic skills and knowledge at affordable price.
The term quality entails two things:

- Conditions for quality including, infrastructure, resources, teacher supply, and of course access, enrolment and retention
- Pedagogy, learning, classroom processes, and evaluation systems.

3.7.3.2While the former does not pose much challenge in the case of Kerala, the latter needs a review. The issue of quality in terms of its content and pedagogical methods is becoming increasingly important. A plethora of claims have emerged about what constitutes 'best practice' in teaching and learning (teacher-centred or student-centred) and about the virtues of different pedagogical nostrum – group work, activity methods, joyful learning, child-centred teaching, teaching-learning materials, personalised learning, and interactive teaching. The National Curriculum Framework 2005 is centred on the idea that human knowledge and learning is actively constructed by the learner, not passively received from the environment. It is based on the belief that the learners are capable of constructing knowledge themselves. Teachers are not containers of knowledge. Their role is to support the process of learning and encourage knowledge formation not merely by transferring information but by promoting creativity, knowledge and development of relevant skills through interactive teaching. This will require far-reaching reforms in the education system.

Element 1: International bench marking:

3.7.3.3 School education will be benchmarked against that of Finland. Finland is an international leader in school education. It has consistently ranked in the very top tier of countries in all Programme for International Schooling Assessment (PISA) over the past decade, and its performance has been especially notable for its remarkable consistency across schools. Finnish schools seem to serve all students well, regardless of family background or socio-economic status. It has been observed that educators and policy makers from different parts of the world travel to Finland to understand its system of school education.

Element 2: Participation in PISA:

3.7.3.4 Programme for International Student Assessment (PISA) is a programme of the Organisation for Economic Cooperation and Development (OECD), an intergovernmental organisation of industrialised countries. It is conducted by the National Center for Education Statistics (NCES) in the US Department of Education and its contractor. It compares national progress against international standards and identifies strengths and weaknesses in regions' education systems. In 2009, two Indian states, Himachal Pradesh and Tamil Nadu, participated in PISA and were ranked at the bottom (72nd and 73rd out of 74 countries) in mathematical and reading abilities. Thus, participating schools can use the results to benchmark their performance against schools across the world. Participation in this programme will be a leap towards ensuring international standards in school education.

Element 3: A common comprehensive school system:

3.7.3.5 The first best option for reforming the standards of school education will be to merge parallel sets of schools namely government, private aided and private schools, into a unified school system which is known as the Common School System (CSS). This is the single most important reform that laid the foundation of higher schooling standards in Finland. Most other developed countries practise similar systems. Following their experience, the Kothari Commission had recommended a Common School System of Public Education (CSS) as the basis of building up the National System of Education in the mid–1960s. However, this system could not be implemented. The system is based on the principle that students from different social and economic classes and with different abilities will be studying in the same schools, which will be a significant leap towards achieving social equity. More importantly, this will create social capital and better learning environment for all to contribute to economic prosperity. The resistance to such a system is bound to come. In Finland also, its implementation took a while. The system will be introduced in India in a phased manner through consensus.

It must be clarified here that CSS does not mean that privately-managed schools will not be permitted. On the contrary, CSS implies that all schools – irrespective of the type of their management, sources of income or affiliating boards of examinations – will participate and fulfil their responsibility as part of the National System of Education. This means that it will be the responsibility of the private players to participate in the government programme of "free and compulsory education". It means equitable (not uniform) quality of education for all types of schools, be they government, government-aided, local body or private schools at an affordable price. Parliament has expressed its commitment to CSS twice in its resolutions on the National Policy on Education, respectively in 1986 and 1992. Yet, the concept could not be translated into practice. Kerala can take a lead in this initiative using two-pronged policies:

- Raise the quality of education in government schools in terms of minimum physical infrastructure, professional quality of teachers and teacher-student ratio; curriculum; and pedagogy for holistic, child-friendly and liberal education. An incentive structure based on PISA scores maybe the guiding force.
- Bring the private schools into the ambit of CSS. A carefully constructed programme of incentives, disincentives, persuasion and, eventually legislation, may include grants for children from low-income groups, computed at the rate of allocation per child in government schools, such that all children have access to this education; disincentives may include gradual withdrawal of all hidden subsidies to private schools, like cheap land, tax-free income and exemption from income tax on donations, teachers trained at public cost, etc.

Element 4: Introduction of unified curricula:

3.7.3.6 A unified curriculum with emphasis on importance of mathematics, science and technology will be introduced. It will be designed such that it promotes creativity, problem-solving, teamwork and cross-curricular projects in schools. The school education will lay foundation for the skilled workers in a knowledge economy who can think differently or create original ideas. In Finland, linkages have been forged between schools and industry. Finnish industry sends very strong signals to the schools about the kinds of knowledge, skills and dispositions young people need in order to be successful in the new economy. They also promote the ideas of team work.

The new curriculum will draw on the National Curriculum Framework 2005 to introduce a shift away from traditional teacher-directed syllabus-driven classroom contexts to learning and knowledge creation in classrooms. Schools will promote creativity and independence and prepare them for further education.

Element 5: Teachers' training

3.7.3.7 The new approach will require "individualised attention" to be given to all children, and emphasis on mathematical, logical and scientific skills, and team work. To implement this approach, the professional development of teacher educators/trainers will be a critical enabling condition. It would require investment of huge efforts and resources in increasing the knowledge and practical skills of administrators and teachers at educational institutions (personnel) and operators of educational institutions to make it work. A new teacher training education programme will be developed aiming at ensuring better quality and increased opportunities for specialisation and a targeted effort in continuing education of teachers and school managers. Entrance to the training programme will be through a state-wide prestigious recruitment test. Further, a special, comprehensive and compulsory in-service training programme for all teachers will be instituted to ensure lifelong learning. Campus recruitment of teachers will add to the prestige of the course. Interestingly, in Finland, primary school teaching is now the most popular profession among the Finnish youth, attracting the top quartile of high school graduates into its highly competitive teacher training programmes. This strengthens the foundation of their education system. The education imparted in the early years has a lasting impact on the future of the children. The Twelfth Five-Year Plan (2012–17) places strong emphasis on the quality of education in the early years.

Element 6: Arrangement for special services

3.7.3.8 Schools will offer more than education. These will be full-service schools providing health services, mid-day meals, guidance and psychological counselling, and access to a broader array of mental health and other services for students and families in need. Mainstreaming of

students with differential abilities will add to the objective of social inclusion. It will also provide these students better opportunities to grow and greater acceptability in the society. There may be arrangements for counsellor services for them and school infrastructure should be friendly to them.

Element 7: Expansion in infrastructure in backward areas

3.7.3.9 With the enrolment at the primary and secondary levels of education on decline in the absolute terms, thanks to the demographic transition which led to fertility decline, the state might consider strengthening the existing elementary schools rather than building the new ones. Nevertheless, some expansion may be needed in tribal-dominated areas where accessibility still appears to be a problem. Partnering with the organisations working for *adivasis* and fishermen would not only help understand the problems of these deprived groups better, but would also help to take them into confidence.

3.7.4 Preschool facilities

3.7.4.1 Day-care facilities and preschool class play a very important role in the personal, intellectual and social development of children. This shall be achieved through the following initiatives in particular:

- Making the preschool class an obligatory part of a basic school.
- Setting standards for preschools,
- Preparing curricula for day-care facilities.
- Introducing reading in the preschool class.

3.7.4.2 Private players will be invited to promote uneconomic primary schools on a contract basis through an open statement of interest. The contract will be renewed only upon the satisfaction of the conditions. Transparency will be maintained by developing quantitative criteria of performance and through constant monitoring and evaluation.

3.8 Life-long learning

3.8.1 In a knowledge economy, inventiveness and work efforts of people, together with their ability to continuously develop, produce and sell new goods and services, are a key to exploiting the opportunities presented by globalisation and technological development. Continued growth in the economy will be dependent on continuous upgrading of learning. Besides, the labour force is ageing. This too presents a challenge. The skills of the labour force must therefore be upgraded at all levels. This requires a well-designed strategy for life long learning and adult education. A high level of educational attainment together with good opportunities for lifelong learning are

among the most important preconditions for strong competitiveness and for everyone to be able to actively participate in achieving sustainable prosperity. Major goals of the strategy will be as follows:

- Everyone shall engage in lifelong learning.
- Adult education and continuing training must provide everyone with opportunities to improve competences and support good jobs
- Adult education and continuing training must reflect changes in the qualification requirements and needs of the labour market.

Key initiatives

3.8.2 A legislative framework will be required to facilitate lifelong learning to motivate people to upgrade skills and create demand for such programmes with following key initiatives:

3.8.3 **Guidance and counselling about opportunities** in adult education and continuing training for workers and enterprises must be improved. The guidance effort shall contribute to strengthening the demand from both employees and enterprises.

3.8.4 **Create better opportunities for individuals to update their knowledge:** Stronger training institutions are to be developed. It will be the Government's goal to create fewer and stronger institutions with a large academic breadth and high quality. This will help develop and future-proof education and training, and help strengthen knowledge development and innovation through interaction with research and enterprises etc

3.8.5 **Skill development programmes:** The Government must enter into a framework agreement with knowledge partners to ensure high quality and relevant skill development programmes.

3.8.6 **Integrate skills with employment opportunities:** Adult education and continuing training efforts must support good job opportunities for individuals. Promotions may be directly linked with skill development.

3.9 Technology enhanced education programmes

3.9.1 Finally, it is proposed that education has to shift from imparting a static package of knowledge to a dynamic goal of being able to create knowledge and deploy skills to new situations. The education systems need to be flexible with a shift in the *role* of the administrator from being a *controller* to an *enabler*, so as to liberate the energies and talents of the teachers and remove impediments that are getting in the way of their work. The education system needs

to promote self-driven learning of the students and the mode should change from instructions to conversation. The use of technology can play an important role in this process. Education at all levels needs technology that is designed for learning and teaching. Without it, educations will languish, locked in an analogue mind-set while the rest of society goes digital. Six broad themes in promoting the use of ICT in education are as follows:

- Exploit the power of ICT to enhance learning
- Allow technology to help learners apply their education to the real world.
- Utilise artificial intelligence to personalise teaching and learning.
- Enhance teachers' productivity with new tools for designing teaching and learning.
- Empower the digitally and socially excluded to learn with technology.
- Unleash learners' creativity through building and tinkering.

3.10 Conclusion

3.10.1 The proposed education strategy will help create a world-class education system and have everyone participate in lifelong learning. It will help develop Kerala as a leading knowledge society in a globalised world.

CHAPTER 4

HEALTH SECTOR

Kerala has already built a strong health care system and has achieved for its people a level of health status, which is comparable with advanced countries in many aspects. In spite of this, there are major challenges. Shifting family structures, an aging population, and increasing social inequities are all exacerbating health problems. For Kerala, the health sector is the backbone of economic and social prosperity. Kerala's health sector would focus on twin goals of health care promotion, namely "health for all" and "health hubs". The new health strategy requires participation by all: public, communities, and government. Health costs need to be brought down and out-of-pocked expenditures reduced. Health hubs will be the hotbed of innovative activity in health care with complementarities in education. This will only benefit citizens of Kerala in multiple ways – proving jobs, making the best health care in the world available to the local people etc.

4.1 Background

4.1.1 Health is vital for human well-being. It contributes to the quality of life and enhances peoples' ability to enjoy life and relationships. In a knowledge economy, health is also a major contributor to economic growth. The state of health can affect the growth path of an economy through various channels. Healthier workers are more productive; they have higher learning capacity, efficiency, coping skills, and creativity. More specifically, health is a component of human capital, analogous to skill component.

4.1.2 In this era of globalisation and information technology, health systems contribute to growth not only by improving human capital but also by participating directly in the growth process through trade and investment. Health services have become tradable and have significantly transformed the sector across different parts of the globe. There has been growing corporatisation of health care facilities. These facilities have become more entrepreneurial and enterprising by contributing to income generation and by enhancing the national competitiveness in innovation, research and development, and technological advancement. Kerala has already built a strong health care system and has achieved for its people a level of health status, which is comparable with advanced countries in many aspects. In spite of this, there are major challenges. Shifting family structures, an aging population, and increasing social inequities are all exacerbating health problems. On the other hand, internationalisation of health care has opened up vast opportunities for direct trade and investment in this sector. A big challenge is to tap these opportunities while addressing the challenges. There is thus a need for new approaches to deal effectively with the health care challenges of the future.

This chapter proposes a Perspective Plan for Kerala with an aim to meet emerging health challenges and ensuring high quality and affordable health care for all.

4.2 Kerala's Achievements in Health Care

4.2.1 Historical Review of Health Policy in Kerala till 1956[1]

Public health policy interventions of the Travancore region in Kerala are well documented in literature. While the motivation to intervene may have been contentious, i.e. whether it was the long cultural history of the region (Kutty, 2001 and Singh, 2010) or fear of being annexed by the British due to mis-governance (Singh, 2010), the interventions gained strength due to social movements from various caste and religious group[1] The indigenous system of Ayurveda, which mainly comprised family physicians, gave way to modern medicine with the arrival of the British. The relatively more egalitarian public health interventions in the latter part of the 19th century set the trajectory of Travancore apart from the rest of the country in the health sector. The Malabar region of Kerala was distinct from the Travancore region but soon caught up with the health achievements of the Travancore region within a decade[2].

4.2.2 Health achievements till 1956

The health achievements in Kerala were notable indeed, especially when compared to other Indian provinces. However, as Singh (2010) notes that the absolute levels of social development in Kerala in 1947 were very low. The following statistics highlight Kerala's achievements in health as compared to the rest of India:

- Ramachandran (1998)[3]
    - Life Expectancy for males in Kerala during 1921−30 was 29.5 years and during 1951−61 was 44.5 years. The corresponding numbers for Indian males were 26.9 and 35.5, respectively. Life expectancy for Kerala females during 1921−30 was 32.7 and during 1951−61 was 44.5 years. The corresponding numbers for Indian females were 26.6 and 35.7, respectively.
    - Birth rate in Kerala (per 1,000) was almost equal to India: In 1941−50, it was 39.8 in Kerala versus 39.9 in India.
    - Death rate was lower in Kerala during 1941−50 versus India: 18 per 1,000 versus 27 per 1,000 respectively.

[1] The two references for this section are:

1. Kutty, R. V. 2000. Historical analysis of the development of health care facilities in Kerala State, India. *Health Policy and Planning*. 15(1). 103−109.
2. Singh, P. 2010. We-ness and Welfare: A Longitudinal Analysis of Social Development. *World Development*. 39(2). 282−293.

[2] Shah, A. 2010. Putting "Kerala Model" to Rest: Lessons for a New Era of Development in India. *The American Enterprise Institute Working Paper Series On Development Policy Number 4*, September.

[3] Ramachandran, V. K. 1998. On Kerala's development achievements. In J. Dreze, & A. Sen (Eds.), *Indian development: Selected Regional Perspectives* (pp. 205–356). Delhi: Oxford University Press.

- Infant mortality rate was lower in Kerala versus India during 1941−50: 153 per 1,000 live births versus 192 per 1,000 live births, respectively;

- Sadanandan (2001)[4]
  - The number of institutions per 1,000 square miles in 1940 in British India was 6.8, Mysore 11.9, and Travancore 22.56.
  - The number of beds per lakh population in 1940 in British India was 21.27, Mysore 46.78, and Travancore 46.81.

4.2.3 Health Policy and Achievements post 1956

4.2.3.1 Progressive health policies were further augmented by the socio-political movement in Kerala after the formation of the state on 1st November, 1956. From the beginning, the budget allocation for the social sector consisting of health and education, by the state government was significant. This sector was assigned as one of the priority development sectors by the government.

4.2.3.2 Notably, Kerala had already built the foundation for accessibility to health care for all its citizens at the time of its formation. Since then, all elected governments in Kerala, irrespective of their political leaning, have sustained the tradition of massive state support to health. The period from state formation to the early 1980s was characterised by a tremendous expansion of government health care services. Kerala devoted a higher proportion of revenue expenditure on health compared to other states right from 1960 onwards (Sadanandan, 2001)[5]. The mid−1970s witnessed an outbreak of 'fiscal crisis' for the state government[6]. However, health sector spending continued to grow even during this period. It was in the mid−1980s, that the growth in state health care expenditures started slowing down. The gap between Kerala and rest of India in terms of share of revenue expenditure devoted to health has narrowed since the late 1970s as per the data (Sadanandan, 2001)[7]. Further, the share of revenue expenditure devoted to health has come down for Kerala.

4.2.3.3 The trend of health care expenditure (medical and public health) as a proportion of total revenue expenditure for the last 12 years along with other major Southern states is presented in Table 4.1[8]. While Kerala continues to perform relatively better than the other

[4] Sadanandan, R. 2001. Government Health Services in Kerala: Who Benefits? *Economic and Political Weekly*. 36(32). 3071−3077. August 11.

[5] Kerala devoted the following percentage of its total revenue expenditure to health for the period: 10.45 per cent in 1960−65, 10.41 per cent in 1965−1970, 9.58 per cent in 1970−75, 10.33 per cent in 1975−79, 9.14 per cent in 1980−85, 9.07 per cent in 1985−90, and 8.6 per cent in 1991−95. The numbers for all India (all states) for the corresponding periods are 8.3, 7.96, 8.3, 9.8, 9.8, 9.5, and 8.1 per cent, respectively.
Sadanandan, R. 2001. Government Health Services in Kerala: Who Benefits? *Economic and Political Weekly*. 36(32). 3071−3077. August 11.

[6] Kutty, R. V. 2000. Historical analysis of the development of health care facilities in Kerala State, India. *Health Policy and Planning*. 15(1). 103−109.

[7] Sadanandan, R. 2001. Government Health Services in Kerala: Who Benefits? *Economic and Political Weekly*. 36(32). 3071−3077. August 11.

[8] Capital health expenditure forms a small share of total expenditure and therefore not incorporating in the overall health expenditure does not significantly affect any interpretations of the numbers.

states, the share of medical and public health expenditure has come down over time (after 2001-2002). Overall, medical and public health revenue expenditure as a per cent of GSDP has declined from 0.97 per cent in 1984−85 to per cent to 0.63 in 2010−11[9].

Table 4.1: Health Expenditure as a percentage of Revenue Expenditure across Southern states, 1999−2000 to 2011−12 (3−year moving average, (%)

State/Year	*Andhra Pradesh*	*Karnataka*	*Kerala*	*Tamil Nadu*
1999−00	4.8	4.7	**5**	4.7
2000−01	4.5	4.6	**4.9**	4.5
2001−02	4.2	4.2	**5.4**	4.5
2002−03	4.2	4.2	**4.5**	3.7
2003−04	4	3.7	**4.6**	4
2004−05	3.8	3.4	**4.6**	3.8
2005−06	3.7	3.6	**4.5**	3.5
2006−07	3.6	3.1	**4.7**	3.4
2007−08	3.8	3.4	**4.4**	3.4
2008−09	3.7	3.6	**4.8**	3.5
2009−10	4.4	3.4	**4.7**	4.2
2010−11 (RE)	4.2	3.7	**4.9**	4.6
2011−12 (BE)	4.3	4	**5.3**	3.8

Notes: RE stands for revised estimates and BE for Budget Estimates

Source: Compiled by NCAER from Comptroller and Auditor General of India. 2012 and previous reports. *Combined Finance and Revenue Accounts- Union and State*. http://saiindia.gov.in/english/home/Our_Products/Accounts/Combined_Finance/Combined_Finance.html.

4.2.3.2 The outcome of the government's efforts in promoting the health care sector is reflected in health indicators of the state. The summary statistics of six basic health indicators are presented in Table 4.2. These are: life expectancy at birth (LEB), crude birth rate (CBR), crude death rate (CDR), maternal mortality rate (MMR), infant mortality rate (IMR), total fertility rate (TFR), general health, women's health, and mental health problem and suicide rates in the state. Notably, the state has been the top performer in terms of basic health indicators among Indian states. It fares better than the all−India statistics in each of the six indicators.

[9] The revenue expenditure numbers differ in the Statistics for Planning 2009 and Economic Review documents, both products of the Government of Kerala. Therefore, the central statistics have been used here.
Comptroller and Auditor General of India. 2012 and previous reports. *Combined Finance and Revenue Accounts- Union and State*. http://saiindia.gov.in/english/home/Our_Products/Accounts/Combined_Finance/Combined_Finance.html and Directorate of Economics and Statistics, Government of Kerala.

Table 4.2: Health indicators: Kerala vis-à-vis All India average in 2012

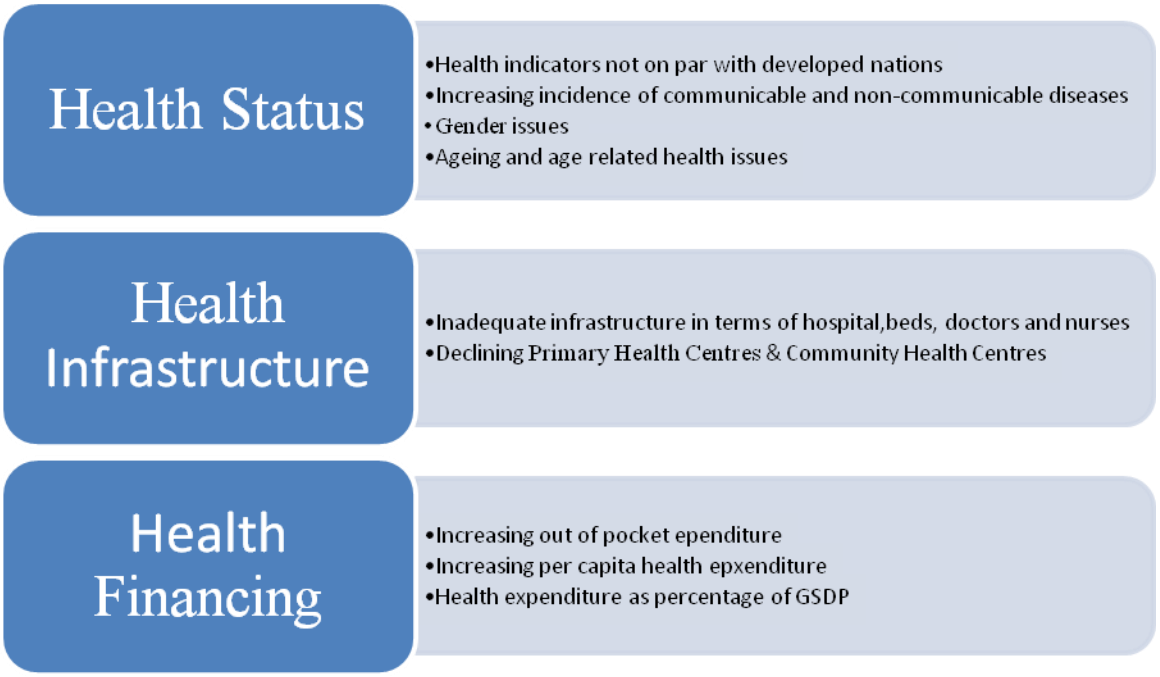
Indicator	*Kerala*	*India*
Life Expectancy at Birth (years)	74	63
Crude Birth Rate per 1,000 people	14.8	22.1
Crude Death Rate per 1,000 people	7	7.2
Maternal Mortality Rate per lakh live births	81	212
Infant Mortality Rate per 1,000 live births	13	47
Total Fertility Rate (number of births per woman)	1.7	2.6

Source: State Planning Board. 2013. *Kerala Economic Review 2012*. Government of Kerala, Thiruvananthapuram

4.3 Health challenges

Despite intensive efforts by the state, health challenges remain which are not being adequately addressed by current health policies and practices. These challenges are three-fold and are presented in Figure 4.1.

Figure 4.1: Health challenges



Source: Conceptualised by NCAER

4.3.1 Health status

Lags behind the advanced countries in terms of the certain health indicators

4.3.1.1 Table 4.3 presents the performance of selected low, middle, and high income countries in terms of three health indicators: MMR, TFR, and IMR. It reveals that not only is the TFR in Kerala on par with many of the upper middle-income and high-income countries; but it is also lower than some of the representative countries in the two categories. The state has been able to curb population growth successfully, which is evident from the high level of life expectancy, low level of mortality, and total fertility rate. However, Kerala's performance lags behind advanced countries in terms of MMR and IMR. Indeed, it is doing better than the low-income countries but its performance is not comparable with the upper-middle-income and high-income ones.

Table 4.3: Kerala and the World: Basic Health Indicators

Country	Maternal Mortality Rate, (2010) Adjusted	Total Fertility Rate, (2011)	Infant Mortality Rate (under age 1 year), (2011)
Unit	per 1,00,000 live births	Births per woman	per 1,000 live births.
Low-income & Low- middle income economies			
Kerala*	**81**	**1.7**	**13**
India	200	3	47
Ethiopia	350	4	52
Somalia	1,000	6	108
Bangladesh	240	2	37
Pakistan	260	3	59
Upper Middle-income economies			
Thailand	48	2	11
Malaysia	29	3	6
China	37	2	13
Sri Lanka	35	2	11
High-income economies			
UK	12	2	4
Canada	12	2	5
US	21	2	6

Note: * Figures for Kerala are for the year 2012

Sources: UNICEF website, http://www.unicef.org/infobycountry/ and State Planning Board. 2013. *Kerala Economic Review 2012*. Government of Kerala, Thiruvananthapuram

"Kerala has performed remarkably well in reducing the infant mortality rate from 120 in the 1950s to 14 in 2000. The decline in IMR in Kerala almost ceased by the 1990s. For several years, IMR has remained around 14−15 per 1,000 live births, with virtually no change"[10]. The Sample Registration System (SRS) shows that IMR was 16 in 1998, reduced to 10 in 2002, before increasing again to 14 in 2005 and then declined again to 10 in 2007[11]. The average IMR between 1998 and 2007 has been 12.7. This shows that Kerala may fall in the middle human development trap as mentioned in the second chapter.

Spatial inequities in health indicators within Kerala

District Disparities

4.3.1.2 There is a significant disparity in the performance of health indicators across the districts in Kerala (Table 4.3). Health indicators for 2001 presented in Table 4.3 reveal that Idukki and Wayanad have been the worst performers in terms of infant mortality rate and life expectancy at birth.

Table 4.3: District-wise Health Indicators, 2001

State/Districts	***Infant Mortality rate (per 1,000 births)***	***Life Expectancy at Birth in 2000***	***Total Fertility Rate (per woman)***
Alappuzha	8	77.1	1.6
Ernakulam	11	75.9	1.5
Idukki	20	72.4	1.5
Kannur	12	75.6	1.6
Kasaragod	10	75.7	2.4
Kollam	8	77.1	1.9
Kottayam	12	75.6	1.6
Kozhikode	12	75.4	1.5
Malappuram	10	75.6	1.8
Palakkad	11	76.1	1.6
Pathanamthitta	8	76.7	1.7
Thiruvananthapuram	11	75.2	1.7
Thrissur	9	76.4	1.6
Wayanad	22	73.5	2
Kerala	**12**	**71**	**1.7**

Source: State Planning Board, Government of Kerala. 2006. *Human Development Report 2005*. Prepared by the Centre for Development Studies, Thiruvananthapuram

[10] Planning Board, Government of Kerala. 2006. *Human Development Report 2005*. Prepared by the Centre for Development Studies, Thiruvananthapuram.
[11] Department of Economics and Statistics website, Vital Statistics. http://www.ecostat.kerala.gov.in/index.php/vital-statistics.html.

Low Rural-Urban Gap

4.3.1.3 The Sample Registration System (SRS) from 2010 shows that the IMR is higher in the Northern region (16) versus the Southern region (13)[12]. The SRS data show that overall the IMR is 14. The TFR is same for both rural and urban regions at 1.8 in 2010. The per cent of live births where the mothers received medical attention at either government or private hospital is 99.5 per cent in rural areas and 99.6 per cent in urban areas in 2010. This is considerably higher than the rest of India. The per cent of medical deaths where medical attention was received before death, either at Government or private hospitals was 76.8 in rural areas and 61.6 in urban areas 2010.

High morbidity

4.3.1.4 Morbidity rate is the relative incidence of a particular disease in a specific locality. The State Human Development Report 2005 (henceforth referred to as HDR, 2005) brought this particular issue to the limelight by citing a series of studies conducted since 1974−75[13]. The earliest study cited in the HDR 2005 conducted in 1974−75 showed that Kerala's morbidity was the highest in India, 71 per 1,000 persons in case of acute illness and 83 per 1,000 persons in case of chronic illness. Various studies throughout the years support this finding of HDR, 2005. Few other salient points about morbidity rates in Kerala are:

- Navaneetham, Kabir and Krishnakumar (2009) cite other studies to report that morbidity rates have increased over the years.
- NSS data from 2004 (60th Round) shows that the combined morbidity rate in Kerala was 25.1 per cent while the Indian morbidity rates were 9.1 per cent[14].
- Rural morbidity rates (25.5%) were marginally higher than urban morbidity rates (24.1%) in 2004[15].
- Female morbidity rates (9.69%) were higher than male morbidity rates (8.56%) in 2004 [16];
- Using a primary survey conducted in three districts of Thiruvananthapuram, Kannur and Malappuram in 2004, Navaneetham, Kabir and Krishnakumar (2009) confirm results of the previous studies and also find that morbidity rates are higher for SC (261.5 per 1,000 people) and ST (254 per 1,000) versus overall three districts (241.6 per 1,000 people)[17].

The HDR (2005) mentions the discussion in the literature as to the reasons behind the high morbidity rates[18]. Since morbidity rates are based on surveys of illnesses as perceived by the

[12] Office of the Registrar General and Census Commissioner, India. Sample Registration System 2010.
[13] State Planning Board, Government of Kerala. 2006. *Human Development Report 2005*. Prepared by the Centre for Development Studies, Thiruvananthapuram.
[14] Suryanaryana, M.H. 2008. Morbidity and Health Care in Kerala: A Distributional Profile and Implications. IGIDR Working Paper No. WP-2008-004. Indira Gandhi Institute of Development Research, Mumbai.
[15] Ibid.
[16] Ibid.
[17] Navaneetham,K., Kabir, M. and C.S. Krishnakumar. 2009. Morbidity Patterns in Kerala: Levels and Determinants. *CDS Working Paper No. 411*. Centre for Development Studies, Thiruvananthapuram.
[18] The reference for this paragraph is the:

respondents, one argument was that the reported rates of morbidity might be due to better reporting, given the higher levels of education and awareness among the people about health care services. The HDR 2005 cites a KSSP study of 10,000 households conducted in 1987 to report that the high morbidity rates cannot be just perception, for two reasons given in the study – (i) Infections constitute a large amount of morbidity and, (ii) poor people reported more illness more than rich.

Morbidity rates vary with respect to communicable and non-communicable diseases in the state:

Communicable diseases

4.3.1.5 "Communicable diseases such as Dengue, HIV/AIDS, Malaria, Leptospirosis, Hepatitis, Chikungunya, HINI fever, etc., are increasing every year. Thiruvananthapuram district is almost endemic to Dengue and reporting about two thirds of cases in the state"[19]. Appendix 4.1 describes all the major communicable diseases. The numbers of Swine Flu and Chikungunya cases have come down over time (Table 4.4). Kerala had the highest number of lab- confirmed case of HINI Fever or Swine Flu in 2011. The numbers of dengue and malaria cases have varied from year to year but there is a linear positive trend between 2007 and 2011. Further, there is a significant outbreak of a few communicable diseases like leptospirosis, which is an emerging zoonotic disease especially during monsoon.

Table 4.4: Morbidity: Communicable Diseases in Kerala, 2007 to 2011 (Number of Cases)

Disease	***2007***	***2008***	***2009***	***2010***	***2011****
Chikungunya	909	492	711	209	58
Dengue	603	733	1,425	2,597	1,281
HINI Fever/Swine Flu	NA	NA	1,440†	1,483	210
HIV/AIDS	1,769	4,407	6,106	7,664	9,751
Leprosy	870	778	827	884	931
Malaria	1,927	1,804	2,046	2,299	1,339
Pneumonia	15,659	14,446	18,568	19,694	21,390
Tuberculosis (TB)	24,339	24,935	27,019	26,255	26,126

Notes: * All 2011 numbers are provisional
†Data are from May to December, 2009
Chikungunya: Number of confirmed cases
HINI: Lab Confirmed Cases
HIV/AIDS: Number of Patients who ever started on Anti-retroviral Therapy (ART)

State Planning Board, Government of Kerala. 2006. *Human Development Report 2005*. Prepared by the Centre for Development Studies, Thiruvananthapuram.

[19] State Planning Board. 2013. *Kerala Economic Review 2012*. Government of Kerala, Thiruvananthapuram.

Leprosy: Total new cases detected
TB: Number of TB Patients Declared and Registered for Treatment (DOTS)
Sources: Central Bureau of Health Intelligence (CBHI), Directorate General of Health Services, Ministry of Health and Family Welfare, Government of India. 2011 and previous reports. *National Health Profile 2011: January to December*. New Delhi.

4.3.1.6 "During 2007, out of the 1, 359 cases reported of leptospirosis, 17 per cent of cases resulted in death. The rate has come down to 7.4 during 2011 and to 2.2 in 2012"[20]. Japanese encephalitis has become a serious problem in the state.

Non-communicable diseases

4.3.1.7 Kerala has matured over time and its health challenges are different from that of the rest of the country. While it has achieved a good degree of success on basic health indicators, it is yet to achieve the benchmarks of high-income countries in IMR, MMR, TFR, and LE. Simultaneously, Kerala is being associated with lifestyle diseases (HDR, 2005).

4.3.1.8 A considerable proportion of people suffer from various lifestyle diseases such as asthma, goitre, diabetes, obesity, etc. The intensity of **asthma and goitre** diseases is significantly higher among women as compared to men in Kerala, as is presented in Table 4.5. The number of people in Kerala suffering from heart disease and high blood pressure is also increasing.

Table 4.5: Non-Communicable diseases, Number of Cases, 2005−06

Morbidity - Non Communicable Disease (2005−06)

Disease	*Gender*	*Kerala*	*India*
Diabetes	Male	3,078	1,051
	Female	2,549	881
Asthma	Male	2,984	1,627
	Female	4,037	1,696
Goitre or any other thyroid related disease	Male	1,888	383
	Female	5,744	949

Note: Number of men and women age 15−49 per 1,00,000 who reported that they have above mentioned diseases

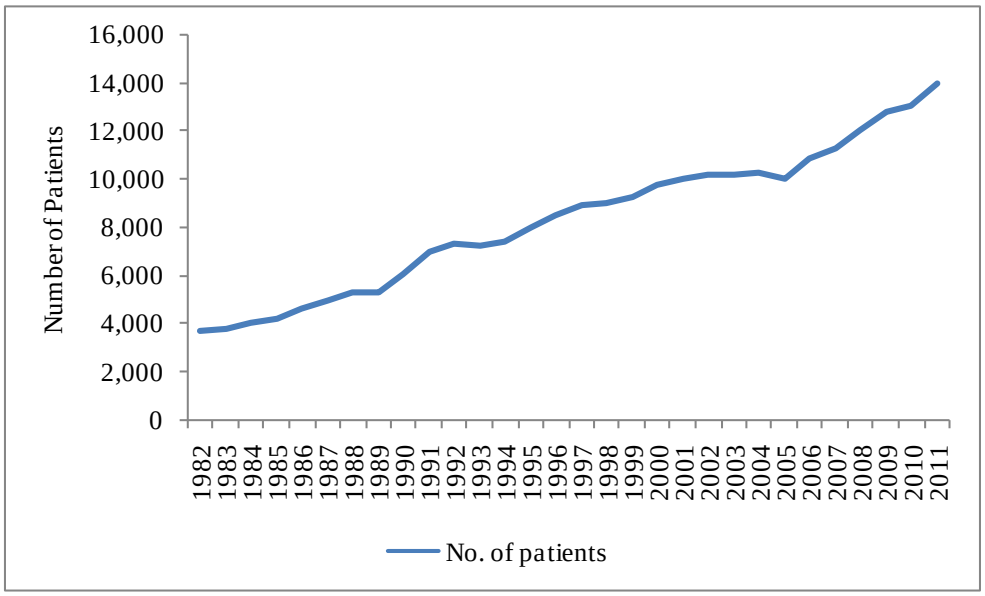
Source: International Institute of Population Sciences (IIPS) and Macro International. 2007. *National Family Health Survey (NFHS−3), 2005−06*: India Volume I.Mumbai: IIPS.

Cancer

[20] The number of Leptospirosis cases could not be confirmed from CBHI. Therefore, the numbers have been taken from the following source.
State Planning Board. 2013. *Kerala Economic Review 2012*. Government of Kerala, Thiruvananthapuram.

4.3.1.9 Increasing cases of cancer has become a matter of concern in Kerala along with the rest of India. As mentioned in the 12th Five Year Plan Document [21], number of new cancer patients registered has increased from 11,173 in 2006−07 to 13,040 in 2009−10, while existing number of cancer patients has increased from 1,29,974 to 1,67,628 during the same period. Figure 4.2 shows the rising number of patients at the Regional Cancer Centre in Thiruvananthapuram. As per the Regional Cancer Centre in Thiruvananthapuram, in Kerala among males, 50 per cent of cancers that occur in the mouth, throat and lungs are caused by tobacco and alcohol habits[22]. Among women in Kerala, age adjusted incidence rates are highest for breast cancer amongst urban and rural Thiruvanthapuram and Karunagapally[23]. The latter is located on the coast of Kerala and is particular known for cancer incidence.

Figure 4.2: Number of Cancer Patients at the Regional Cancer Centre, Thiruvananthapuram 1982 to 2011



Source: Regional Cancer Centre. 2012. Hospital Based Cancer Registry Consolidated Report 1982−2011. http://www.rcctvm.org/AnnualRep.htm, Thirvananthapuram, December.

4.3.1.10 The major risk factors for cancer in India are tobacco, alcohol consumption, infections, dietary habits, and behavioural risk factors (sexual and reproductive factors) as per Murthy and Mathew (2004) [24]. Jayalekshmi et al. (2009) studied breast cancer in Karunagapally in Kerala and found that low number of pregnancies, more frequent intake of roots and tubers except tapioca (cassava), milk drinking, and consumption of chicken meat

[21]State Planning Board. 2013. *Kerala Economic Review 2012*. Government of Kerala, Thiruvananthapuram.
[22] Regional Cancer Centre, Thiruvanthapuram website. http://www.rcctvm.org/lifestyle%20and%20cancer.htm.
[23] Murthy, N.S. and A. Mathew. 2004. Cancer epidemiology, prevention and control. *Current Science*. 86(4). February 25 and Jayalekshmi P, Gangadharan P, Mani KS. 2006. . Cancer in women in Kerala- A transition from a less developed state. *Asian Pacific J Cancer Prev*. 7. 186−190.
[24] Murthy, N.S. and A. Mathew. 2004. Cancer epidemiology, prevention and control. *Current Science*. 86(4). February 25.

were found to increase breast cancer risk[25]. The study showed that consumption of tapioca which is a commonly used food item in South India, particularly in Kerala, reduced breast cancer risk. Risk analysis was attempted among pre- and post-menopausal women separately and similar odds ratio were obtained. The consumption of tapioca (cassava) decreased risk of developing breast cancer among premenopausal women, whereas the consumption of roots & tubers and usage of chicken meat increased the risk of breast cancer among post-menopausal women.

Female health

4.3.1.11 Kerala has a long history of a positive sex ratio and the latest Census re-confirms that trend. The number of females per 1,000 males shows further improvement: 1,084 females per 1,000 males in 2011 versus 1,058 in 2001[26]. However, the Census 2011 shows that sex ratio is falling in the age group of 0−6 years: 959 females per 1000 male children in 2011 versus 963 in 2001[27]. Other serious health concerns amongst females include high rate of abortion, lifestyle diseases including diabetes, hypertension, thyroid-related problems, and terminal illnesses like cancer.

4.3.1.12 The NFHS-3 states that "adults aged 15-49 years in Kerala suffer from a dual burden of malnutrition; about one-fifth of adults are too thin (18% of women and 22% of men), and more than one-quarter of women (28%) and 18 percent of men are overweight or obese. Only 54 percent of women and 61 per cent of men are at a healthy weight for their height. Undernutrition among ever-married women has declined in the past seven years from 19 per cent in NFHS-2 to 13 per cent in NFHS-3[28].

4.3.1.13 Women in Kerala also suffer from nutritional deficiency, which is clearly indicated by the prevalence of anaemia in the state. In the NFHS, anaemia is defined as anaemia-haemoglobin level < 11.0 grams/decilitre (g/dl) for children and pregnant women and less than 12.0 g/dl for non-pregnant women. Moderate/severe anaemia-haemoglobin level is below 10.0 g/dl. The per cent of women aged 15 to 49 with anaemia in 1998−99 was 22.7 per cent in Kerala. This number has increased to 34 per cent in 2005−06[29].

The NFHS- 3 also finds increase in anaemia amongst children in Kerala between 1998−00 and 2005−06.

Mental health scenario is grim in Kerala

[25] Jayalekshmi, P., Varughese, S.C., Kalavathi, Nair, M.K., Jayaprakash, V., Gangadharan, P., Nair, R.R.K. and S. Akiba. 2009. A Nested Case-Control Study of Female Breast Cancer in Karunagappally Cohort in Kerala, India. *Asian Pacific J Cancer Prev*, 10, 241−246.
[26] State Planning Board. 2013. *Kerala Economic Review 2012*. Government of Kerala, Thiruvananthapuram.
[27] Planning Board. 2013. *Kerala Economic Review 2012*. Government of Kerala, Thiruvananthapuram.
[28] International Institute of Population Sciences (IIPS) and Macro International. 2007. *National Family Health Survey (NFHS−3), 2005−06*: India Volume I.Mumbai: IIPS.
[29] International Institute of Population Sciences (IIPS) and Macro International. 2007 and previous issues. *National Family Health Survey (NFHS−3), 2005−06*: India Volume I.Mumbai: IIPS.

4.3.1.14"Health has been defined as a positive sense of well being - physical, mental, social and not merely an absence of illness. Mental health thus is an integral component of total health so mental health is not merely an absence of mental illness. It is a balance between all aspects of life like emotional, economical, spiritual, as well as physical which shows how we feel and think about our self, others and how we face life's situations"[30].

4.3.1.15"Mental health care activities in the State of Kerala are governed by the Mental Health Act, 1987 enacted by Government of India and the State Mental Health Rules, 1990. The State Mental Health Authority established in 1993 under Section 4 of the Act is responsible for regulation, development and coordination of all activities in the State connected with mental health"[31].

4.3.1.16"In Kerala 5.87 per cent (18.66 lakh) of the total population as per the 2001 census is affected with mental illnesses such as psychosis, bipolar disorder, alcohol and drug abuse etc., compared to the all India figure of two per cent"[32].

4.3.1.17 The statistics that are used to show the extent of mental health problem are taken from HDR 2005, which in turn has cited this from the Kerala State Mental Authority website (Table 4.6).

Table 4.6: The Extent of Problem of Mental Health in India

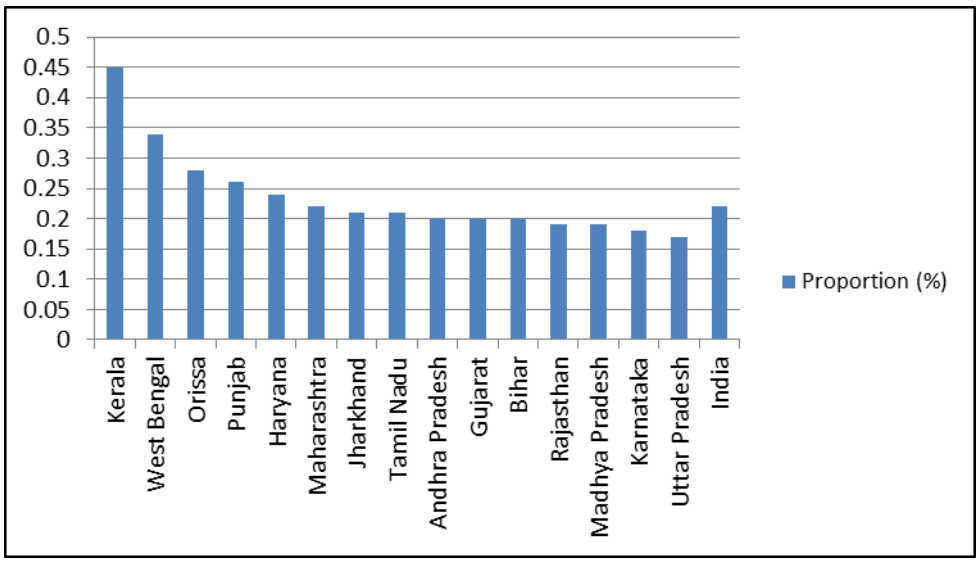
Indicator	***Statistic***
Population of Kerala (2001 Census)	3,18,38,619
Prevalence of Psychiatry Disorders (58/1,000 population)	18,46,640
Prevalence of Severe Psychiatric Disorders (10−20/1,000 population)	3,18,386−6,36,772
Neurosis and Psychosomatic Disorders (20−30/1,000 population)	6,36,772−9,55,159
Mental Retardation (0−1% of all children up to 6 years)	18,267−36,535
Psychiatric Disorders in Children (1−2% of all children up to 6 years)	36,535−73,071

Sources: Kerala State Mental Authority website, http://www.ksmha.org/kerala.htm via State Planning Board, Government of Kerala. 2006. *Human Development Report 2005*. Prepared by the Centre for Development Studies, Thiruvananthapuram

[30] Kerala State Mental Authority website. http://www.ksmha.org/.
[31] Comptroller and Auditor General of India. 2011. *Audit Report (Civil) for the year ended 31 March 2010*. http://mhpolicy.files.wordpress.com/2011/05/cag-report-on-audit-of-mh-sector-in-kerala-2010.pdf.
[32] Comptroller and Auditor General of India. 2011. *Audit Report (Civil) for the year ended 31 March 2010*. http://mhpolicy.files.wordpress.com/2011/05/cag-report-on-audit-of-mh-sector-in-kerala-2010.pdf.

4.3.1.18The 2001 Census shows that there is 0.45 per cent mentally disabled in Kerala (out of total population) in 2001, which is the highest amongst all the states in India (Figure 4.3). The corresponding number for all India was 0.22 per cent.

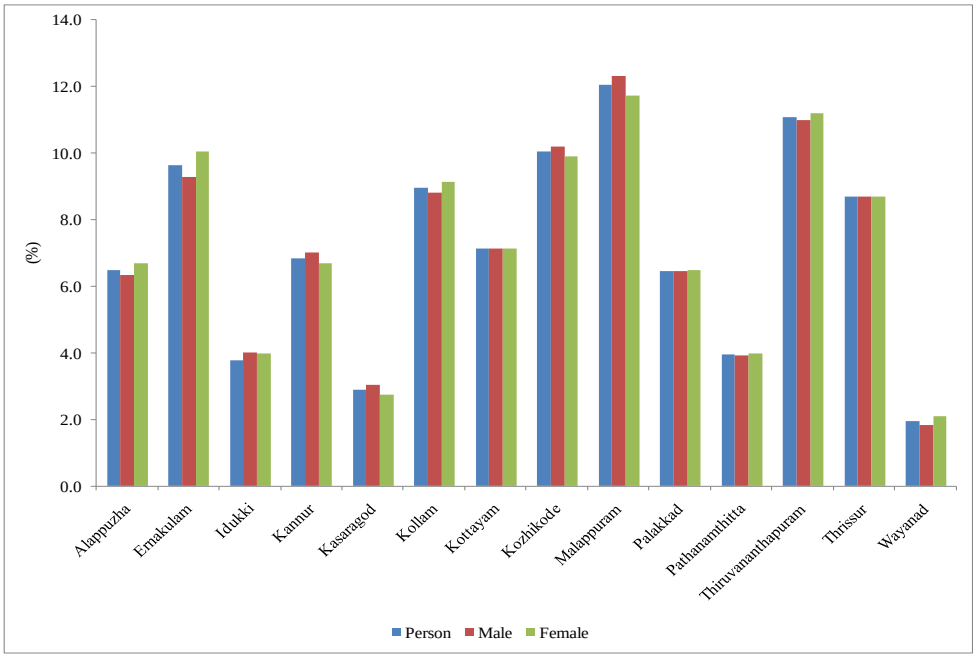
Figure 4.3: State-wise Distribution of Mentally Disabled (%), 2001



Source: Census 2001. Office of the Registrar General and Census Commissioner, India.

4.3.1.19 District-wise analysis using the census of mental disability (2001) reveals that the incidence of mental illness is relatively high in Malappuram, Kozhikode, and Thiruvananthapuram as shown in the Figure 4.4.

Figure 4.4: District-wise Distribution of Mentally Disabled, 2001 (% share of State)



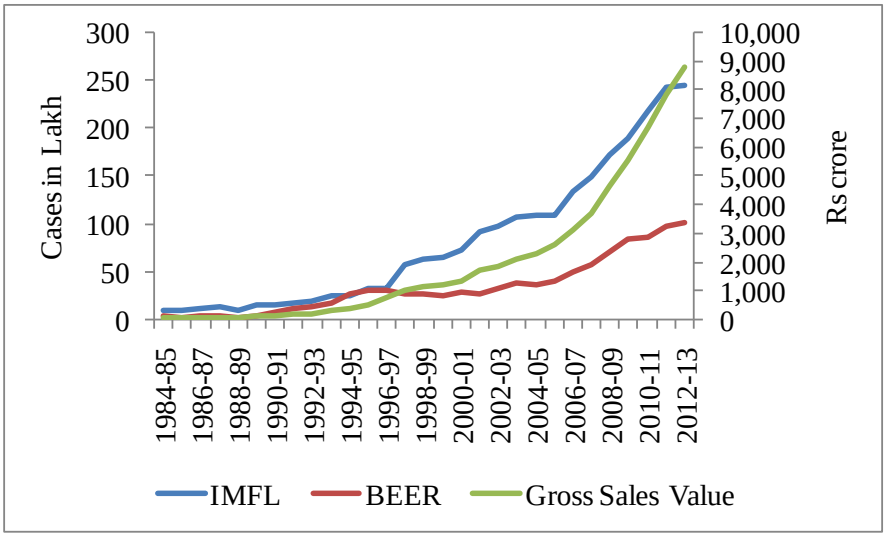
Note: y axis represents proportion of mentally disabled people in respective districts out of total number of mentally disabled people in Kerala
Source: Census 2001. Office of the Registrar General and Census Commissioner, India

4.3.1.20 The CAG (2011) sums it up using the following words - "A review of the mental health care facilities revealed absence of proper mental health planning; non-achievement of objectives of the Mental Health Policy 2000; non-utilisation of Central funds; inadequate infrastructure facilities; shortage of manpower and inadequate monitoring of mental health care facilities available in the State"[33].

Rising alcoholism

4.3.1.21 The Alcohol and Drug Information Centre-India (ADIC-India) estimates that per capita consumption of alcohol in Kerala is 8.3 litres per annum[34]. The age of first drinking has also decreased steadily from 19 years (1986) to 13 (2001)[35]. Data on sales reveal a sharp increase in sales since the mid−1990s (Figure 4.5). This could be due to a ban on toddy in that period which led to increased reporting of consumption. Yet, even after that, there has been continuous increase in the consumption of alcohol. Projections based on linear models indicate that sales of Indian Made Foreign Liquor (IMFL) will increase from 188 lakh cases (2009−10) to 287 lakh cases (2031−32). This is an increase of 58 per cent over the Perspective Plan period. Over the same period, sales of beer will increase from 85 lakh cases (2009−10) to 116 lakh cases (2031−32), an increase of 35 per cent.

Figure 4.5: Sales of IMFL and beer and net sales value of alcohol in Kerala, 1984−85 to 2012−13



Source: Kerala State Beverages Corporation Ltd. website. http://www.ksbc.kerala.gov.in/homemain.htm.

[33] Comptroller and Auditor General of India. 2011. *Audit Report (Civil) for the year ended 31 March 2010*. http://mhpolicy.files.wordpress.com/2011/05/cag-report-on-audit-of-mh-sector-in-kerala-2010.pdf.
[34] Ramanathan, H. N. and V. P. J. Raj. 2007. Prohibition! A Constitutional Promise and the Reality - A study on Indian Made Foreign Liquor Markets in Kerala. *International Conference on Marketing and the Society*. Indian Institute of Management –Kozhikkode.
[35] Ramanathan, H. N. and V. P. J. Raj. 2007. Prohibition! A Constitutional Promise and the Reality - A study on Indian Made Foreign Liquor Markets in Kerala. *International Conference on Marketing and the Society*. Indian Institute of Management –Kozhikkode..

4.3.1.22 Using unit level NFHS-3 data, NCAER has obtained a profile of male drinkers. Results reveal that, while 45 per cent of males residing in Kerala drink, in other states, this figure is only 34 per cent. This is observed in almost every socio-economic category. Only among two categories—'Professionals, technicians and management' and 'Service sector workers'—is the incidence of drinking lower in Kerala, compared to other states.

4.3.1.23 Intensity of drinking is also generally higher in Kerala (14 percent drink almost daily), relative to other states (11 percent drink daily). In particular, a higher proportion of persons aged 50-54 years, and widowers and separated persons in Kerala drink daily, compared to other states.

4.3.1.24Visits to de-addiction centres and interaction with patients and counsellors revealed a grim picture. Patients seeking treatment in de-addiction centres are mainly in the age group 18−25 years. While most of them are from low-income families—with low education levels and working as manual labourers in construction sites, or in rubber plantations, or as drivers— a not so negligible proportion are from affluent households. Peer pressure leads to drinking by the age of 16−18 years, though an alarming number of 9−10 year children drinking is increasingly being reported. Marital problems and heredity are common factors responsible for rising alcoholism in the state.

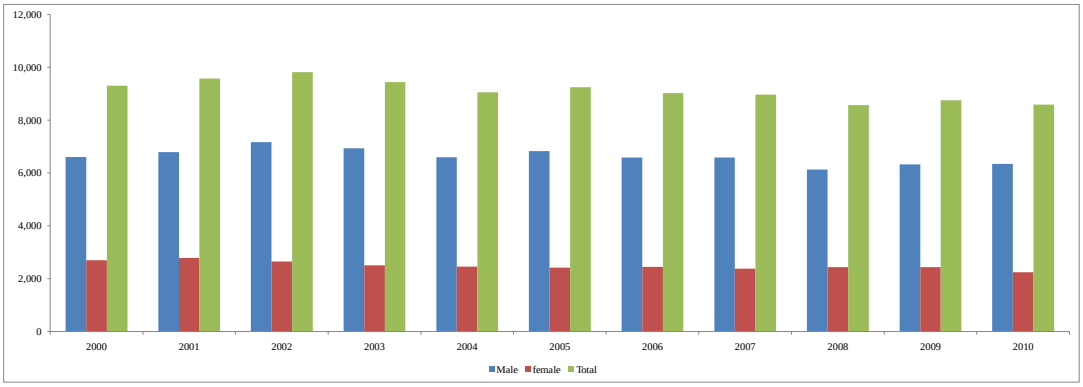
4.3.1.25Available literature suggests that the global burden of disease with regard to both alcohol and unsafe sex is considerable. Alcohol consumption causes 1.8 million deaths per year (3.2% of all deaths) and is responsible for 4.0 per cent of the disability-adjusted life years lost per year worldwide (WHO, 2004)[36]. It is causally related to more than 60 different medical conditions—like cardio vascular disorder, hypertension, diabetes mellitus, TB, neurological disorders, seizures, psychiatric problems, etc. The aggregate costs of alcohol consumption—injuries and morbidity, consequent health care costs, loss of productivity, loss of man days due to absenteeism, diversion of productive resources towards treating alcohol-related problems, and so on—can be quite considerable. This has led to calls to combat the problem of alcohol consumption.

Decreasing suicide cases

4.3.1.26 Data from the annual report on "Accidental Deaths and Suicides in India" compiled by the National Crime Records Bureau from 2000 to 2010 shows declining number of suicides (Figure 4.6). The compound annual growth rate is −0.8 per cent between 2000 and 2010. The percentage share of Kerala in total national suicides has come down over time from 8.6 per cent in 2000 to 6.7 per cent in 2010. However, compared to the share of total population (3%), the share of suicides remains fairly large.

[36] World Health Organisation. 2004, Department of Mental Health and Substance Abuse. *Global Status Report on Alcohol 2004*. www.who.int. Geneva.

Figure 4.6: Number of Suicides, 2000 to 2010



Source: National Crime Record Bureau, Ministry of Home Affairs. 2010 and previous issues. Accidental Deaths and Suicides in India. http://ncrb.gov.in/adsi/main.htm. New Delhi

4.3.1.27 District-wise analysis reveals that suicide rate (in terms of suicides per lakh persons) is highest in Idukki (35.5), followed by Kollam (34.7), Wayanad (34.3), and Thiruvananthapuram (34.3) in 2010[37]. Males commit about 74 per cent of the suicides—interestingly suicide *attempts* are higher among females. Age-wise analysis discloses that 62 per cent of the suicides are committed by young population in the age group of 30−59 years; in addition, every fifth suicide is committed by a person aged 15−29 years. Most of them (78%) are married. Causes of suicide are the same for men and women — family reasons (41%), mental illness (17.4%), and physical illness (16.2%). The incidence of suicides due to dowry disputes was only 0.9 per cent in 2010.

The HDR 2005 states that low (?) literacy rates or lower job opportunities do not explain high rates of suicide.

Ageing

4.3.1.28 Kerala is ahead of the rest of India in terms of demographic transition. In 2001, the total population in Kerala was 31.8 million. The projections in the Kerala State Development Report 2008 (henceforth referred to as SDR 2008) show that total population will increase up to 33.8 million in 2026. Then it will start decreasing. In 2031, total population will be 32.4 million. The growth rate of children in the age group of less than fifteen years started falling gradually from 1971. It had already become negative by 1991. Decomposition of the number

[37] Kerala State Mental Health Authority website. http://www.ksmha.org/suicide.htm.

of children in the age group of 0−5 clearly indicates that the decline is highest among the youngest group. The school age population will shrink considerably by 2030.

4.3.1.29 The SDR 2008 has predicted that the number of elderly will rise from 3,442,000 people in 2001 to 9,169,000 by 2031[38]. The increase would be almost two and a half fold. In other words, their population growth rate will increase from 2.98 per cent to 3.25 per cent during 2001 to 2031. The KPP 2030 has categorised elderly population in two groups: "young old" who are in the age group of 60 to 74, and "old-old" who are more than 75 years old. In 2001, the proportion of each of the group in total population was between 10 per cent and 13 per cent, respectively. It will jump to around 30 per cent for both the groups by 2031 (Table 4.7).

Table 4.7: Demographic projection - proportion of children and elderly in total population

Year	***Proportion of Children to Total Population***	***Proportion of Old to Total Population***	
	Under 15	***60−74 Years***	***75 and Older***
1961	42.62	5.83	1.14
1971	40.26	6.22	1.25
1981	34.97	7.5	1.54
1991	29.64	8.85	1.95
2001	23.4	10.83	2.74
2011	21.1	13.57	3.76
2021	18.6	18.59	4.87
2031	16.1	25.49	7.13

Source: Planning Commission, Government of India. 2008. "Kerala Development Report". www.planningcommission.nic.in.

4.3.1.30 With an ageing population, tackling geriatric diseases has become a crucial issue in Kerala. Some of the major geriatric diseases are epilepsy, coronary heart disease, dementia, Parkinson's, hypertension, and essential tremor. It is estimated that 10 per cent of the elderly are likely to suffer from Alzheimer's disease and 15 to 25 per cent of them are likely to become clinically depressed.

4.3.2 Health infrastructure and resources

4.3.2.1 Along with modern medicine, i.e. Allopathy, Kerala has a strong presence of alternative systems of medicine including Ayurveda (the traditional Indian system of

[38] Planning Commission, Government of India. 2008. "Kerala Development Report". www.planningcommission.nic.in.

medicine) and Homeopathy. These also attract outsiders to come to Kerala for a complete physical and mental rejuvenation.

4.3.2.2 As discussed before, the fiscal crisis in the 1970s led to the withdrawal of government expenditure on hospitals. This created a vacuum which was filled up by the private sector. Sadanandan (2001) shows that the share of government medical institutions went down from 53.3 per cent in 1976 to 22.7 per cent in 1995 and the share of private medical institutions went up from 46.7 per cent in 1976 to 77.3 per cent in 1995[39]. The share of institutions in the private sector further increased to 82.7 per cent in 2004. Similar trends can be seen for the share of beds in the private sector, which has consistently increased over time – 41.2 per cent in 1976, 59.5 per cent in 1986, and 63.6 per cent in 1995 (Sadanandan, 2001)[40]. However, there is some moderation seen in the share of beds in the private sector in 2004, which is 56.9 per cent.

4.3.2.3 Sadanandan (2001) further reports that government institutions had an urban bias in terms of presence and private institutions a rural one[41]. The urban poor also preferred going to the government hospital. However, in rural areas, all income classes preferred going to the rural ones.

4.3.2.4 When one looks at the number of private institutions for the three years – 9,663 in 1986, 12,618 in 1995, and 12, 918 in 2004, the growth rate mainly occurred between 1986 and 1995[42]. The decadal growth rate between 1995 and 2004 was barely 2.4 per cent[43].

4.3.2.5 Currently, under the Directorate of Health services, there are primary health centres, community health centres, district/general/taluk hospitals, women and children hospitals, TB centres, leprosy sanatoriums, and mental health centres.

4.3.2.6 Table 4.8 looks at the cumulative health resources per 10,000 people of Kerala for the year 2004, as the latest data for the private sector is only available till then. While dated, it does give a perspective on the health sector of Kerala. The latest available data (2012) for the government sector does not show much change in terms of institutions. One can safely assume that the growth in health sector in Kerala is being driven by the private sector. Some key takeaways from Table 4.8 are:

[39] Sadanandan, R. 2001. Government Health Services in Kerala: Who Benefits? *Economic and Political Weekly*. 36(32). 3071−3077. August 11.
[40] Ibid.
[41] Sadanandan, R. 2001. Government Health Services in Kerala: Who Benefits? *Economic and Political Weekly*. 36(32). 3071−3077. August 11.
[42] Government of Kerala. 2004. *Report on Survey of Private Medical Institutions in Kerala 2004*. Department of Economics and Statistics, Thiruvananthapuram.
[43] The Government of Kerala (2004) explains that this difference in growth rate is due to difference in concepts followed during the two surveys in 1995 and 2004. Doctor's consultation centres were also taken as hospitals during 1995 but it was not considered as hospital during 2004. Due to this, the total number of institutions showed only nominal increase.
Government of Kerala. 2004. *Report on Survey of Private Medical Institutions in Kerala 2004*. Department of Economics and Statistics, Thiruvananthapuram.

- The private sector dominates the public sector.
- Ayurveda (33.2%) and Homeopathy (24.3%) institutions form a significant share of the total medical sector in Kerala. Allopathy forms 39.1 per cent of the total institutions.
- Kerala is comparable to the United Kingdom in terms of the number of beds available (Table 4.9), even if the allopathy sector alone is taken.
- However, Kerala is still below in number of doctors and nurses per 10,000 populations, if one compares it to developed countries (Table 4.9). Of course, one is comparing 2004 data with the 2010 data. A little exercise suggests that Kerala would be still below the developed countries in terms of allopathy doctors per 10,000 population. The government data for doctors are available for 2012 from the latest Economic Review 2012. Total number of medical officers and faculty in government medical colleges under DHS (allopathy) are 6,490. The CAGR between 2004 and 2012 is 2.6 per cent. That would be the minimum growth rate for doctors in the private sector. Using that, the total number of private doctors is calculated. Adding that to the public sector number, we derive the number of doctors per 10,000 people in 2012 which is 7.4. That is the lower bound but one can interpret this as to understand that some work in this sector is required.

Table 4.8: Health Resources in Kerala, 2004

System of Medicine	***Number of institutions***		***Number of beds***		***Number of doctors***		***Number of nurses***	
	Public	***Private***	***Public***	***Private***	***Public***	***Private***	***Public***	***Private***
Allopathy	1,278	4,825	43,619	57,071	5,273	15,281	14,257	19,125
Ayurveda	857	4,332	3,920	5,502	1,054	5,986		1,598
Homeopathy	561	3,226	1,295	813	607	3,684		463
Others		535		1,105		447		138
Total	15,614		1,13,325		32,322		40,713	
Total per 10,000 population	4.8		34.6		9.9		12.4	
Total Allopathy per 10,000 population	1.86		30.7		6.3		10.2	

Notes: 1. Doctors include Medical Officers and Faculty in Medical Colleges. 2. Nurses in the Public sector include Senior and Junior Nurses and Junior Public Health Nurses. 3. The total number of nurses does not add up to the sum of nurses in private and public institutions. However, there are 40,713 registered nurses as per the Kerala Nurses and Midwives Council. Since the number of nurses in Ayurveda and Homeopathy are not available, we take the total given number. The sum is 35,581 and the total numbers per 10,000 population would be 10.9

Sources: Government of Kerala. 2004. *Report on Survey of Private Medical Institutions in Kerala 2004*. Department of Economics and Statistics, Thiruvananthapuram and State Planning Board. 2013 and previous issues. *Kerala Economic Review 2012*. Government of Kerala, Thiruvananthapuram.

Table 4.9: Health resource & infrastructure – International Comparison 2010 (per 10,000)

Indicators	*Malaysia*	*Brazil*	*Nordic countries*	*UK*	*Germany*
No. of hospital beds	18	24	42.3	29.6	82.5
No. of nurses	27.3	65	129.8	97	110
No. of doctors	17.2	17.2	36.4	27.1	37.3

Source: Euro stat, OECD Health Data 2011 & Statistics for Planning Kerala 2010.

Loss of trained manpower

4.3.2.7 The above exercise shows the low number of doctors per 10,000 people in Kerala and helps one to appreciate this point. There has been a continuous loss of substantial numbers of trained physicians to developed countries. Direct interventions by India to prevent this 'brain drain' are likely to be limited due to concerns about protecting physicians' right to mobility. Evidence suggests that physicians who emigrate from India are concentrated at higher quality institutions. These losses in human capital resulting from emigration cannot be readily overcome by simply expanding private medical colleges. If the well-trained doctors and nurses, developed at enormous public expense, are lost permanently, teaching, research, and possibly access to good quality health care, both in the public and the private sector will be very adversely affected.

4.3.3 Health Financing

4.3.3.1 Since the mid-1980s, there has been increasing privatisation of health care services in Kerala. In 2001−02, approximately 13 per cent of total expenditure was public and it reduced to 10 per cent in 2004−05 (Table 4.10). However, price of private health care turns out to be exorbitantly high, which impedes poor people to access this system. Quality control and monitoring of the services also would become a grim issue in the private system.

Table 4.10: Public/Private Contribution to Health, 2001−02 and 2004−05

Per Capita Health Expenditure in Rs.										
	Public		***Private***		***Total***		***Public exp as% of total exp.***		***Private exp as% of total exp.***	
Year	***Kerala***	***India***	***Kerala***	***India***	***Kerala***	***India***	***Kerala***	***India***	***Kerala***	***India***
2001−02	240	207	1,618	790	1,858	997	12.9	20.8	87.1	79.2
2004−05	287	242	2663	959	2950	1201	9.7	20.1	90.3	79.9

Source: Central Bureau of Health Intelligence

Out of pocket expenditure

4.3.3.2 Out of pocket expenditure on health has also increased significantly in Kerala. It doubled up from 5 per cent to 10 per cent approximately during 1993−94 to 2004−05 as presented in Table 4.11. At the same time, all-India average proportion of out-of-pocket expenditure increased from 4 per cent to 6 per cent. Kerala has experienced the highest increase in out-of-pocket expenditure followed by Himachal Pradesh.

Table 4.11: Out-of-pocket Payments for Health Care as a Percentage of Household Consumption Expenditure (Mean, %)

Region	***1993−94***	***2004−05***
India	4.39	5.51
Assam	1.68	2.05
Bihar	3.1	2.92
Madhya Pradesh	4.34	5.82
Odisha	3.05	4.48
West Bengal	4.45	6.15
Uttar Pradesh	5.52	7.38
Karnataka	4.37	3.78
Andhra Pradesh	5.36	5.62
Gujarat	3.64	5.51
Tamil Nadu	3.99	4.56
Rajasthan	4.15	4.76
Maharashtra	4.8	6.82
Punjab	5.43	5.96
Himachal Pradesh	3.82	6.30
Haryana	5.03	5.06
Kerala	5.62	10.36

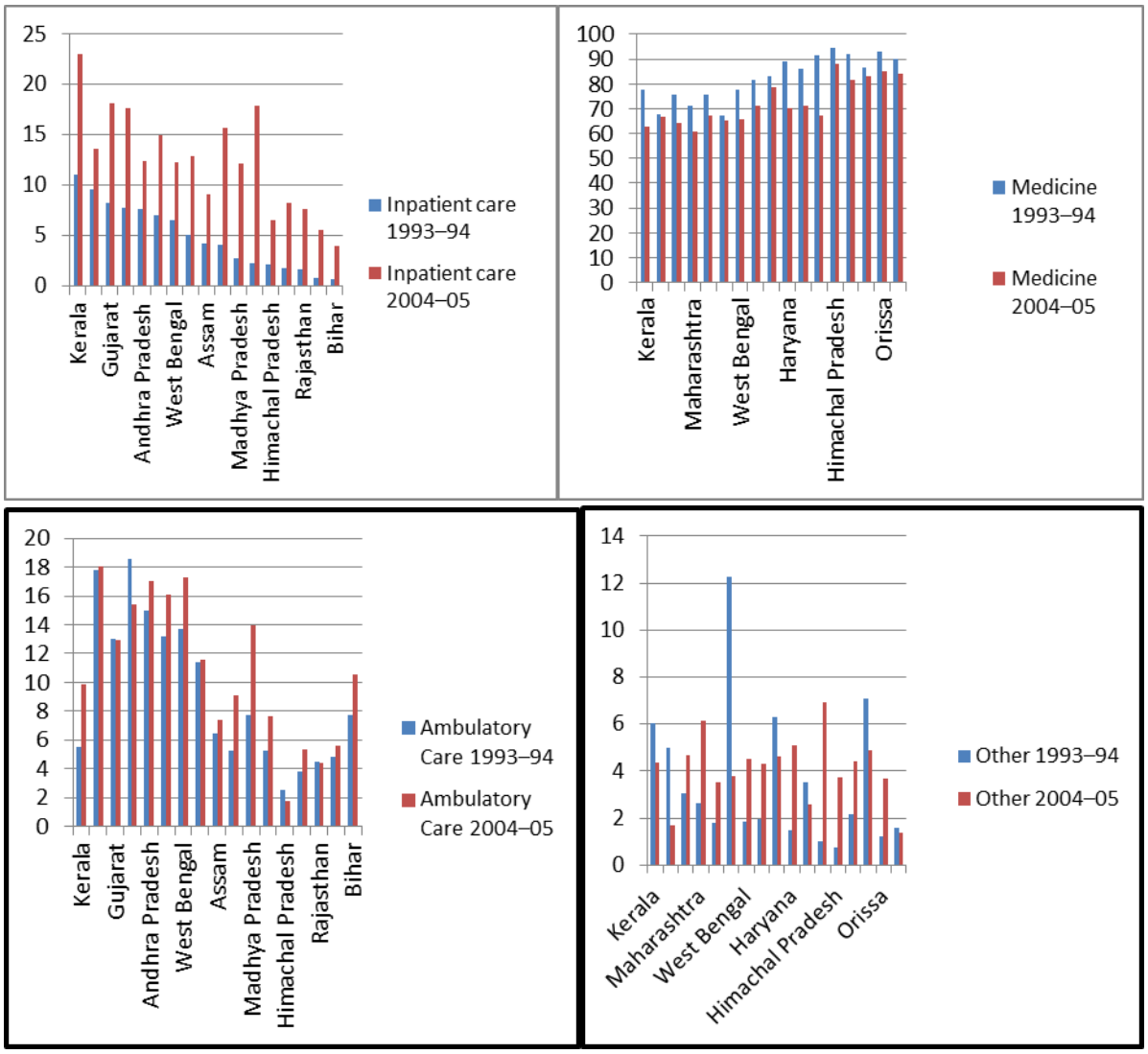
Source: Ghosh, S. 2011. Catastrophic Payments and Impoverishment due to Out-of-Pocket Health Spending. *Economic and Political Weekly*. November.

4.3.3.3 This shows the vulnerability of Kerala's population to health care expenditures. It is widely acknowledged that out-of-pocket (OOP) expenditure on health care has significant implications for poverty in developing economies. Out-of-pocket payments for health can cause households to incur catastrophic expenditures, which in turn can push them into poverty.

4.3.3.4 There are three major components of out-of-pocket expenditure in health: inpatient care, ambulatory care, and costs of medicine. A significant decline is observed in the cost of medicine in Kerala from 1993−94 to 2004−05 (Figure 4.8). It reduced by 15 percentage points as against a 10 percentage point decrease in all-India average. On the other hand, there is an enormous increase in the cost of inpatient care. The proportion spent on ambulatory care

in India remained almost same during the same period (not shown in the graph), while it was augmented by 5 percentage points in Kerala. This increases the vulnerability of the population to catastrophic health care expenditures.

Figure 4.8: Composition of Out-of-Pocket Payments in Health Care (%)



Source: Ghosh, S. 2011. Catastrophic Payments and Impoverishment due to Out-of-Pocket Health Spending. *Economic and Political Weekly*. November.

Health Expenditure Forecasted to Fall

4.3.3.5 If the current trends continue, health expenditure as a proportion of GSDP would fall by 2030 (Table 4.12) from 0.6 in 2010 to 0.4 under business as usual. This proportion is abysmally low as compared to developed and other developing countries. While Sri Lanka spent 1.8 per cent of its GDP on health, the figures for China and Thailand were 2.7 and 3.1 per cent respectively in 2009. India spends only 1.3 per cent of its GDP on health. As per the World Bank estimates, the corresponding figures for the US is 8.4 per cent, while European

nations like the UK, Spain, Italy, and Germany spent 7−9 per cent of their GDP on health (2009).

Table 4.12: Projections - Health Expenditure

Year	***2010***	***2015***	***2020***	***2025***	***2030***
Total health expenditure/GSDP	0.6	0.5	0.5	0.4	0.4
PCHE (w.r.t. inflation & Per capita income)	320	309	309	302	292
PCHE (w.r.t. proportion of elderly population)	323	370	442	518	606

Source: Computed by NCAER

4.3.3.6 Per capita health expenditure (PCHE) is expected to fall under business as usual, controlling for inflation and per capita income. Per capita expenditure controlling for proportion of elderly population would increase from its initial amount of Rs 323 ($7) in 2010 to Rs 606 ($13) in 2030. Countries like the UK and the US spend $2,000−3,000 per capita on health. The neighbouring countries also spend relatively bigger amounts as compared to India; Korea spends $1,093 on health per capita and China $155.

4.3.4 Management of Bio-medical waste

The link between health and natural capital becomes very crucial in Kerala since the state is facing serious issues with respect to solid and liquid waste management.

4.3.5 Challenges in Ayurveda and Homeopathy

Availability of raw drugs and quality of medicine are serious issues in increasing production and commercialisation in the Ayurveda sector. The presence of high amounts of lead limits its saleability in the West. There is a concern on environmental sustainability since most of the medicinal plants are collected from wild forests. Limited existence of research programme in this sector is also a hindrance. There is lack of research on health- seeking behaviour through Ayurveda or homeopathy.

4.4 Countering the challenges

Current Initiatives

4.4.1 To counter these challenges, the state government has launched several health initiatives under the purview of the National Rural Health Mission (NRHM). NRHM came at an opportune time, when the state was finding it difficult to meet the demand for resources.

Leveraging information technology

4.4.2 Apart from various programmes that are implemented in all the Indian states through National Rural Health Mission (NRHM), there are certain special initiatives that have been implemented in Kerala. These are directed towards Health Management Information System, Communication/Information education, and communication.

Initiatives at curbing alcohol consumption

4.4.3 Reducing alcohol consumption is a major challenge facing policy makers due to the contribution of the alcohol sector contribution to the state exchequer. Yet, there have been some measures taken by the government to curb the menace:

1. When new bars are permitted, it is to be ensured that the distance between them should be 3 km in panchayat areas and 1 km in municipality/corporation areas.
2. Bar licences are not allowed from 2012 to hotels below four-star category.
3. It is proposed to reduce the working time of bar hotels. Regulations will be brought to restrict the timings of bar hotels in panchayat and municipality areas from 8 am to 11 pm and corporation areas from 9 am to 12 midnight.
4. A maximum of 27.1 l liquor per adult is permitted at one time, including all varieties. It is proposed to bring this down to 15 l. The maximum quantity of IMFL, which can be kept at any one time, is proposed to be fixed at 3 l.
5. The age limit for eligibility to buy and sell liquor was raised from 18 to 21 years.

4.4.4 The above discussion indicates that the existing policies and practices are not sufficiently effective to ensure that Keralites of all ages and backgrounds can have affordable and an equitable chance of achieving health. These issues need attention.

4.5 Health Strategic Plan

4.5.1 Vision, mission, and goals

Vision

4.5.1.1 “Kerala will ensure “health for all” by 2030. It will provide health security provision to each and everyone by 2030. It will have a highly innovative, affordable, and accessible health system that all Keralites can trust. It will have a health system that is accessible when people need it, regardless of their ability to pay.

4.5.1.2 Kerala would also be able to establish itself in the global health care services market generating foreign exchange and driving its growth process.”

Mission 2030

4.5.1.3 The mission is:

- Good health and wellbeing for all Keralites throughout their lives.
- Timely and equitable access for all Keralites to a comprehensive range of health and disability services, regardless of ability to pay.
- A high-performing system in which people have confidence.
- Active involvement of consumers and communities at all levels..
- Transformation of the health sector into a growth-driving sector by positioning it in the international health care services market.

Goals

1. Health for all

- Increase the health expenditure to GSDP ratio from 0.6 per cent in 2012 to 4−5 per cent by 2027−31. This will be achieved by 1 percentage point increase spread over the next 5 years plans.
- Reduce MMR from 81 to 12 per 1 lakh live births.
- Reduce IMR from 13 to 6 per 1,000 live births.
- Eradicate communicable diseases.
- Prioritise health areas to include mental diseases, alcoholism, and suicides .
- Increase the number of hospital beds from 34.6 per 10,000 in 2004 to 70 per 10,000 by 2030.
- Increase the number of nurses from 12.4 in 2004 to 65 by 2030.
- Increase the number of doctors from 9.9 per 10,000 population to 17.2 in 2030.
- Provide Health insurance cover to all.

2. Promote Health Hubs

- Set up three medical cities by 2030.

4.5.2 The Strategic Framework

4..5.2.1 The health sector is the backbone of economic and social prosperity. Kerala's health sector would require focusing on four major pillars in order to achieve the twin goals of health care promotion, namely "health for all" and "international competitiveness in health". The new health strategy requires participation by all: public, communities, and government. The three pillars of the new health strategy are:

1. Economic prosperity through health by creating world class facilities
2. Social health
3. Environment protection

Pillar 1: Economic prosperity through health

Action Plan 1: Create global health cities

4..5.2.2 A major shift in the strategic approach will be to transform the health sector into a productive sector to bring about economic prosperity. A major plank for promoting economic prosperity through health is to create world-class medical hubs in the state and promote it as a health brand. It will build medical cities of excellence with international- class facilities in education, training, health care services, support infrastructure, and encourage trade in services by promoting:

- cross-Kerala border trade in medical services through the use of IT,
- medical tourism,
- inflows and outflows of foreign direct investment in this sector, and
- movement of health professionals to and from Kerala for knowledge exchange.

These cities will also be instrumental in:

- generating new knowledge through R&D, training, and interactions,
- promoting the quality of health care in the state by attracting international medical professionals and multinational companies, and
- creating and retaining skilled workers.

4..5.2.3 Establishment of medical cities will be one of the major strategic shifts in the approach towards the promotion of health sector. Singapore's medical hub can be considered as a benchmark for the upcoming health cities of Kerala. Some of the major features of Singapore's health hubs are:

- Provision of wide- ranging services from basic health screening to high-end specialised care in cardiology, obstetrics, gynaecology, oncology, ophthalmology, organ transplantation, orthopaedics, paediatrics, etc.

- Institution of Specialty centres for areas like cardiology, ophthalmology, and oncology.

- Involvement of speciality centres in research and development, leveraging further the biomedical research and expertise they possess to develop various new treatments.

- Existence of large numbers of international health professionals and multinational health care companies.

- Emphasis on education and constant updating of skills.

  Singapore's doctors and specialists continuously upgrade their clinical skills and knowledge by attending the Ministry of Health's 'Continuing Medical Education Programme' and other medical-related trainings. Joint training programmes with top foreign universities are also offered. Foreign-trained doctors have to satisfy the Singapore Medical Council's stringent standards on possession of the necessary medical knowledge, experience, and skills before they are allowed to practice in Singapore.

Action Plan 2: Adopt International benchmarking

4..5.2.4 The quality of health care services in the medical cities and those outside them will be benchmarked with the best in the world. This will require national and international accreditation. In countries such as the UK, USA, Australia, New Zealand, and Canada, sophisticated accreditation groups have grown up to survey hospitals. Furthermore, there are some accreditation groups that have been set up for just one specialised area of healthcare, such as laboratory medicine, or psychiatric services, or sexual health and the services of these groups may be availed.

Action Plan 3: Promote R&D

4..5.2.5 There would be a thrust on establishing R&D centres, which would focus on new therapies and technologies in collaboration with some of the world's top medical institutes, and pharmaceutical and medical technology firms. These hubs will develop into a 'global biomedical sciences hub', advancing human healthcare. The thrust will be on accomplishing biomedical breakthroughs. With the availability of robust support, infrastructure, dynamic research culture, and pro-business approach, world-renowned medical experts will be attracted to work in Kerala and will in turn, contribute to upgrading quality of research and health care services in Kerala. The hubs will organise international biomedical conferences, seminars, and exhibitions to create platforms where ideas, knowledge, and techniques are shared among the world's top medical professionals. This will facilitate the collaboration of international projects.

Pillar 2: Enhance human capital by promoting world class facilities

Action Plan 1: Promote health education

4..5.2.6 At present, China and Russia are becoming hubs of medical education for students from developing countries such as India, with a host of student-friendly measures. Tough competition, few seats, and rising costs of medical education have prompted Indian students

to look to countries like China and Russia. Also, with the private and deemed universities charging heavy capitation fees, the middle-class section of society is deprived of quality medical education. The cost of medical education in countries like China and Russia is much lower and varies from $3,400 to $6,000 per year.

4..5.2.7 The proposed hubs in Kerala will divert these students to Kerala. Not only that, students from other countries will also be attracted to the cities promoting medical services.

4..5.2.8 The creation of these hubs in Kerala will also prevent loss of physicians from India due to emigration, by attracting the best facilities within the country.

Action Plan 2: Policy on mental health

4..5.2.9 An explicit policy on mental health, using social capital is an essential tool to combat various issues of mental health in Kerala:

- Not only general health, but also mental health to be covered under insurance policies. In addition, incremental health resources would be made available for people with severe mental disorders.
- Human rights protection to be applied to of people with mental disorder.
- Each primary health care facility to have a mental health coordinator.
- People to be sensitised about the importance of mental health issues by initiating a public campaign for stigma and depression.
- Clinical and administrative guidelines and standards to be elaborated and distributed and specialized nurses' training programmes to be conducted.
- In-service training to be provided to health workers.
- Mental health surveillance system to be maintained.
- Timely meetings with mental health teams in districts, etc., to be arranged.
- Activities involving people with mental disorders and their families to be supported and coordinated.
- Mutual aid and mental health advocacy groups to be formed.
- Various school programmes, including mental health promotion, and early treatments of hyperkinetic disorders to be considered.

Essential Drug procurement and distribution

4..5.2.10 Purchase and distribution of low-cost antipsychotic drug would be beneficial and high- cost anti-depressant medication can be made available through public insurance.

Quality Improvement

4..5.2.11 Accreditation of standard services for in-patient services, day hospitals, community mental health teams, and halfway homes would be ensured. Continuous monitoring of programmes can help in further improvement of services.

Information system

4..5.2.12 Data on health staff, number of psychiatric beds, number of mental health patients, and their number of visits would be made up- to- date. It can help in preparing plans at decentralised levels, in a hassle-free manner.

Human Resource and training

4..5.2.13 This requires projecting the expected human resource required in future. Mental health training should be provided at various training centres. Also, scientific training would take into account the current availability of human resources.

Stakeholders' participation

4..5.2.14 Various stakeholders like academic institutions, professional associations, general health and mental health workers, consumer and family groups, NGOs, and traditional health workers would be consulted while preparing plans.

Box 4.1: Mental health in Brazil

The Centres for Psychological Assistance (CAPs) act like therapy centres in various municipalities in Brazil. They offer therapy groups, sports, workshops for income generation, workshops on activities like dance, painting, drama, pottery, and reading and writing to promote literacy for mentally ill patients. Following psychiatric reforms in Brazil, long-stay psychiatric hospitals were replaced by community health care services, so as to reduce exclusion of mentally ill population in the country. Being run by social workers and psychologists, these initiatives foster partnership in community-based group and cultural institutions. Instead of drug-induced apathy, silence, and social exclusion, these therapies show an innovative way of providing self-esteem and encouraging social interactions.

Source:Mental Health System in Brazil, WHO- AIMS Report 2007.
http://www.who.int/mental_health/evidence/who_aims_report_brazil.pdf

Action Plan 3:Tackling the alcohol menace (Please note,there is a write up on preventing alcohol consumption earlier also)

Preventive measures

- Controlling location and density of sales outlets
- Restricting sales to select time intervals

- Raising taxes

- Adopting the rehabilitation centre based approach, where the person is isolated for long periods, gradually weaned off alcohol, and taught adaptive habits through psychosocial interventions and group survivor strategies

4..5.2.15 These measures may not prove to be very effective, but they still leave some impact ,at least in the short run.

Prevention at an early age

4..5.2.16 In the long run, it proposed to shift to secondary prevention at an early stage, targeting potential patients in advance. This is cost effective, given that a high share of Kerala's population consumes alcohol. Accordingly, the Government may consider introducing a 'Preventing of Alcoholism Scheme (PAS)'. Such a scheme would have four main components:

- **Involvement of family members:** Empirical evidence shows that 'Dyadic Relapse Prevention' is more effective than 'Individual Relapse Prevention' or 'Treatment As Usual'. This calls for incorporating the positive role that family members can play in facilitating, supporting, and playing a catalytic role in rehabilitating and preventing relapses in the de-addiction and rehabilitation programmes.

- **Routine medical intervention:** Physicians at the primary and secondary level of health centres can play an important role in early diagnosis and prevention of alcohol-related problems. In the short run, physicians would be encouraged to elicit information on alcohol consumption as a matter of course during routine check- ups and treatment of other ailments. In the long run, there should be investment in building capacity of the physicians to identify potential cases and intervene in such cases. The objective would be to emphasise attaining functional improvements in health, occupation, and social interaction through reduction in alcohol consumption, rather than focus on abstinence directly.

- **Workplace intervention:** The experience of Karnataka Road Transport Organisation shows that workplace intervention strategies focusing on safety, welfare, and disciplinary measures can not only generate substantial social benefits but also increase profits by reducing accidents and consequent damage to vehicles.

4..5.2.17 Bang and Bang (1991) report emphasises the efficacy of community level action, particularly through women SHGs, in curbing alcoholism in local communities. Given their grass roots contacts and extent of reach, NGOs can play an important role in this context by mobilising such consciousness. They can also play an important role in spreading awareness about the adverse effects of alcoholism, particularly among teenagers. This calls for involvement of educational institutions in a community- based public health model. It also

involves establishment of a monitoring and surveillance agency in the long run that will regularly collect data on trends and patterns of alcohol consumption, periodically undertake studies on costs of alcoholism and evaluate efforts to tackle this social problem.

4..5.2.18 In addition, PAS (?) may also consider involving children enrolled at the secondary level. This is important given the rise of teenage alcoholism. School children may be regularly taken to visit Alcohol Rehabilitation and De-addiction Centres by NGOs, where they may interact with less- serious patients. The objective is to make them appreciate the long- term effects of alcoholism and addiction. This may be made a compulsory part of the school curriculum.

4..5.2.19 Finally, policies to reduce the harmful use of alcohol would go beyond the health sector, and appropriately engage such sectors as development, transport, justice, social welfare, fiscal policy, trade, agriculture, consumer policy, education, and employment, as well as civil society and economic operators.

Pillar 3: Social health

A three-pronged policy is recommended for addressing health challenges in the state:

- Health promotion through self-care and community participation
- Health promotion through infrastructure and health care services
- Health financing

Action Plan 1: Health promotion through self-care and community participation

Fostering Public Participation in self-care

4..5.2.20 Public participation and awareness is essential for the achievement of health for all. People will be educated and equipped to act in ways that preserve or improve their health. This will be done by educated people in particular, disadvantaged and females through social media, co-operative societies, and self-help groups. The state will initiate programmes to encourage participation by volunteers for promoting health literacy among people, health camps, group discussions, health counselling in schools, and state-wide campaigning as a tool to create awareness among people about the environment in which they live, its impact on health and self-care. The objective will be to create a climate in which people become equipped and educated to take care of their health. The enduring impact of public participation on health is well documented. For instance, in the Vancouver "Be Well" programme, a network of seniors established a self-help model to encourage participants to preserve their own health. Crocus Co-operative in Saskatoon offers programmes and counselling for post-mentally ill adults. The Canadian Sickle Cell Society has grown from a handful of volunteers into a national organisation dedicated to educating, testing, and

counselling Canadians affected by sickle cell anaemia. Similar programmes are being run in developing countries as well (see the Box 4.2 below).

Box 4.2: HIV-AIDS Teacher Training Programmes – Africa

A teacher training module, devoted to HIV-AIDS, was introduced by the Cameroonian government with support of UNESCO. The main aim of the programme is to teach school students regarding HIV-AIDS, by including information into school curriculum, concerning prevention, transmission mechanisms, etc. Trained teachers were taught how to modify intermediate indicators so as to modify student behaviour. This programme was successful in Africa, to an extent that exposure to a trained teacher made 16-17 year olds less reluctant about discussing HIV-AIDS with their families.

Source:Acrand,J.L. & Wouabe,E.D. (2009). "Do HIV-AIDS Teacher Training Programs Work in Africa? Evidence from the Cameroon." Global Development Netwrok,Working Paper 9, September 2009.

Strengthening community health services

4..5.2.21 Community health services are already playing an indispensable role in preserving health in Kerala. The policy will encourage greater participation of communities in planning their own services, and the links between communities and their services and institutions will be strengthened. Community health services provide a natural focal point for coordinating services such as assessment, home care, respite care, counselling, and the valuable work of volunteers.

4..5.2.22 The strengthening of community health services will benefit the women, aged, and the people who are trying to cope with mental health problems. While treatment services clearly remain appropriate for the ill, those who are finding it difficult to manage because of life circumstances could be assisted and supported by community health services.

4..5.2.23 In the US, "The Nurse-Family Partnership" programme is a community-based reproductive health programme to assist women belonging to the low-income groups, who become mother for the first time. The programme is being run by the State Department but the community-based health centres, nursing associations, and hospitals implement it, generally through maternal and child health services. This is found to be highly effective in addressing the issues of women's reproductive health and educating women from low-income groups (see Box 4.3.

Box 4.3: Community-based programme

The Nurse-Family Partnership National Service Office works with communities interested in implementing the Nurse-Family Partnership. Nurse-Family Partnership Implementing Agencies contract with the National Service Office to provide services at the community level. These agencies are administered by a range of not-for-profit and for-profit entities, including state and county health departments. Implementing agencies vary in size and location. Some serve hundreds of families in parts of an urban area, while others serve a hundred families in one or two rural counties. The standard implementation of Nurse-Family Partnership is eight nurse- home visitors, each serving a maximum of 25 families – total 200 families – supported by a full-time nurse supervisor. The minimum start-up programme must be able to serve 100 families. The key features of this initiative are:

- Client participates voluntarily in the Nurse-Family Partnership programme.
- Client is a first-time mother and belongs to low-income groups.
- Client is enrolled in the programme early in her pregnancy and receives her first home visit by no later than the end of week 28 of pregnancy.
- Client is visited throughout her pregnancy and the first two years of her child's life in accordance with the current Nurse-Family Partnership guidelines.
- Nurse-home visitors are supervised by a full time supervisor.
- Nurse- home visitors and nurse supervisors are registered professional nurses.
- At a time, a nurse home visitor can take up to 25 cases, while a nurse supervisor can take up to eight cases.

Source: Nurse family Partnership Website
: http://www.nursefamilypartnership.org/assets/PDF/Fact-sheets/NFP_Overview

Strengthening multi-sector participation through institutional frameworks

- Design appropriate health programmes for involving communities and volunteers.
- Develop appropriate institutional frameworks to ensure a consistent community development approach.
- Build capacity within the community and the voluntary sector to identify and address health promotion priorities. Build on existing health promotion programmes and services to ensure a systematic focus on localities experiencing social and material disadvantages.
- Provide adequate support and structure to implement the programme.

4..5.2.24 The box (Box 4.4) below briefly discusses how a well-designed health care programme through self-care and community programmes can address the issue of health for the aged and improve the quality of their life.

Box 4.4: Health for the aged though self-care and community participation

Priority intervention 1: Promoting physical activity:

- ✓ Develop and implement targeted community programmes for physical activity among older people.
- ✓ Provide advice about physical activity in all health and social care settings for older people.
- ✓ Support local governments in creating motivating environments and infrastructure for physical activity (in particular active transport) for all age.
- ✓ Promote the civil engagement of older people and strengthen the role of volunteering.

Priority intervention 2: Public support to informal care giving a focus on home care, including self-care:

- ✓ Design strategies for training older adults in self-care and for training informal caregivers, and adapt self-care training programmes.
- ✓ Design volunteer-based programmes to take care of aged people.

Priority intervention 3: Geriatric and gerontological capacity building among the health and social care workforce:

- ✓ Draw up guidelines on geriatric education and define standards for geriatric training.
- ✓ Engage in geriatric and gerontological capacity planning as part of overall health and social workforce planning for ageing populations.

Supporting intervention 4: Prevention of elder maltreatment:

- ✓ Draw up national policies and plans for preventing elder maltreatment.
- ✓ Improve the quality of services in the community and in (other?) institutions, to adapt them better to the special needs of older people with functional limitations, and to ensure that quality guidelines are in place for preventing elder maltreatment.

Supporting intervention 5: Quality of care strategies for older people including dementia care and palliative care for long-term care patients:

- ✓ Provide training and transfer of knowledge and guidance for initiatives to improve the quality of care provided in resource-constrained settings and health care systems in transition.

Source: Bhuyan, K.K.. Health promotion through self-care and community participation: Elements of a proposed programme in the developing countries.
http://www.biomedcentral.com/content/pdf/1471-2458-4-11.pdf

Action Plan 2: Strengthen health care services

4..5.2.25 The most vital component of health care is to strengthen infrastructure and services to tackle the challenges related to the growing aging population, women health, mental health problems, and high morbidity. The policy on health care services should be inclusive in nature. Further,

- The policy should be age and gender-sensitised.
- It should ensure participation by representatives from different segments and experts in health planning and health decision.
- It must have gender, age, and disease sensitised health programmes to provide a complete health care system that focuses on illness, treatment, after treatment, and disease prevention.

Public-private partnerships in ensuring quality health care services

4..5.2.26 Two challenges facing health care service providers are manpower and costs. The health care industry is short of human resources and the situation will get worse as the government tightens the supply of foreign workers. Public health care providers are raising their pay structure to attract and retain their staff, resulting in both shortage of workers and cost escalation in the private sector.

4..5.2.27 There have been innovative programmes to directly involve private partnerships for delivering health care services:

- In Iceland for instance, women entrepreneurs with the financial support of the Ministry of Social Affairs are running midwife clinics (Box 4.5).

Box 4.5: The midwife clinics in Iceland

These clinics provide integrated health service to expectant parents, including childbirth education classes, home births, and post- partum services to parents. Post-partum insurance is included in general health insurance. The project has been partially funded by the Midwife Association of Iceland and the Ministry of Social Affairs, which supports female entrepreneurs.

This shows how a publically provided maternity and post-partum service could be handled more effectively and with greater consideration for user needs, when conducted in close collaboration with public and private players.

Source: The Midwife Clinic Website
http://www.themidwivesclinic.ca/

- In Kenya, the government has been distributing medicines to the poor in its anti-malaria campaign through partnerships with the private and civil society (Box 4.6).

Box 4.6: Micro-franchising the distribution of anti-malarial drugs: Kenya

The Government of Kenya with a local non-government organisation (NGO) and a private chain of medical stores has initiated micro- franchising of distribution of anti-malaria drugs. A drug named Coartem was distributed to the rural poor, free of cost, with the aim of reducing mortality from malaria. The government distributed medicines with the help of its central procurement body and small privately-owned rural shops namely "Child and Family wellness Shops" (CFW). These shops provide free medicines to patients by charging small screening fees. The local NGO, SHF, is in a micro franchise agreement with CFW shops. CFW shops provide medicines for all other ailments as well. CFW procure all other medicines from SHF at subsidised rates. However, CFW procures anti-malaria drugs from the government for free and hence distributes them for free. Following the introduction of this programme, the number of malaria cases has reduced by 6 per cent within 5 km area of CFW shops. Due to the immense success of this programme, it is recommended to adopt the same in African as well as Asian countries.

*Source***:** Oour, J. et al. (2009) "Evaluating the impact of microfranchising the distribution of anti-malarial drugs in Kenya on malaria mortality and morbidity."

- Health care services in public health care facilities may be franchised to private players. This is a win-win situation for both the public and private players (Box 4.7).

Box 4.7: Government Social Franchise Model of Reproductive Health – Vietnam

Being adopted in many developing and developed countries, this model is organised by a franchisor, generally non-government private organisation. Various health providers are then selected to join the programme. Currently, the model exists in two forms: "stand alone" and "factional models". In the stand-alone model, all facilities are franchised, whereas in factional model only selected facilities are franchised. Franchised facility brings high quality services with brand name at lower cost. Social franchising of health facilities is beneficial to both health care providers as well as users. Providers get opportunities of training, increased promotion, more clientele, and revenues with increased range of services. At the client level, this service helps in improving perceptions regarding quality of services, likelihood of returning and further recommending these services to their friends and relatives, etc.

An evaluation of this programme indicated that the general perception of people regarding public CHS being of low quality was dissipated.

Source: *BMC Health Services Research* 2010
http://www.biomedcentral.com/1472-6963/10/54

Harness existing human capital to build on the existing capabilities

4..5.2.28 Health experts in both private and public sectors may be involved in primary health care facilities on temporary and voluntary basis for strengthening local capacities (Box 4.8).

Box 4.8: Safe Motherhood Initiative – China

UNICEF introduced safe Motherhood Initiative in China in 1999. The main aim of the programme is to reduce the risk of maternal mortality by enhancing qualified hospital delivery. Under the programme, ad hoc obstetric experts were assigned to primary maternal care centres, for at least two weeks to help in reinforcing local capacity, to train local staff, and to set up referral green channels. Impact evaluation study results indicate that the programme has been successful in reducing MMR by enhancing MCH care (via hospital delivery).

Source: Gua, Y. etal (2009) "An Impact Evaluation of the Safe Motherhood Program in China." GDN Working paper

Incentivise medical college students to participate in community services for strengthening primary health care services

4..5.2.29 Medical students and other health experts can be incentivised to work in backward areas as well as in primary health care facilities. They may be given preference in employment and enrolment in higher studies such as post-graduate and research for serving in primary and secondary health care facilities for at least one year. In Vietnam, this programme is being run by the government to build up health facilities in backward areas (Box 4.9).

Box 4.9: Vietnam

The project piloted a new way to fill the health stations of the poor, rural and mountainous communes with young medical graduates. At the core of the initiative there was an agreement between the central government, the provincial authorities, and the VNUS The VNUS organised teams of medical graduates who volunteered to work for two years in the selected communes as project members; the governments of all levels provided budget to support volunteer teams and facilitated the operation of the project. As an incentive to the volunteers, the government committed to give a certain merit to those volunteers wanting to apply for a job in the public sector or continue further education after fulfilling the two year contract in the project communes. The Y project has broad objectives, including improving primary health care and disease prevention; building capacity of local health staff; improving social development of the commune; and advocacy for young medics to stay and work permanently in mountainous areas. Volunteers provided primary examination and treatment, referral of patients to hospitals, carried out national disease prevention programmes on vaccination, malaria, tuberculosis, diarrhoea, child malnutrition, safe motherhood, family planning, etc., promotion of hygienic lifestyle, and use of traditional medicinal herbs among local communities. They also delivered training on primary care for village health activists, ran literacy classes, assisted organising of agricultural

extension courses for farmers, promoted youth clubs, etc.

Source: Vietnam National Union of Students
http://english.doanthanhnien.vn/Article-category/322/Vnus.htm

Performance-linked compensation to health workers in specific government-run programmes

4..5.2.30 Health personnel are not adequately motivated to work in rural areas. Raising salaries and bonus salary do not work as a proper incentive for workforce to stay and work in rural areas. One solution is to link the salary of health workers in rural areas with the evaluation and outcome of the programme. Hence, health staff can increase their earnings and salary by increasing the quality of services provided and the quantity of outputs. This scheme has been implemented in Rwanda in various programmes of maternal and child health care. The result of an impact evaluation study has shown that this scheme has increased the use of maternal and child health care services, including child growth monitoring, vitamin A, and institutional delivery.

Strengthen technological capabilities through R&D and technology transfers:

4..5.2.31 Last, but the most important is the strengthening of technological capabilities in health care. New technologies are emerging to facilitate this. For instance, **Nox Medical has been introduced in the market as** a sleep diagnostic tool. It detects and diagnoses sleep disturbances that can cause other illness like high blood pressure, diabetes, heart failure, and strokes. This technique was formed by a team of doctors from Iceland, the US, and Italy. This product is sold worldwide and used by various other countries to a large extent.

Action Plan 3: Promote e-health

4..5.2.32 Population growth, population ageing, and the increasing burden of chronic disease are continuously driving the demand for health services. This is challenging the way services need to be delivered. Kerala will introduce an e-health Strategy. This will set the strategic direction for ICT, so as to effectively leverage its existing ICT capability. It will be developed with a clear understanding of the health and hospital reform agenda. Kerala already has taken initiatives in this direction. These will be carried forward to develop a comprehensive strategy for e-health, which will ensure both preventive and curative health.

Action Plan 4: Alternative systems of medicine

4..5.2.33 The Ayurveda and homeopathy systems of medicine will be promoted and given importance as allopathy. They need to be monitored with benchmarks. Since they also attract foreign tourists, regulation of the alternative systems of medicine, can be an engine of economic growth.

Action Plan 4: Facilitate health financing

4..5.2.34 Health financing is the most urgent issue of all for a health care strategy. It is impossible to envision dealing with access or quality without addressing this aspect. It is crucial for the state government to take initiatives to provide financial coverage for health depending on the income strata of people. It is an important strategy to provide access and quality health care to every citizen.

Health insurance for the poor

4..5.2.35 The state has already implemented the centrally-sponsored RSBY for health financing of the poor. Notably, Kerala is at the top among Indian states and Union Territories in terms of the per cent of targeted families enrolled with the programme. Of the 32.8 families, 27.4 (83.5%) families are already enrolled with the programme. Andhra Pradesh follows it with 67.4 per cent families enrolled. Other states are way behind. The present report proposes a new scheme that can supplement the centrally-sponsored scheme to make health affordable.

Health voucher scheme for the poor

4..5.2.36 The central government scheme which promises to fund medical expenses up to Rs. 30,000 can be supplemented by a state-sponsored health voucher scheme. Health vouchers will be issued to the poor population. These vouchers can be used to purchase health insurance and to pay for health care. Vouchers would be means-tested. In other words, the poorest of the poor families would receive large vouchers, but the size of the voucher would decline as income rises. With a voucher, the family decides what type of health insurance meets its needs. The state will not decide what type of health insurance everyone should have and from whom to buy the insurance. A voucher system, which would allow a family to choose any doctor, rather than be limited to those who work with the programme, would be a better idea. The objective will be to cover the standard package for the poorest. It is expected that this scheme will trigger competition among insurance companies for the voucher-based insurance and ensure better insurance offers.

Financing of the scheme

4..5.2.37 The scheme can be funded by contributions received from individuals, charitable trusts, Companies, and Diaspora. The fund can be invested in income earning assets to fund the health requirement through interest income. See box 4.10.

Emergency care in case of Accidents

4..5.2.38 In case of emergencies, people should be immediately taken to the nearest hospital, public or private and provided care at the expense of the government.

Box 4.10: Singapore health financing system: Singapore CPF

Singapore's health financing system includes complementary programmes designed to promote individual responsibility, protect the poor, and address potential market failures.

Medifund: To ensure that no Singaporean is denied good basic care because of inability to pay, the government set up Medifund in 1993 to subsidize health care for the poor (roughly 10% of the population). The fund's initial capital of US$150 million has grown to US$500 million with contributions during years of overall budget surplus. Under Medifund rules, only interest income, not capital, may be disbursed. At each hospital a medical social worker assesses applicants' eligibility through means testing.

ElderShield: In June 2002, the government introduced a low-cost insurance programme, ElderShield, to provide financial protection for people with severe disabilities. Medisave account holders are automatically enrolled in ElderShield when they reach age 40 unless they opt out. ElderShield pays a monthly cash allowance (for a maximum of 60 months) to those unable to perform three or more basic "activities of daily living".

Provider subsidies: The financing system is designed to help individuals pay their share of medical costs. But to ensure that basic medical care is available for all, the government also provides direct subsidies to public hospitals, polyclinics, and nursing homes for the elderly. In 2000, direct subsidies totalled US$700 million, or 25per cent of health spending.

To meet the increasing healthcare needs of the population, the government is tapping more on private health care resources. One example is the recently introduced Community Health Assist Scheme which will allow 710,000 Singaporeans to enjoy government subsidies when they visit private GPs and/or dentists.

Source: Centre Provident Fund Board Website, Singapore Government.
http://mycpf.cpf.gov.sg/CPF/my-cpf/Healthcare/PvdHC2.htm

Increase in public investment on public health provisions

- Public investment in the health sector is the basic requirement for sustainable development which would allow state government to furnish other needs. It is proposed in this document that public sector investment in the health sector must increase up to 5per cent as a proportion of GSDP by 2030. This target can be reached in a phased manner. In the current Five-Year Plan of 2012-17, the state government can target to spend around 1-2per cent of its GDP on health care. Similarly, this expenditure can be increased to 2-3per cent in 2017-21, to 3-4per cent in 2022-26 and finally 4-5per cent in 2027-31.

Pillar 4: Natural and environmental capital

4..5.2.39 Kerala already has a Bio-medical waste (Management and Handling) Rules, 1998, in place. Under the rules, at least one Common Waste Treatment Facilities (CWTF) is envisioned for each of the four identified regions that include the following districts:

- Region 1: Alappuzha, Kollam, Pathanamthitta, and Thiruvananthapuram. There are a total of 38,474 beds in 873 health care facilities in this region.
- Region 2: Ernakulam, Idukki, and Kottayam There are a total of 34,171 beds in 788 health care facilities in this region.
- Region 3: Malappuram, Palakkad, and Thissur. There are a total of 20,604 beds in 557 health care facilities in this region.
- Region 4: Kannur, Kassargod, Kzhikode, and Wayanad. There are a total of 21,536 beds in 599 health care facilities in this region.

4..5.2.40 The Kerala State Pollution Control Board provides authorization to hospitals for the use of various treatment methods such as incineration, Autoclave Hydroclave Treatment, and Microwave Treatment. However, very few government hospitals have taken the authorization. A common biomedical waste management treatment and disposal plant functioning in Palakkad district since 2002-03 is being used by a few government hospitals. But evidently, this is not enough looking the severity of biomedical waste being produced in state.

The way forward

4..5.2.41 The strategy for Hospital Common Waste (HCW) management will require a "Bio Medical Waste Management Legislation", supervised together by the state Department of Health and the Department of Environment. This legislation will comprehensive with detailed policies on

- Facilities and Procedures
- Labelling
- Generator requirements
- Treatment
- Transport
- Inspections
- Permits
- Fees
- Enforcement and penalties

4..5.2.42 The legislation will be enforced strictly with provisions of penalties for the defaulters. Further details are provided in Chapter 22 on Environment.

Appendix 4.1: List of Communicable Diseases

Dengue- Dengue is also known as a breakbone fever, is an infectious tropical disease caused by dengue virus.

Malaria - Disease is caused by transmitting via bite from an infected female Anopheles mosquito, which introduces the organisms from its saliva into the person's circulatory system.

Chikunguniya- It is an arthropod-borne virus, of the genus Alphavirus, that is transmitted to humans by virus-carrying Aedes mosquitoes.[1] There have been recent breakouts of CHIKV associated with severe illness.

HIV/AIDS- Human immunodeficiency virus infection / acquired immunodeficiency syndrome (HIV/AIDS) is a disease of the human immune system caused by infection with human immunodeficiency virus (HIV)

Leptospirosis (also known as Weil's syndrome, canicola fever, canefield fever, nanukayami fever, 7-day fever, Rat Catcher's Yellows, Fort Bragg fever, black jaundice, and Pretibial fever) is caused by infection with bacteria of the genus *Leptospira* and affects humans as well as other animals.

Swine influenza, also called pig influenza, swine flu, hog flu and pig flu, is an infection caused by any one of several types of swine influenza viruses. Swine influenza virus (SIV) or swine-origin influenza virus (S-OIV) is any strain of the influenza family of viruses that is endemic in pigs.[2] As of 2009, the known SIV strains include influenza C and the subtypes of influenza A known as H1N1, H1N2, H2N1, H3N1, H3N2, and H2N3.

Hepatitis (plural hepatitides) is a medical condition defined by the inflammation of the liver and characterized by the presence of inflammatory cells in the tissue of the organ.
Japanese encephalitis —is a disease caused by the mosquito-borne Japanese encephalitis virus. The Japanese encephalitis virus is a virus from the family Flaviviridae.

CHAPTER 5

AGRICULTURE

MOVING FROM AGRI-CULTURE TO KNOWLEDGE DRIVEN AGRI-BUSINESS

Agriculture will be prosperous, socially inclusive, and environmentally friendly. There will be a paradigm shift from subsistance farming to highly knowledge- intensive, competitive farming. The focus will be on increasing competitiveness and productivity in agriculture so as to raise incomes and well-being of the stakeholders, and bring prosperity not only for this generation but also future generations. Land zoning is key in this sector with paddy land being protected especially if they are wetlands. Farmers will be agripreneurs. Producer companies will set up. Latest technologies will be adopted to develop a knowledge intensive agriculture. Adopting integrated farming technique is recommended for Kerala.

5.1 Introduction

There is almost a consensus that the role of agriculture in the overall economy diminishes with rapid economic growth. The process of rapid growth is closely associated with, and indeed requires, a shift in economic structure from an agricultural base to a modern industrial base. Kerala is no exception where the contribution of agriculture and allied services to the overall Gross State Domestic Product (GSDP) has fallen from about 30 per cent in 1990−91 to 10.6 per cent in 2010−11. However, globalisation, emergence of integrated value chains, rapid technological and institutional innovations, livelihood and food security issues, and environmental constraints have redefined the role of agriculture. A new paradigm has emerged that recognises agriculture's role in development in the emerging context of sustainable development even while its overall share in GDP declines. This paradigm requires traditional agriculture to transform rapidly into a modern sector through the adoption of science-based technology, thereby making a large contribution to overall economic growth along with environmental and social enhancement. In this backdrop, the perspective Plan provides insights for a roadmap for the development of Kerala's agricultural and allied sectors. The long- term view of Kerala agriculture and allied sectors will be to shift to a new technology- based paradigm.

5.2 Performance of Kerala's agriculture

Diminishing share of agriculture in both GSDP and workforce

5.2.1 The estimates of annual trend growth rates of gross domestic product of agriculture, forestry and fishery sectors along with that of overall agriculture and allied sector and non-agricultural

sector in Kerala are presented in Table 5.1 These estimates show that agriculture (including livestock) exhibited a modest growth of 2.53 per cent during the nineties but displayed poor performance (0.27 per cent) during the decade after 2000. A similar deceleration in growth was noticed in the forestry and logging sector too, but the fishery sector experienced a slight improvement in growth from −0.37 per cent to 0.32 per cent. The overall growth rate of agriculture and allied sectors slid from 2.34 per cent in the nineties to an almost stagnant rate of 0.46 per cent in the succeeding decade. On the contrary, the non-agricultural sector registered an impressive growth during both the periods. Agriculture in Kerala experienced a slower growth during the last decade with all its sub-sectors losing growth momentum (except fishery but the growth rates are fairly low), whereas the non-agricultural sector gained pace in growth during this period.

Table 5.1: Trend Growth Rates in GSDP (2004−05 Prices) of Various Sub-sectors in Kerala
(% per year)

Sector	***1990−91 to 1999−00***	***2000−01 to 2010−11***	***1990−91 to 2010−11***
Agriculture*	2.53	0.27	1.28
Forestry and Logging	3.69	2.00	2.31
Fishery	−0.37	0.32	0.35 (?)
Agriculture and allied sector	2.34	0.46	1.29
Non-Agriculture	6.24	9.41	7.53
All sectors	5.25	7.96	6.30

Note: * GSDP Agriculture includes both crops and livestock.
Data Sources: National Accounts Statistics and Central Statistical Office

5.2.2 As a result, the share of agriculture and allied sectors in Gross State Domestic Product (GSDP) declined steeply from 32.6 per cent in 1980−81 to 10.6 per cent in 2010−11. Agriculture alone accounted for about 8.3 per cent of total GSDP in Kerala in 2010−11.

Table 5.2 Profile of Workers Population in Kerala

Particulars	***1981***	***1991***	***2001***	***2011***
No. of main workers (‘000 nos.)	6,790.1	8,299.4	8,237.0	8,236.7
As share of total population (%)	26.68	28.53	25.87	24.67
Number of cultivators (‘000 nos.)	887.5	1,015.8	586.5	740.4
As share of main workers (%)	13.07	12.24	7.12	7.20
Agricultural labour (‘000 nos.)	1,916.8	2,119.7	1,021.4	1,653.6
As share of main workers (%)	28.23	25.54	12.40	16.1

Source: Devi, P.I. 2012. Dynamics of Farm Labour Use-An Empirical Analysis. *Agricultural Economics Research Review*. 25(2). 317−326. July−December

5.2.3 Correspondingly, the share of work force in agriculture has also been declining. Although there are some fluctuations, the longer term trend is one where the share of work force engaged in agricultural operations has demonstrated a steep decline over the years (Table 5.2). Reduction is seen in both number and share of cultivators and agricultural labourers. In 1981, nearly 13 per cent of the workforce was engaged as cultivators, but this share went down to 7.2 per cent by 2011. Similarly, agricultural labour as a share of main workers declined from 28.2 per cent to 16.1 per cent during the same period. In total, the share of population that depended on agriculture as a source of livelihood went down from 41.1 per cent in 1981 to that of 23.3 per cent 2011[1].

5.2.4 Notwithstanding this, agriculture still forms the backbone of Kerala's economy as approximately one-fourth of the workforce is in the primary sector, directly dependent on agriculture and allied services. It also forms the resource base for a number of agro-based industries and agro-services.

Increasing value of product

5.2.5 Between 1990−91 and 2010−11, per capita income (GSDP based, at 2004−05 prices) in Kerala has increased from Rs 19,502 per capita to Rs 56,107 per capita, an increment of 187 per cent within a period of two decades. But such an improvement did not happen in the case of income from agricultural sector (Table 5.3). It increased from Rs 4,187 to Rs 4,674 which is a mere 11.6 per cent .On the other hand, value of product (VOP) from agriculture per hectare of net sown area increased considerably in the state. Improvement in agricultural productivity is a major reason behind this upswing of VOP from Rs 54,231 per hectare (ha) to Rs 97,200 per ha between 1990−91 and 2010−11. A similar enhancement in VOP from agriculture was noticed at all India level also during the same period, but at a slower pace.

Table 5.3 Income from Agriculture: Kerala *versus* India

Particulars	***Kerala***		***India***	
	1990−91	***2010−11***	***1990−91***	***2010−11***
Per capita income in Rs (2004−05 prices)*	19,502	56,107	15,865	40,752
Per capita agricultural income in Rs (2004−05 prices)*	4,187	4,674	4,007	5,084
Value of Product from agriculture/ha in Rs (2004−05 prices)*#	54,231	97,200	21,116	32,929
Share of Agriculture in GDP (%)*	21.5	8.3	28.7	12.3

[1] This number is derived by adding percentage share of cultivators and agricultural labourers out of main workers.

Share of Agriculture and allied sectors in GDP (%)*	26.9	10.6	31.4	14.6

Note: *GDP Agriculture includes both crops and livestock; GSDP in the case of Kerala *# Corresponds to the year 2008−09

Source: Agricultural Statistics at a Glance, 2012, http://agricoop.nic.in/agristatistics.htm

Rising yield per acre

5.2.6 Increase in VOP is essentially due to rising yield per acre in most crops. Table 5.4 shows performance of selected crops during the periods under consideration in terms of the trend growth rates in their area, production, and yield. Taken together, these crops account for 82 per cent of Gross Cropped Area (GCA) in Kerala. The key trends are,

Table 5.4: Trend Growth in Area, Production and Yield of Major Crops in Kerala (%)

Sector	***1990−91 to 1999−00***			***2000−01 to 2010−11***			***1990−91 to 2010−11***		
	A	***P***	***Y***	***A***	***P***	***Y***	***A***	***P***	***Y***
Rice	−5.55	−4.74	0.87	−4.55	−2.79	1.84	−4.92	−3.64	1.34
Coconut	0.34	1.61	1.26	−1.92	−0.11	1.85	−0.49	1.12	1.62
Rubber	1.41	7.35	5.85	1.31	3.37	2.04	1.10	4.51	3.38
Tapioca	−2.30	−0.09	2.26	−4.19	0.15	4.54	−3.17	−0.30	2.96
Arecanut†	2.92	3.48	1.26	0.73	2.11	1.27	2.83	2.63	−0.13
Cashew nut	−3.12	−6.91	−3.91	−7.48	−6.52	1.03	−3.99	−4.31	−0.33
Banana‡	3.31	10.04	6.51	0.01	1.04	1.04	3.30	4.25	0.92
Pepper	0.52	2.46	1.93	−2.65	−5.26	−2.69	0.26	−0.26	−0.51
Ginger	−1.55	-0.36	1.21	−5.60	−2.63	3.15	−3.75	−1.86	1.96
Cardamom	−0.83	7.97	8.87	−0.05	−0.54	−0.50	−0.35	5.38	5.75
Tea	0.36	0.92	0.56	−0.05	−1.65	−1.59	0.30	−0.97	−1.27
Coffee	0.59	12.61	11.95	0.04	−1.44	−1.48	0.25	4.02	3.76

Notes: A: Area, P: Production, Y: Yield

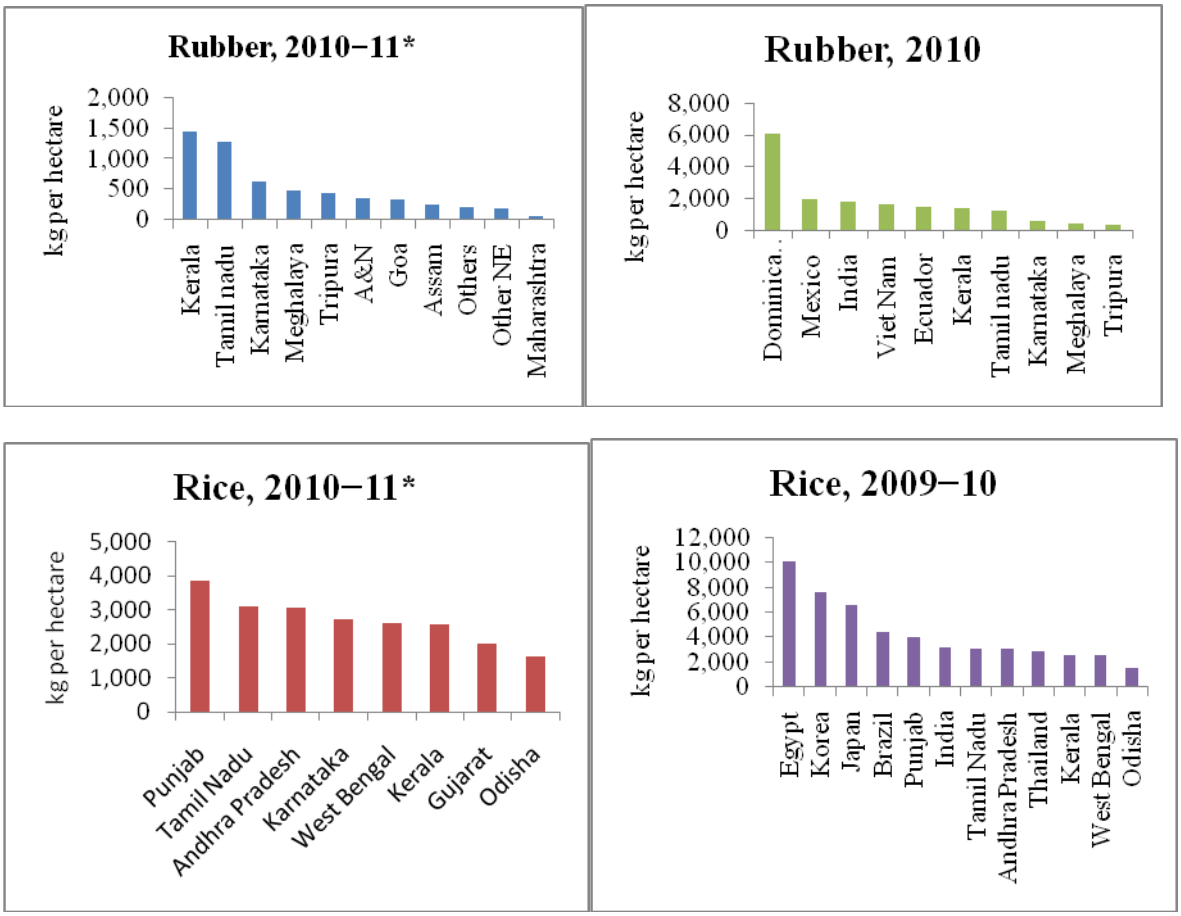
† The growth rates shown above are exponential growth rates. However, the numbers are counterintuitive as the growth rate for the whole period 1990–91 to 2010–11 is smaller than either of the two sub-periods. We calculate average annual growth rate for the three periods: 0.73 per cent between 1990–91 and 1999–2000, –0.1 per cent between 2000–01 and 2010–11 and 0.3 per cent 1990–91 and 2010–11. This shows significant decrease in yields of the arecanut in the second sub-period of 2000–01 to 2010–11.

‡ Similar to arecanut we calculate the average annual growth rate of banana: 12.24 per cent in the period 1990–91 to 1999–2000, –1.2 per cent in the period 2000–01 to 2010–11 and 5.2 per cent for the whole period. This shows significant fall in yield of bananas in the second sub-period.

Sources: Farm Guide, 2012, Farm Information Bureau, Government of Kerala and Department of Economics and Statistics

- Only three major crops namely, rubber, banana, and arecanut displayed impressive performance with both area under them and yield per hectare growing impressively over the past two decades (better than the average growth in agriculture).
- Rice, and, to some extent, ginger have experienced conspicuous decline in area and production throughout the 1990s and 2000s despite increase in yield per acre. Area under paddy declined although there have been attempts to conserve paddy area through measures such as the Kerala Conservation of Paddy and Wetland Act, 2008. Cashew nut experienced decline in productivity in the 1990s which showed signs of improving in the 2000s.
- In the case of coffee and cardamom, production growth was high in the 1990s due to the growth of productivity. However, yield decreased in 2000s. Pepper also shows similar pattern although rate of increase in yield in the 1990s was below two per cent per year. Production of tea has stagnated during the two decades of 1990s and 2000s.

Figure 5.1: Yield for Rice and Rubber in Countries and Indian states (kg/hectare)



Note: * These figures are provisional.

Sources: Rubber Board via National Multi Commodity Exchange, 2012-13, FAO Statistical Database, Directorate of Economics and Statistics, Department of Agriculture and Cooperation & FAO, Regional Office for Asia and the Pacific, Bangkok and Department of Agriculture and Cooperation (Horticulture Division)

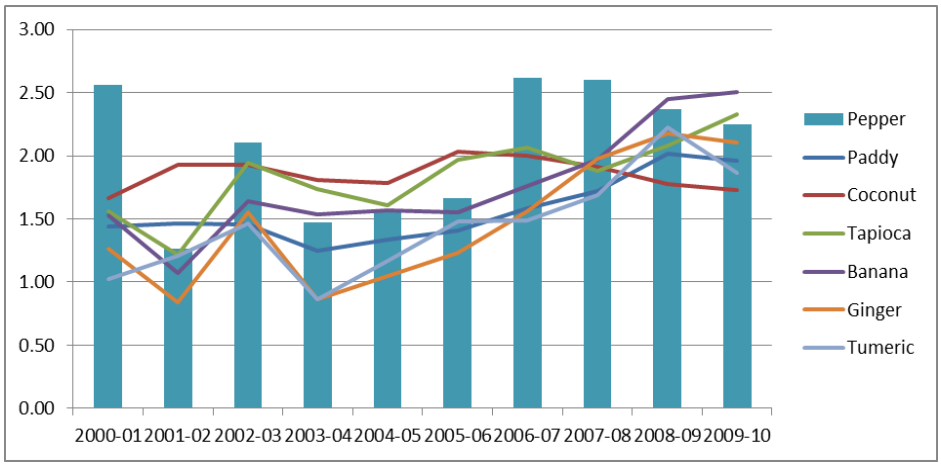
5.2.7 A general pattern that can be discerned from the above analysis on crops is that, agriculture in Kerala has suffered considerable setback in the recent years, particularly in terms of loss in area. The declining productivity in some niche crops like pepper, tea, coffee, and to some extent cashew nut etc. is a cause of concern. It must, however, be observed that most crops have managed to improve their productivity (except tea, coffee, cardamom and pepper) even in the midst of losing share in area.

5.2.8 Inter-state and international comparisons of two major products of Kerala, rice and rubber, however, show that there is vast scope for increase in productivity in Kerala (Figure 5.1).

Increasing profitability

5.2.9 The ratio of VOP to Cost A (both at current prices) was worked out for the major crops in Kerala for the period 2000−01 to 2009−10 and is depicted in Figure 5.2. Cost A, corresponds to all paid-out costs, i.e., the cost the farmer meets with liquid cash. The results suggest that except in the case of coconut and pepper, the increase in value of output have steadily outpaced increase in paid-out costs for all other crops. While the ratio increased from 1.33 in 2000-01 to 1.96 in 2009–10 for paddy, the rate of increase was even more pronounced in the case of tapioca (1.56 to 2.33). A similar sharp improvement in the ratio from 1.53 to 2.50 was noticed for banana during the same period. The increase was perceptible for ginger and turmeric also, but with higher inter-year fluctuations (ginger ?). For coconut, even though there was a slight improvement in the ratio in the initial years, a steady deterioration was noticed in the years after 2005−06. In case of pepper, there were larger fluctuations, but the last few years showed declining trend.

Figure 5.2: VOP-Cost A ratio for Major Products



Source: Computed by Author based on Agricultural Statistics at a Glance, 2011

5.2.10 In the last decade, although there are improvements in productivity of crops together with increase in farm prices relative to the rise in costs, both net sown area (NSA) and gross cropped

area (GCA) in Kerala have declined over the past two decades. The land use statistics published by the Ministry of Agriculture, Government of India, shows that NSA of Kerala in 1990–91 was 22.47 lakh hectares (ha); in a span of two decades, NSA has declined by 7.5 per cent. The GCA has declined by 11.6 per cent. In a growing economy, the area under agriculture may decline as demand for land for other uses intensifies. The decline in area must be compensated by corresponding rise in productivity to ensure healthy growth in agriculture. In Kerala, too, productivity rose, but it was not high enough to ensure a significant rate of growth in agriculture and agricultural income.

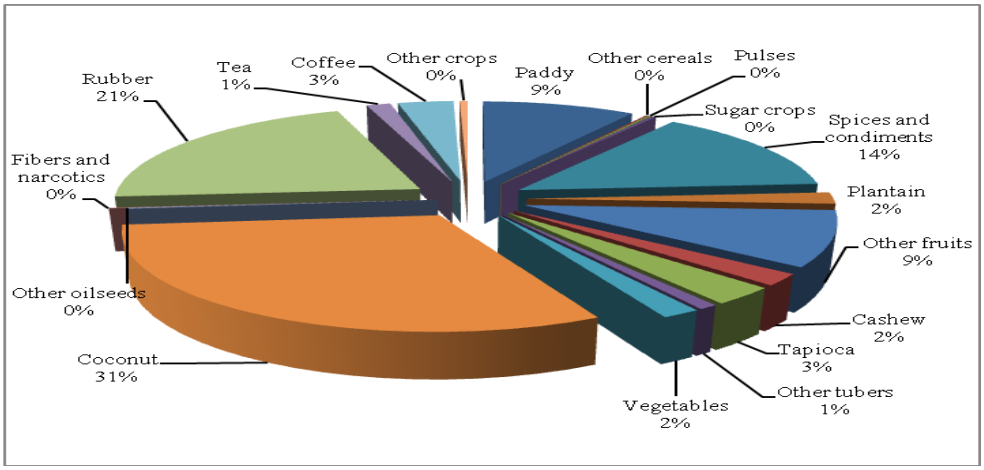
5.3 Challenges

5.3.1 Structural challenges

Highly skewed cropping patterns

5.3.1.1 Agriculture in Kerala is distinct from that of the rest of India in terms of cropping pattern. The terrain in Kerala is highly diverse, ranging from high-altitude zones that have temperate climate to low- altitude coastal regions endowed with humid tropical climate. The nature of cropping pattern in Kerala has a strong association with these ecological and physiographic peculiarities of the state. The lowlands of Kerala, which are abundant with submerged wetlands, are mostly utilised for cultivation crops like paddy and sugarcane. In the lower slopes, where the water table is fairly high, but soil is drained, annual crops like tapioca, plantains, vegetables, minor roots and tubers, and perennial crops like coconut, rubber, mango, cashew, arecanut, etc., are preferred. The highlands of Kerala support crops like tea, coffee, cardamom, ginger, turmeric, and, even temperate vegetables, like cabbage and cauliflower. The geographical distribution of area under major crops of Kerala is presented in Figure 5.3. Coconut occupies the highest area among all other crops in Kerala with a share of 31 per cent area under it. This is followed by rubber (21%), which has gained considerable area under it in the recent years. Spices and condiments that include pepper, cardamom, turmeric, ginger, cinnamon, clove, vanilla, nutmeg, etc., claim a share of 14 per cent, whereas paddy, the main staple food of Kerala, has only 9 per cent area under its cultivation. Banana and other fruits together constitute an area share of 11 per cent, whereas all other crops-crop groups together have less than 14 per cent area under them.

Figure 5.3: Distribution of Cropped Area under Various Crops in Kerala, 2009–10



Source: Agricultural Statistics at a Glance, 2011

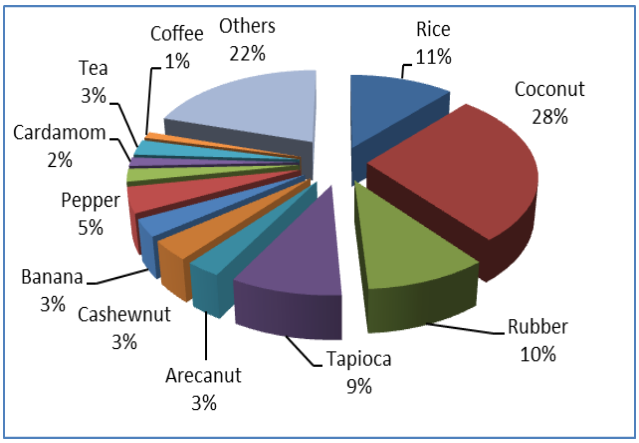
Structural shift in the composition of agricultural output

5.3.1.2 The differential performance of crops in terms of area, production and prices during the last two decades has resulted in significant alteration in the composition of VOP from crops. These variations are depicted in Figure 5.4. During the Triennium Ending (TE) 1990–91, coconut topped the list of crops with the highest share of 28 per cent in total VOP from crops. Other major contributors to output were rice (11%), rubber (10%), and tapioca (9%) with other crops contributing 5 per cent or less individually. However, by TE 2008–09, the scenario underwent a major change with the share of VOP from rubber rising to 40 per cent and the contribution of coconut declining to 15 per cent. The share of rice got squeezed to a mere 4 per cent while that of tapioca to 7 per cent. The share of pepper also decreased to 3 per cent from 5 per cent during this span of time. Other minor crops, like tea, cashew nut, etc., also lost their share, to a smaller extent. On a different note, banana improved its position with a share of 5 per cent in TE 2008–09 from 3 per cent in the previous period.

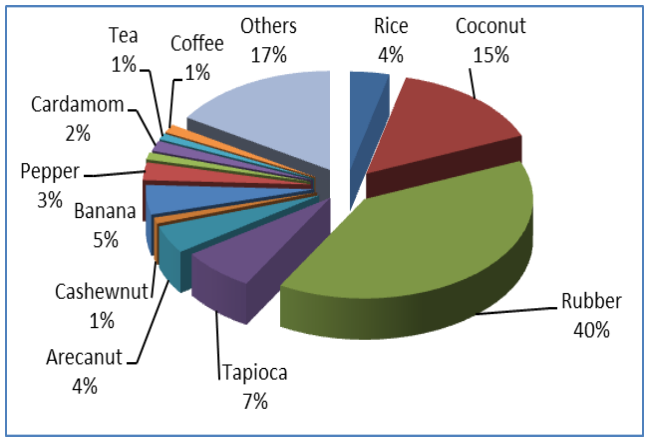
5.3.1.3 A general point emerging from the above patterns is that, agriculture in Kerala has witnessed decline in net area sown and also the increasing importance of more profitable and commercial crops like rubber.

Figures 5.4: Shares of VOP of major crops in Kerala: TE 1990−91 and TE 2008−09

TE 1990−91



TE 2008−09



Source: Agricultural Statistics at a Glance, 2011

Ownership patterns are highly skewed

5.3.1.4 In Kerala, marginal and small holders dominate agriculture. As per the Agricultural Census, 2005−06, a total of 6,904.3 thousand farm holdings were operating in Kerala. Of them, marginal farmers accounted for 95.6 per cent of holdings, followed by small farmers constituting 3.11 per cent. The other three holding categories, namely semi-medium, medium and large holdings accounted for the rest 1.3 per cent (Table 5.5).

5.3.1.5 It is notable that, 95.6 per cent of holders operated only 57.6 per cent of the total farm area. On the other hand, 3.1 per cent holders, constituting small farmers took possession of 18.3 per cent area and the rest of 1.3 per cent constituting other holding categories shared the remaining 24.1 per cent land. On an average, marginal farmers operated in an average size of 0.14 ha of land. The average size of holdings of small farmers was 1.33 ha, and that of semi-medium, medium, and large farmers were 2.56 ha, 5.30 ha and 47.73 ha respectively. The relatively bigger size of land under large farmers is due to the presence of commercial estates devoted to cultivation of crops like tea, coffee, cardamom, etc. Taking all categories, the average size of operational holding is as low as 0.23 ha, which is one of the lowest in the country.

Table 5.5: Distribution of number of Holdings and Operated Area in Kerala Agriculture, 2005−06

Particulars	***Marginal***	***Small***	***Semi-medium***	***Medium***	***Large***	***All***
Number of operational holdings ('000 nos)	6,602.4	214.8	69.7	14.8	2.5	6,904.3
Share in total (%)	95.63	3.11	1.01	0.22	0.04	100.00

Particulars	*Marginal*	*Small*	*Semi-medium*	*Medium*	*Large*	*All*
Area operated ('000 ha)	895.8	284.8	178.6	78.8	116.9	1,554.8
Share in total (%)	57.61	18.32	11.49	5.07	7.52	100.00
Average size of holdings (ha)	0.14	1.33	2.56	5.30	47.73	0.23

Notes: Marginal: Below 1 ha; Small: 1.0-1.99 ha; Semi-medium: 2.0-3.99 ha; Medium: 4-9.99 ha and Large: 10 ha and above.

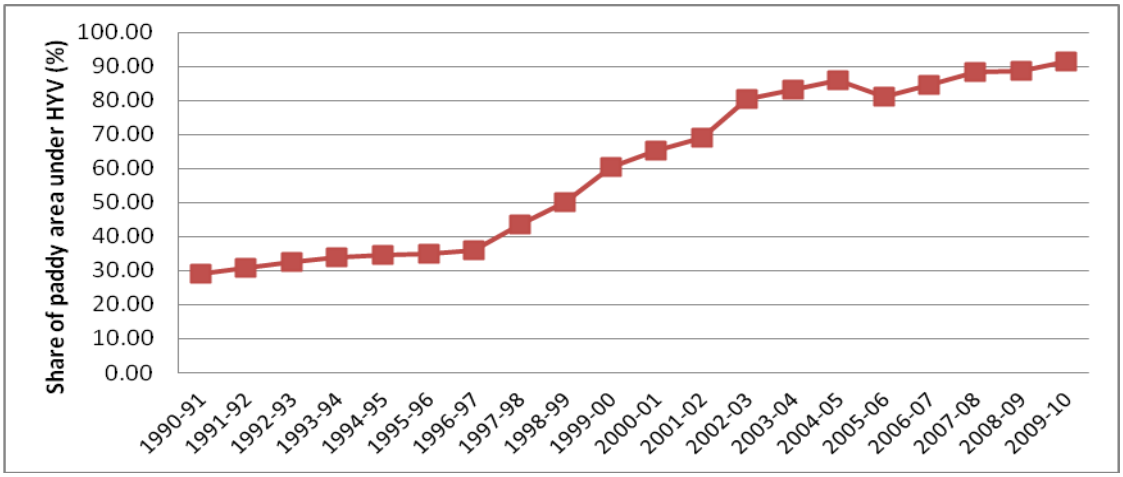
Source: Agricultural Census, 2005−06

5.3.2 Gap between Requirements and Availability

Adoption of high yielding variety seeds

5.3.2.1 The level of adoption of high yielding varieties (HYVs) has been rather high for paddy. The level and pace of spread of HYVs of paddy in Kerala has been phenomenal. As a result of the concerted efforts of the government and various private stakeholders involved, area under HYV paddy has increased at an exponential rate in the state during the last two decades. The share of HYV paddy area in total paddy area was a meagre 29 per cent in 1990−91, which shot up to 91 per cent by the year 2009−10 (Figure 5.5).

Figure 5.5: Growth in Area under High Yielding Varieties of Paddy, 1990−91 to 2009−10



Source: Farm Information Bureau. *Farm Guide 2012*. Government of Kerala.

5.3.2.2 Along with an increase in area under HYV, there has been steady improvement in yield levels of HYVs. Table 5.6 substantiates this point by depicting the improvement in yield of HYVs of paddy between two periods, TE 2002−03 and TE 2009−10 corresponding to the three cropping seasons. In contrast, the average yields of local paddy varieties were seen to be declining, perhaps due to lower interest of farmers in cultivating them. There is no data available

for the adoption of HYV in the case of the other crops. The need for increasing adoption of HYVs for other crops also is demonstrated by the experience in the case of paddy.

Table 5.6: Yield of High Yielding and Local Varieties of Paddy in Different Cropping Seasons, 2002−03 and 2009−10

Particulars	***TE 2002−03***	***TE 2009−10***
Yield of HYV paddy (kg-ha)		
i. Autumn	2,137	2,367
ii. Winter	2,345	2,591
iii. Summer	2,671	2,724
Yield of local paddy (kg-ha)		
iv. Autumn	1,781	1,485
v. Winter	1,849	1,748
vi. Summer	1,838	1,645

Source: Farm Information Bureau. *Farm Guide 2012*. Government of Kerala

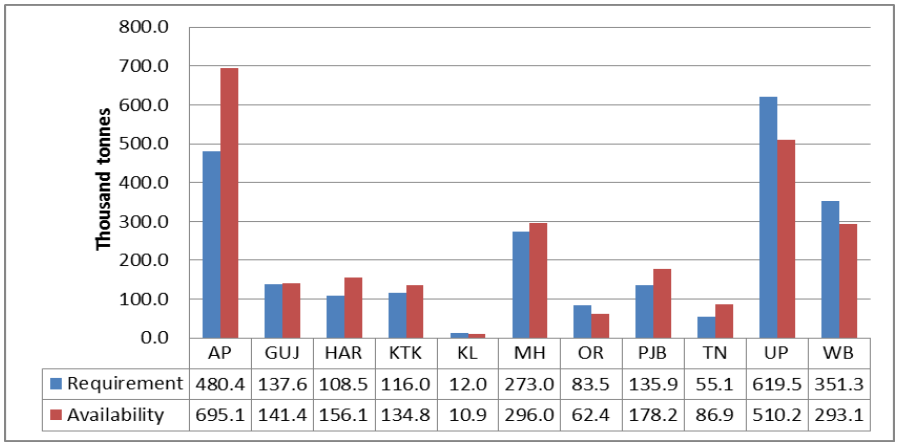
Seeds: Gap between the supply and requirement

5.3.2.3 Realising the potential of quality seeds and planting materials in securing productivity gains, the Government of Kerala has been striving hard to develop a good network of seed production and distribution. Certified seed production in Kerala is almost entirely from the government sector, unlike in other states. More than half of the certified seeds are sourced from the state department of agriculture, whereas the rest are met from National Seeds Corporation or other government approved agencies. Presently, there are 33 state seed farms, 10 district farms, 10 special farms, and 8 coconut nurseries functioning in the state with the purpose of delivery of quality seeds to farmers (GoK, 2012)[2]. The major share of certified seed pertains to that of improved paddy varieties, hybrid seeds of vegetables, and other minor crops. The state government also produces and distributes coconut and arecanut seedlings, rooted pepper cuttings, cashew grafts, tissue culture banana seedlings, grafts of other fruit crops, etc., through Krishi Bhavans, Krishi Vigyan Kendras (KVKs), and other seed outlets.

5.3.2.4 For Kerala, the total requirement worked out to be 12,000 tonnes, whereas the actual availability was 10,900 tonnes. This means actual availability fell short of the requirement. The other states where availability falls short of requirement are Odisha, Uttar Pradesh (UP) and West Bengal. In majority of other states, however, seed availability exceeds the requirement indicative of the dynamic role played by seed producers and distributors in these states.

[2] Government of Kerala. 2012. *Kerala Economic Review – Agriculture and Allied Sectors*, State Planning Board, Government of Kerala.

Figure 5.6: Requirement and Availability of Quality-certified Seeds in Major States, 2011−12



	AP	GUJ	HAR	KTK	KL	MH	OR	PJB	TN	UP	WB
Requirement	480.4	137.6	108.5	116.0	12.0	273.0	83.5	135.9	55.1	619.5	351.3
Availability	695.1	141.4	156.1	134.8	10.9	296.0	62.4	178.2	86.9	510.2	293.1

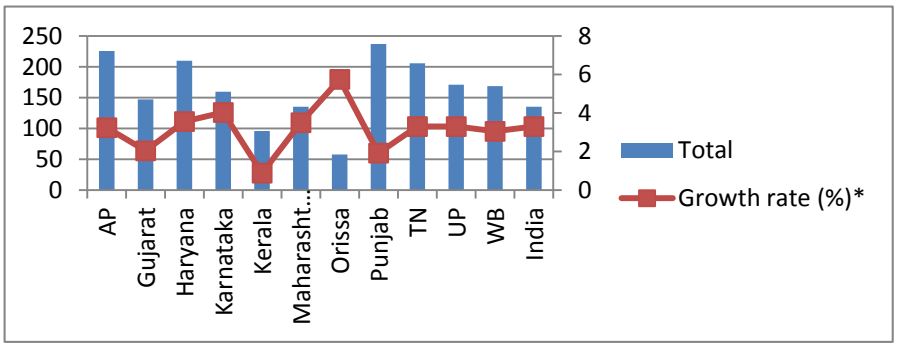
Source: Lok Sabha un-starred question accessed through Indiastat.com, 2012

Fertilisers: Gap between demand and supply

5.3.2.5 Kerala is a relatively low fertiliser consuming state in relation to other major agricultural states in the country. During 2009−10, the total consumption of NPK (Nitrogen-Phosphorus-Potash) in Kerala was estimated to be 95.9 kg per ha of NSA (Figure 5.7). This was much lower than the levels consumed in the neighbouring states, like Tamil Nadu (205.8 kg per ha), Karnataka (159.5 kg per ha), and Andhra Pradesh (225.6 kg per ha). Odisha (57.6 kg per ha) was the only state among the major ones where fertiliser consumption was found to be lower than that of Kerala. The growth rate in fertiliser consumption during the last two decades (1990−91 to 2009−10) was also the lowest (0.88 per cent per year) in Kerala, while other states registered an annual rate of growth between 2−6 per cent. One reason why Kerala consumed lower fertilisers could be that its cropping pattern is dominated with plantation crops, which require relatively lower amount of fertilisers. The general preference of people towards organic food could have also contributed to this pattern. What is worrisome is that despite low consumption, there remains a gap between demand and supply of fertilisers (Table 5.7). In 2011−12, Kerala required[3] around 649 thousand tonnes of fertilisers. Out of this, 565 thousand tonnes were made available by the state government and the total sales realised were 531 thousand tonnes. This suggests that, there was a gap of around 118 thousand tonnes of total fertilisers to be met during this period.

[3] Requirement is as reported by the respective state departments of agriculture based on the assessment of farmers demand for fertilisers.

Figure 5.7: Fertiliser Consumption in Major States (kg per ha), 2009−10



Source: Agricultural Statistics at a Glance, 2011; *corresponds to the period 1990−91 to 2009−10

Table 5.7: Requirement, Availability and Sales of Major Fertilisers in Kerala, 2011−12 ('000 tonnes)

Item	*Requirement*	*Availability*	*Sales*
Urea	182	150	149
MOP	45	44	41
DAP	175	151	142
Complex	247	220	199
Total	649	565	531

Note: MOP: Muriate of Potash; DAP: Di-ammonium Phosphate
Source: Lok Sabha un-starred question accessed through Indiastat, 2012

Low irrigation

5.3.2.6 Out of the total gross cropped area of 2,695,000 hectares in Kerala, an area of 458,000 hectares was found to be irrigated in 2009−10 (Table 5.8). This share of nearly 17 per cent area under irrigation is far below the all India share of 45.3 per cent. Among the various crops, sugarcane leads with the highest share of irrigated area (97.3%), followed by paddy (72.0%), vegetables (39.3%), banana (35.8%), arecanut (34.5%), etc. Coconut, whose productivity is highly linked with irrigation, has only 19.5 per cent of its area under irrigation. Surprisingly, predominant annual crops like spices and tubers also fall under the category of 'under- irrigated' crops. Over the years, area under irrigation has hardly improved in the state. Trend growth rates during the period 1990−91 to 2009−10 show that irrigated area increased at a slow pace of 1.5 per cent per annum.

Table 5.8: Area under Irrigation of Major Crops in Kerala, 2009−10

Crop	*Gross area irrigated ('000 ha)*	*Gross cropped area ('000 ha)*	*Share irrigated (%)*
Coconut	151.9	778.6	19.5
Spices	18.8	351.6	5.3
Paddy	168.6	234	72
Tubers	13.1	101.3	12.9
Arecanut	34.2	99.2	34.5
Banana	35.5	99.1	35.8
Vegetables	17	43.4	39.3
Sugar cane	2.9	2.9	97.3
All crops	458	2,695	16.9

Source: Farm Information Bureau. *Farm Guide 2012*. Government of Kerala

5.3.2.7 Of the total potential area under micro irrigation methods in India, only about 9.2 per cent is covered under this system. Andhra Pradesh tops in the use of micro irrigation with almost 50 per cent of the potential area already covered under the system. It is followed by Karnataka, Tamil Nadu, Maharashtra, and Haryana[4] (Table 5.9).

Table 5.9: Potential and Actual Area under Micro Irrigation in Different States, 31st October, 2008

	Drip			*Sprinkler*			*Total*		
State	*P ('000 ha)*	*A ('000 ha)*	*%*	*P ('000 ha)*	*A ('000 ha)*	*%*	*P ('000 ha)*	*A ('000 ha)*	*%*
Andhra Pradesh	730	363.1	49.7	387	200.9	51.9	1,117	564	50.5
Gujarat	1,599	169.7	10.6	1,679	136.3	8.1	3,278	305.9	9.3
Haryana	398	7.1	1.8	1,992	518.4	26	2,390	525.5	21.9
Karnataka	745	177.3	23.8	697	228.6	32.8	1,442	405.9	28.2
Kerala	179	14.1	7.9	35	2.5	7.2	214	16.6	7.8
Maharashtra	1,116	482.3	43.2	1,598	214.7	13.4	2,714	697	25.7

[4] As per the latest statistics available from indiastat.com, the total land that is now under the scheme of National Mission of Micro Irrigation in Kerala is 12 thousand hectares (July, 2012).

Orissa	157	3.6	2.3	62	23.5	37.9	219	27.1	12.4
Punjab	559	11.7	2.1	2,819	10.5	0.4	3,378	22.2	0.7
Tamil Nadu	544	131.3	24.1	158	27.2	17.2	702	158.5	22.6
Uttar Pradesh	2,207	10.7	0.5	8,582	10.6	0.1	10,789	21.2	0.2
West Bengal	952	0.2	0	280	150	53.6	1,232	150.2	12.2
India	11,659	1,428.50	12.3	30,578	2,442.40	7.9	42,237	3,870.80	9.2

Sources: Raman, S. 2010. State-wise Micro-Irrigation Potential in India-An Assessment", unpublished Paper. Natural Resources Management Institute, Mumbai cited in Palanisamy, K., Kadiri, Mohan, Kakumanu, K.R. and Raman, S. 2011. Spread and economics of micro irrigation in India: Evidence from nine states. *Economic and Political Weekly*, Vol. XLVI (26&27): 81−86 and www.indiastat.com

Low farm mechanisation

5.3.2.8 Farm mechanisation has also been abysmally low in Kerala. Even though labour availability for agricultural operations has decreased in Kerala over the years, a commensurate improvement in mechanisation did not take place. The numbers of major implements used for agricultural purposes in Kerala based on the Livestock Census, 2003 are presented in Table 5.10 (This is the latest available data on agricultural implements at the state level).

Table 5.10: Number of agricultural implements used for agricultural purposes in Kerala, 2003

Type of Machinery	***Rural***	***Urban***	***Total***	***Number − 1000 ha of GCA***
Power operated implements				
Power tillers	1,702	603	1,765	0.60
Tractors	2,061	77	2,138	0.72
Mouldboard Plough	153	8	161	0.05
Cultivator	274	5	279	0.09
Disc harrow	254	17	271	0.09
Rotavator	35	1	36	0.10
Animal operated implements				
Cultivator	934	5	939	0.32
Disc harrow	672	16	688	0.23
Seed-fertiliser drill	610	4	614	0.21
Leveller	7,453	248	7,701	2.61
Wetland puddler	378	3	381	0.13
Sugarcane crusher	69	1	70	0.02

Source: Livestock Census, 2003

5.3.2.9 On a per hectare basis, the density of implements was found to be very low in Kerala. This was much lower compared to other states. For instance, the density of use in the case of power tillers and tractors were 0.60 and 0.72 respectively. These were much lower than those for Haryana (30.3 for tractor; 4.1 for tiller), Punjab (37.8 for tractor; 4.5 for tiller), and southern states like Tamil Nadu (9.4 for tractor; 1.9 for tiller) and Karnataka (5.3 for tractor; 2.4 for tiller). The relatively smaller size of farm holdings in Kerala, decreasing area under paddy and other field crops, predominance of plantation crops, etc., could be the key reasons behind this observed pattern. A disaggregated analysis indicates that the marginal and small holders that comprise 98 per cent of the total farm households in Kerala have much lower intensity farm mechanisation. Considering that the agricultural wage rates are rather high and that there is a shortage of agricultural labour, low levels of mechanisation have constrained the productivity growth. Mechanisation can have a large effect on productivity. For instance, increasing adoption of coconut climbers can make a big difference in the harvesting operation of nuts. It can minimize time for coconut harvesting and at the same time reduce labour requirements and also reduces cost of harvesting. Similarly, there are several other small-farm friendly farm implements, like power operated levellers, ridgers, puddlers, harrows, furrow-bund formers, seed and fertiliser drills, planters, weeders, shellers, harvesters, etc., that are suitable for agriculture in Kerala, but are yet to find significant levels of adoption.

Peculiar Challenges in the Plantation Sector

5.3.2.10 Kerala's agriculture is different from the rest of India as it is dominated by the plantation sector. The Kerala State Economic Review 2012 states that the state "has a substantial share in the four plantation crops of rubber, tea, coffee, and cardamom. These four crops together occupy 7.02 lakh ha, accounting for 34.4 percent of the net cropped area in the state. Kerala's share in the national production of rubber is 87.3 per cent, cardamom 79 per cent, coffee 22 per cent, and 7 percent in tea during the year 2011−12"[5]. Of course, coconut is the notable exception, which can be had in several forms.

5.3.2.11 As in the rest of the country, Kerala inherited this style of farming from the British. The present day plantations are governed by the Plantation Labour Act 1964. In plantation farming, the labourers stay on the farms. The plantations owners are supposed to pay regular wages, along with payment for school fees for children of plantation workers; provide health benefits; and land. These drive up the costs of plantation farming. Child labour has been banned, but before that the whole family used to work on the plantations.

[5] State Planning Board. 2012. Economic Review 2012. http://www.spb.kerala.gov.in/images/pdf/er12/Chapter2/chapter02.html#Agriculture. Government of Kerala, Thiruvanthapuram, Kerala.

5.3.2.12 Joseph and George (2011) list some of the major challenges in the plantation sector[6]:

- Acute labour shortage
- Domination of small land holders in rubber production
- Large scale deforestation due to cardamom production in Kerala: Joseph and George (2011) specifically write, "In Kerala a large proportion of cardamom plantations are raised in the forest land given on long term lease - *kuthakappattom* - by the revenue department and after the expiry of the *kuthakappattom* lease it is rarely renewed due to environmental considerations".
- Land tenure systems that do not encourage crop diversification
- Multitude of taxes which are higher in Kerala versus other neighbouring states; for example, plantation tax is 50 per cent in Kerala. It does not even exist in Karnataka and Tamil Nadu. Land revenue tax is Rs 100 per hectare versus Rs 5 per acre or Rs 12.5 per hectare in Tamil Nadu.

5.3.3 Financing patterns

Gaps in Agricultural credit

5.3.3.1 There has been tremendous growth in institutional financing in the agricultural sector in Kerala over the last two decades:

- According to the 2010−11 data, the highest share (65.8%) of the total advances outstanding was contributed by scheduled commercial banks (SCBs). The co-operative banks, including Kerala State Co-operative Agricultural and Rural Development Bank (KSCARDB), contributed 24.5 per cent, whereas Regional Rural Banks (RRB) accounted for 9.7 per cent. The share of Kerala Finance Corporation (KFC) towards agricultural credit was negligible (0.01%).
- Between 1990−91 and 2008−09 the disbursement of direct credit through Scheduled Commercial Banks (SCBs) shot up several times from Rs 678 crore to Rs 10,866 crore. The indirect credit also experienced a similar boost from Rs 46 crore to Rs 1,196 crore. This corresponds to an annual growth of 6.6 per cent in direct and 8.1 per cent in indirect credit at 2004−05 prices. In terms of disbursements per hectare of gross cropped area, direct credit increased from Rs 2,400 per ha to Rs 40,300 per ha and from Rs 200 per ha to Rs 4,400 per ha in the case of indirect credit during the same period. Like commercial banks, the co-operative credit sector consisting of State

[66] Joseph, K.J. and P.S. George. 2011. Structural Infirmities in India's Plantation Sector: Natural Rubber and Spices. *Report Prepared for the Ministry of Commerce, Government of India*. National Research Programme on Plantation Development. Centre for Development Studies, Thiruvanthapuram.

Co-operative Banks, District Central Co-operative Banks (DCCBs), and Primary Agricultural Credit Societies (PACSs) are also playing an active role in disbursing agricultural credit in Kerala.

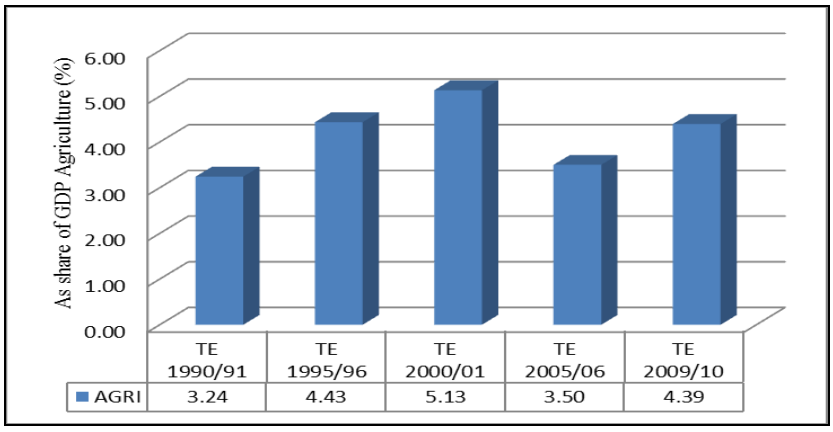
5.3.3.2 Notwithstanding this, there is still a wide gap in terms of the outreach of formal credit in the state of Kerala. In 2004−05, only 8.21 per cent of all farm households could access institutional credit. While the percentage of marginal farmers that took credit was only 7.41 per cent, the corresponding figure was 29.50 per cent for the medium households, and 20.25 per cent for large households.

5.3.3.3 However, since then substantial developments have taken place in this arena, with the growing adoption of Kisan Credit Cards (KCCs), increased percolation of micro-finance through Self Help Groups (SHGs), etc. The role of Kisan Credit Cards (KCCs) in widening credit delivery among farm households during the last decade has been substantial. As of October 2011, a total of 38.9 lakh KCCs have been issued in Kerala. Assuming that one card is issued to a farm household, this translates to around 56 per cent of coverage and speaks of the contribution of this new tool towards improving ground level credit delivery in the state. Even then, there is vast scope for further improving the credit delivery system, given the relatively higher literacy status among the people of Kerala.

Declining government Expenditure

5.3.3.4 Government expenditure as a share of GDP from agriculture in Kerala has been between 3−5 per cent over the last two decades (Figure 5.8). The corresponding all India figure was in the range of 6−10 per cent during the same period.

Figure 5.8: Government Expenditure in Agricultural Sector as a Share of GDP Agriculture in Kerala (%), 1990−91 to 2009−10 (TE)

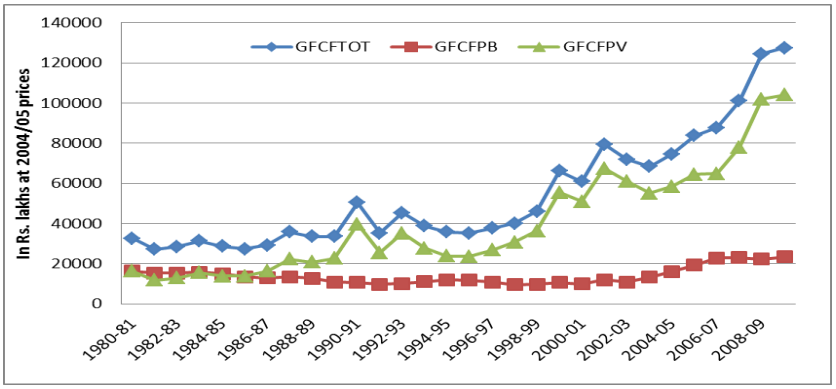


Source: Centre for Monitoring Indian Economy, Online database, 2012

Small share of Capital Formation in agricultural GSDP

5.3.3.5 The long-term trends in estimated public, private, and total capital formation in agriculture[7] are plotted in Figure 5.9. It is observed that public capital formation in agriculture remained more or less stagnant for a very long-time in Kerala before experiencing a boost sometime in the early 2000s. On the other hand, private capital formation started picking up in the 1990s itself and grew substantially in the ensuing years.

Figure 5.9: Trends in Public, Private and Total GFCF in Agriculture in Kerala



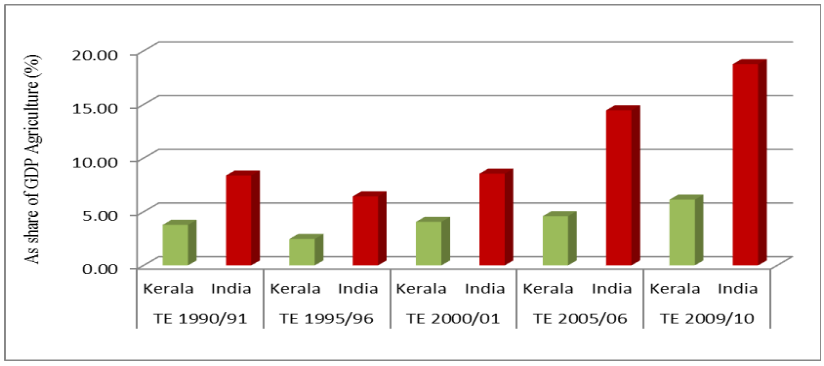
Note: Total Gross fixed capital formation (GFCFTOT); public capital formation (GFCFPB); private capital formation (GFCFPV).

Source: Computed by NCAER based on national figures on capital formation

[7] As there are no direct estimates available on capital formation in agriculture in Kerala, these were estimated based on reported incremental capital output ratio (ICOR).

5.3.3.6 Kerala's share of GFCF in GDP agriculture remains much lower than the corresponding all India figures (Figure 5.10).

Figure 5.10: Total GFCF as share of GDP agriculture in Kerala and all India: TE 1990−91 to TE 2009−10



Source: Computed by NCAER based on national figures on capital formation

5.3.4 Agricultural Marketing

Weak legal and regulatory framework for agricultural marketing

5.3.4.1 Agricultural marketing in Kerala is relatively unregulated[8]. Unlike in most other states of India, the Agricultural Produce Marketing (Regulation) Act, 1966 (APMC Act) that later got modified into Agricultural Produce Marketing (Development and Regulation) Act, 2003 is not operational in Kerala. The state government and local self-government institutions provide infrastructural facilities for the agricultural markets. Currently, six wholesale agricultural markets are functioning in the state. These include 3 urban wholesale markets and 3 rural wholesale markets. All these markets are government- owned and were constituted in 1999−2000 under the Kerala Agricultural Market Project (KAMP) with financial assistance from the European Union.

5.3.4.2 Apart from the above-mentioned wholesale markets, there are 1,290 local self-government governed markets in Kerala. These include 129 Municipality markets, 85 Municipal Corporation markets and 1076 rural primary markets (Table 5.11). In terms of numbers per administrative unit, these turn out to be 1.07 rural primary markets per Panchayat, 17 urban wholesale markets per Municipal Corporation, and 2.43 wholesale markets per Municipality[9].

[8] Tea, Coffee and Rubber are regulated through their respective autonomous commodity Boards in India, which fall under the Ministry of Commerce, Government of India. http://commerce.nic.in/aboutus/aboutus_autonomousbodies.asp#b2.

[9] There are five municipal corporations and 60 municipalities. Out of that 12 are first grade, 22 second grade and 26 third grade councils as per Census 2011. "The Kerala Municipalities Act do not prescribe any criteria for constitution of Municipalities. However Government as per G.O MS 108/67/HLD dated 2nd March 1967 had laid

The functioning of these markets is not uniform and their rules on market cesses, rents, other charges, etc., vary from one another.

Table 5.11: Number of Agricultural Markets in Kerala

Type of market	***Number***	***Number per Administrative unit***
Rural primary markets (Panchayat markets)	1076	1.07
Urban wholesale markets		
(a) Municipal corporation markets	85	17
(b) Municipality markets	129	2.43
Total markets	1290	–

Source: Report of Survey of Markets in Kerala, 2005−06, DES, Kerala

5.3.4.3 Besides markets, a number of organisations are involved in procurement and marketing of agricultural commodities in Kerala. Most of them are government owned. A list of organisations involved in the procurement and marketing of agricultural commodities in Kerala has been provided in Box 5.1.

Box 5.1: List of organisations involved in the procurement and marketing of agricultural commodities in Kerala	
Vegetable and Fruit Promotion Council Keralam (VFPCK)	A registered company that operates with the objective of developing the vegetable and fruit sector in Kerala. The company operates through the intermediation of Self Help Groups (SHGs) of farmers that work as the base units and undertakes activities ranging from group marketing, extension, facilitation of credit delivery, value addition, exports, etc.
Public Sector agencies	Kerala State Co-operative Marketing Federation (MARKETFED), Kerala State Horticultural Products Development Corporation (HORTICORP), Kerala Kerakarshaka Shahakarana Federation (KERAFED), Kerala State Co-operative Rubber Marketing Federation Limited (Rubber Mark),Oil Palm India Limited, Plantation Corporation of Kerala, Kerala Agro Machinery

down the following standards for the constitution of new Municipalities: (i) the locality should predominantly be urban i.e. at least 3/4th of the adult population of the area should be engaged in pursuits other than agriculture, (ii) the population of the locality should not be less than 20,000 and the density of population should not be less than 4000 per 2.59 sq.km. except in hilly areas and (iii) Per capita revenue resources of the locality should not be less than Rs 5".

Department of Town and Country Planning, Government of Kerala. 2012. *State Urbanisation Report Kerala: A Study on the Scattered Human Settlement Pattern of Kerala and its Development Issues*. March.

	Corporation Limited, State Farming Corporation of Kerala, Kerala State Warehousing Corporation, Small Farmers' Agribusiness Consortium, and commodity boards like Coconut Development Board, Rubber Board, Spices Board and Coir Board.

Source: Compiled by NCAER

5.3.5 Agricultural research

Extensive R&D infrastructure with unimpressive outcome

5.3.5.1 Agricultural research and education in Kerala is primarily led by the Kerala Agricultural University (KAU) situated at Vellanikkara, Thrissur. Under the University, there are 6 Regional Research Stations (RARS) and 17 specialised stations for conducting crop- specific and issue-based research. Besides, 5 Colleges are also functioning under KAU with the primary responsibility of imparting agricultural education. Apart from this, several Indian Council of Agricultural Research (ICAR) institutes and Sub Centres, KVKs, commodity boards and other central and state Government institutes (such as the Biotechnology and Model Floriculture Centre) are involved in research, education, and extension activities related to agriculture in Kerala. Kerala Agro Industries Corporation (KAIC) is a joint venture of the government of India and the government of Kerala and promotes mechanisation and modern technology in agriculture through setting up of agro industries, infrastructure development, value addition, waste management, and so on.

5.3.5.2 In addition, the Kerala Department of Agriculture (KDoA) coordinates the quality control activities through a network of laboratories. Presently, there is one Pesticide Testing Laboratory, 2 Fertiliser Quality Control Laboratories, 2 Seed Testing Laboratories, and 23 Soil Testing Laboratories for quality control of agricultural inputs. To ensure grading and standardisation of food products, the KDoA also operates 10 AGMARK Grading Laboratories spread across the state. It also undertakes capacity building and technology dissemination activities through two Farmers' Training Centres, 10 Mobile Agro Clinics, and eight Sales-cum-Service Depots. For promoting development and release of bio-control agents, a State Bio-control Laboratory was established in the year 2000. The pest surveillance activities in the state are carried out by the Operational Research Project (Pest Surveillance Unit), at Mancombu. Finally, there are 5 Regional Agricultural Technology Training Centres in operation in Kerala.

5.3.5.3 A well-established agricultural research institutional framework with balanced regional distribution is the strength of Kerala agriculture. However, despite the extensive R&D infrastructure, Kerala's agriculture remains dominated by a few traditional crops. Further, despite being endowed with rich biodiversity dedicated R&D infrastructure in medicinal plants, Kerala lags behind in the production of a variety of medicinal plants when compared to the rest of India

(Table 5.12). This is revealed in a state- wise comparative study conducted by the Chhattisgarh Government.

Table 5.12: Medicinal and Aromatic Plants by State, 2006

S. No.	*Name of State*	*No. of Species Produced*	*% of Species Produced*	*Amount of MAPs produced (in MT)*	*% of MAPs produced*
1.	Chhattisgarh	42	59.15	87065	67
2.	Andhra Pradesh	10	19.72	6116	4.7
3.	Himachal Pradesh	3	4.23	599	0.46
4.	Karnataka	11	15.49	5933	4.5
5.	Kerala	8	11.27	1699	1.3
6.	Madhya Pradesh	37	52.11	16789	12.9
7.	Odisha	5	7.04	9528	7.3
8.	Uttarakhand	6	3.45	2024	1.55
9.	Manipur	2	2.82	88	0.06

Source: Chhattisgarh State Medicinal Plants Board. Assessment of Export Potential of Medicinal Plants and its Derivatives from Chhattisgarh and is Policy Implications. http://cgvanoushadhi.gov.in/export.pdf. Raipur.

5.3.6 Food security in Kerala

5.3.6.1 Presently, Kerala is dependent on Andhra Pradesh for a considerable part of its requirement of rice, on Tamil Nadu for vegetables, and Karnataka for meat and milk. Lately, there have been concerns brewing over this increasing dependence on other states for essentials. Table 5.13 presents the per capita consumption of major food items in Kerala for three points of time, viz., 1999−00, 2004−05 and 2009−10. The data pertains to the reports of the National Sample Survey Organisation (NSSO) for the 55^{th}, 61^{st} and 66^{th} rounds of surveys, respectively. The estimates indicate a slow shift in the preferences of Keralites from rice-based food preparations to wheat-based preparations like chapattis and bread. The consumption of pulses remained more or less the same during the three periods, whereas consumption of edible oil increased perceptibly. In the case of fruits and vegetables, the increase in consumption has been rather steep.

Table 5.13: Trends in Per Capita Consumption of Major Food Items in Kerala

Commodity	*Per capita consumption (Kg-capita-annum)*		
	1999−00	*2004−05*	*2009−10*
Rice	105.4	100.2	90.6

Wheat	12.5	11.9	12.7
Pulses	7.1	7.3	7.4
Edible oil	5.2	5.3	6.6
Vegetables	43.7	45.7	58.3
Fruits	NA	32.4	39.1
Spices	4.9	4.1	7.1
Milk	37.7	36.9	40.2
Egg*	33.3	30.4	42.1
Meat	3.4	4.4	5.6

Note: Per capita demand of egg expressed in numbers

Source of Data: Reports of NSSO for the 55th, 61st and 66th rounds of surveys

5.3.6.2 Based on the latest estimates of per capita consumption, the total demand- at given price level- for major commodities at the state level was computed and are presented in Table 5.14. The total demand consists of both household demand (direct demand) as well as indirect demand. Indirect demand arises mainly from consumption outside the households, industrial uses, use on account of seed, feed, wastage, etc. The estimates of indirect demand were arrived at based on similar calculations undertaken by past studies. For detailed forecasts, methodology used and forecasts under various scenarios, please look at Appendix A.5.1.

Table 5.14: Base-year Demand for Major Food Items in Kerala, 2009−10

Commodity	***Total demand ('000 tonnes)***	***Production# ('000 tonnes)***	***Balance (production – demand)***	***Level of sufficiency (Production/ Demand)%***	***Demand***	***Required annual growth rate if sufficiency to be 25%***
					Projections for 2030	
Rice	3,558.9	594.3	-2964.6	17.0	3,789.7	2.4
Wheat	524.2	negligible	-524.2	0	627	188.2
Pulses	428.8	3.3	-425.5	0.1	488.7	19.8
Edible oil	296.4	NA	NA	NA	395.5	-
Vegetables	2,713.2	993.2	-1720	37	3,551.4	-
Fruits	1774.2	2398.1	623.9	135	2,639.2	-
Spices	282.5	100.4	-182.1	36.0	445.1	0.5

Note: *Per capita demand of egg expressed in numbers and total demand in million numbers

Corresponds to BE 2009−10.

Source: Computed by NCAER

5.3.6.3 Production fell short of demand in almost all food commodities, except for fruits, in Kerala. In terms of production as a per cent of demand, food grains such as rice, wheat, pulses, etc., fared poorly. The level of self-sufficiency for rice was only 16.7 per cent with the rest of the demand being met through imports from neighbouring states, like Andhra Pradesh and Tamil Nadu. Since Kerala doesn't produce wheat but consumes it in reasonable quantities, the entire wheat demand was met from north Indian states through inter-state trade; and the case of pulses was no different. Self-sufficiency in vegetables was to the level of 36.6 per cent whereas that for spices was 35.5 per cent. Kerala produced more fruits than it consumed, with the major share coming from fruits such as banana, mango, papaya, pineapple, jack fruit, etc. However, it depends on imports to meet the demand for other types of cool- season fruits, even as it exports considerable quantities of what it produces to other states.

5.3.6.4 In order to secure a sustainable path for a prosperous and abundant agricultural sector for Kerala, it will be necessary to adopt a multi-pronged approach. We articulate such a strategy in the remaining sections of this chapter.

5.4 Strategic Framework

5.4.1 Vision

5.4.1.1 "Agriculture will be prosperous, socially inclusive, and environmentally friendly. There will be a paradigm shift from subsistance farming to highly knowledge- intensive, competitive farming. Farmers will be ***agripreneurs*** and their performance will be driven by how they acquire, organise, and process their knowledge. Agriculture will be viewed not as a means to livelihood, but as a means of economic prosperity. The younger generation will take pride and dignity in agriculture as an occupation and sector."

5.4.2 Targets

- The average agricultural growth rate will be 2 per cent per annum.
- Improved farming efficiency will be achieved despite the expected drop in agricultural area.
- The expenditure allocation towards agricultural research and education will be raised to 1−2 per cent of GSDP of Agriculture by 2030.

5.4.3 Mission

- Foster global competitiveness, growth and profitability in the sector in order to attract new investment,
- Build lasting partnerships among public, private, and other community stakeholders
- Increase creation of wealth in agriculture and rural areas
- Improve investor confidence leading to increased domestic and foreign investment in agricultural activities and rural areas

- Promote sustainable use of agricultural resources

The focus will be on increasing competitiveness and productivity in agriculture so as to raise incomes and well-being of the stakeholders, and bring prosperity not only for this generation but also future generations.

5.4.4 Strategic framework

The strategic framework will have three main pillars:

(i) Agricultural prosperity
(ii) Social inclusiveness: Food security, Livelihood, Rural area development
(iii) Natural resource conservation

Pillar 1: Increasing productivity and competitiveness

Action Plan 1: Shift from livelihood (subsistence) approach to entrepreneurial (competitiveness) approach in agriculture and, moving forward to entrepreneurial farming

5..4.4.1 The new strategy will focus on transforming agriculture into a high value- added sector through a focus on acquisition, organisation, and application of knowledge. There will be a shift from low value- added to the high value- added crops, application of suitable technologies, and restructuring of production and distribution systems. Sustained global competitiveness in the agriculture sector requires efficient input supply, primary production, agro-processing, and agri-marketing industries, which in turn calls for a change in the structural approach towards agriculture. Agriculture will be run as a business and not as a livelihood programme. In this scenario, farmers will have to develop new skills to be competitive. They will be a new class of entrepreneurs termed "agripreneurs". They will manage the business with the intention of expanding the business and will develop leadership and managerial capabilities for achieving their goals. A pre-requisite of this transformation will be a change in the organisational structure of farming. Alternative organisational forms have been discussed in what follows:

Promote and encourage the change in organisational set- up by encouraging the formation of producer companies

5.4.4.2 Kerala's agricultural scene has been dominated by marginal farmers with an average holding of less than 0.5 acre. In this scenario, co-operative farming is one form of organisation that enables farmers to organise themselves as collectives and move up the value chain by ownership and operation of their own land holdings. Cooperatives are essentially state promoted,

with a focus on welfare rather than on doing business on commercial lines. Due to lack of managerial capabilities, their success has been limited. Collective farming is another form of farming practiced in particular, by women SHGs for livelihood purposes. It has helped women farmers to continue with agriculture for their livelihood. The emphasis has been on welfare, rather than efficiency.

5.4.4.3 For improving the efficiency and competitiveness in agriculture, however, farmers will have to be more entrepreneurial in their approach and move from the conventional approach to an entrepreneurial approach to agriculture.

5.4.4.4 Realising this and following worldwide patterns, the Government of India initiated the concept of "Producer Companies" in 2002. These are an emerging entrepreneurial form of co-operative farming. In order to upgrade co-operatives into commercial entities without changing the underlying principle of group farming, the concept of producer companies was introduced by incorporating a new Part IXA into the Companies Act. This enabled incorporation of co-operatives as companies and conversion of existing co-operatives into companies. The objective is to integrate the unique elements of co-operative business with a regulatory framework similar to that of companies. The United States of America, New Zealand, and Denmark have provisions for producer enterprises that are registered and operate under the same laws that govern companies. In India, Madhya Pradesh has tested several models of producer companies and has emerged as the largest producer-companies hosting state. The Government of Madhya Pradesh, under the 'District Poverty Initiatives Programme' (DPIP), has promoted a large number of Producer Companies in various parts of the state. It provides various incentives to promote these industries including hand- holding support for three years. Other incentives include:

- Debt linked Start-up support based on business plan
- Viability gap support for establishment costs
- Treatment at par with industries
- Performance linked, back- ended interest-subsidy
- Support – price preference, infrastructure development.

5.4.4.5 In Kerala the first farmers' producer company was the Indian Organic Farmers Producer Company Ltd. This was followed by Vanilla India Producer Company Ltd. (VANILCO) / Banana India Producer Company Ltd. (BIPCL); and the Evangelical Social Action Forum (ESAF). A study by the Central Government Agricultural Department shows that the Indian Organic Farmers Producer Company Ltd. in the state has shown impressive results.

5.4.4.6 There is an evolutionary process for producer companies (Figure 5.11). In India, most of the existing producer companies are performing the function of providing technical services and inputs to farmers, or pooling produce for collective marketing. This is the first stage of evolution.

In the second stage, more activity is seen in the emergence of producer companies, like that promoted by 'Fab India', where corporates come together with farmers to share prosperity with the farming community through commercial farmer- corporate/retailer partnerships. Producer Companies having their own processing infrastructure, and developing their own identity, brands and supply chain is the third stage. Only then will the producers be able to directly connect with and have command over the markets and thu,s have a greater share in the retail pie.

Figure 5.11: Evolutionary Process of Producer Companies in India

*Source:*Conceptualised by NCAER

Japan, which is known to be a country of co-operatives, has been a successful example of the evolution of these companies into the third stage. These co-operatives have been organised along entrepreneurial lines and have been managing the value chains from farming, to research and development, to wholesaling, to warehousing (including logistics), and to processing, and retailing (Box 5.2 below).

Box 5.2: Japan

Japan is a long, narrow chain of islands stretching 3,300 km from the sub-arctic to the sub-tropical zones. Mountainous areas account for 67 per cent of the total national land and there is only limited flat land available that is substantially urbanized. Under these circumstances, the ratio of farmland is about 13 per cent of the total national land, and the cultivated land under management per farm household is very small, at approximately 1.6 hectares. Despite the small size of farming operations, it has the distinction of having one of the highest yields per acre in the world. This can be attributed to the promotion of farming communities which have been organised along entrepreneurial lines.

During the rapid economic growth of Japan in the 1960s, co-ops grew rapidly. Over time, the organisational set up of these co-operative societies underwent radical changes. They have established such organs as unit leaders' council and steering committees. They have specialised committees for inspection and development of co-op products. The committee members participate in all phases of product development, including determination of safety, quality, and price; comparison of samples; and conducting of development tests. In the case of agricultural products, the committee for inspection and development of co-op products enters into contract negotiations with farmers about the kinds of pesticides, chemical fertilisers, and concentrated fodder to be used the quantity and frequency of their application,, and the parameters for price determination. Furthermore, the co-op members are in charge of the overall agri-food supply system, including agricultural methods and farming structure. These co-

operatives undertake direct marketing and distribution operations to propagate their produce. The marketing avenues are of many types, such as through permanent in-shops, and A-coop stores; direct sales during organised events like agricultural fairs in co-operative facilities; and regular direct sales at the morning market and Saturday market. Moreover, some co-operatives directly sell to supermarkets with which they have a contract. Recently, the co-operatives have been developing a new modality of direct selling, different from the conventional A-coop, in which co-operatives make a franchise contract with convenience store chains, and sell the local products like vegetables under the special clauses of contract.

Further, in 1990, the Ministry of Agriculture, Forestry and Fisheries of Japan (MAFF) established a new foundation, the "School for 21st Century Farm Community Development". MAFF sought the full cooperation of the private sector to help the foundation achieve its objective of revitalizing farm communities. Recognizing that big general trading companies ("Sogo Shosha") have the power for developing new businesses through closer ties with regional communities, these companies were set up in fields such as food products, life sciences, fertilisers, machinery, finance, distribution, and R&D. These companies enter into consulting contracts with the regional community governments and co-operatives to implement various projects to upgrade technologies, strengthen infrastructure, and facilitate distribution based on literature review.

Source: Matsuik, Y. Agri-Food Supply Chain Development by Various Chain Leaders: Case Studies in Japan and New Concept of High Nature Value. http://www.ifmaonline.org/pdf/congress/Matsuki.pdf

Development of special agri-zones

5.4.4.7 Cluster development is revolutionising business, prompting economic development, and increasing productivity across the globe. The key to success in a global, dynamic, knowledge-based economy is innovation. Innovation is most likely to occur where talent, skills, technology and businesses are clustered and organised in a manner to respond to competitive forces and opportunities.

5.4.4.8 Under the new strategy it is proposed to set up "special agri-zones". These will be voluntarily set up by agripreneurs with state support. They are different from the agri-export zones, which are state-promoted. These zones will not only focus on exports but also on domestic markets. A case study of West Caln Agricultural Security Area in the US is given in Box 5.3.

Box 5.3: West Caln Agricultural Security Area, USA

The process of establishing an Agricultural Security Area is initiated by a petition of owners of productive farmland totalling at least 500 acres. The land to be included must have soils conducive to agriculture and be used for the production of crops, livestock, and livestock products. The petition is submitted to the local government unit along with a description and boundaries of the proposed Area. Non-adjacent parcels of at least 10 acres can be included. The proposed Area, located in more than one government unit, is submitted for approval to each governing body.

1. The governing body gives public notice of the proposal to create an Area. Basic information is printed in a newspaper and posted in five locations, with an invitation for objections and modifications to be submitted to the governing body and local planning commission within 15 days.
2. After the comment period, the proposal, with objections and modifications, is referred to the local planning commission and a specially formed Agricultural Security Area Advisory Committee. The Advisory Committee is made up of three active local farmers, one citizen, and a member of the local governing body. Both groups have up to 45 days to review the proposal and make recommendations to the governing body.
3. When an Agricultural Security Area is formed, it entitles the participating landowners to special consideration from the local governing body and state government agencies. The local government unit may not impose ordinances that unreasonably restrict farm structures or practices within the Area. The State government agencies modify their administrative regulations and procedures to encourage viable farming in Agricultural Security Areas.

Source: West Caln Township website. http://www.westcaln.org/agricultural-security-area.html

Promote High-tech precision farms

5.4.4.9 Land under agriculture is bound to shrink over the next 20 years. Enhancements in productivity would be the key to prosperous agriculture. High-tech farming is an alternative to derive high incomes from small sizeed holdings due to the attractive crop productivity they offer. Several vegetables and flowers can be raised economically under protected cultivation. In cognizance of this fact, innovative precision farming practices are proposed to be popularised which will increase agricultural productivity both in quality and quantity. These practices involve farming under controlled conditions such as greenhouses, shade net houses, and plant protection nets. A number of different technologies for high- tech precision farms have emerged:

5.4.4.10 *Tunnel technology:* The construction of high tunnels for horticulture can protect plants and promote earlier ripening of the crop. A high tunnel, although resembling a greenhouse, is an

entirely different technology and price range. A tunnel delivers better fruit quality, bigger yields, and higher profit. Tunnels are non-permanent structures that can promote Urban Agriculture. Indeed, the state government has introduced programmes to encourage high-tech agriculture in Kerala, but they are yet to get the attention of prospective investors across the state. So far, pilot studies and innovative experiments at farmers' fields have given encouraging reviews for this method of high-productive agriculture. Proper government support in terms of technical know-how for developing greenhouses, training programmes, maintenance, financial and insurance support, marketing support, etc., are necessary to encourage farmers to take up such innovative initiatives. The produce from greenhouses and poly houses would be relatively costlier than traditional farms. Proper marketing of these products will be of utmost importance for long-term sustainability of such ventures. High-tech farming may be viewed as a potential channel to effectively utilize foreign remittances and income from the non-farm sector for the benefit of Kerala's agricultural sector and to encourage a number of educated youth to take up entrepreneurial activities within the state.

5.4.4.11 *Hydroponics Farming***:** Hydroponics, also known as Soilless gardening, is a method of growing plants using mineral nutrient solutions instead of soil. It can be used in places where in-ground agriculture or gardening is not possible. Hydroponics has been practiced in Singapore, Japan, and now in, Karnataka and Gujarat in India. The main features are:

- No soil needed
- Efficient in energy and water
- Stable and high organic production
- Immune to weather

Pests and diseases easier to get rid of than in soil because of container mobility

- Easier to harvest

5.4.4.12 *Vertical farming:* Singapore is taking local farming to the next level, with the opening of its first commercial vertical farm. Based on the technology known as "A Go-gro", these are vertical urban farms or "farmscapers". Trays of vegetables are stacked inside an aluminium A-frame, and a belt rotates them so that the plants receive equal light, good airflow, and irrigation. In a land-scarce state like Kerala this will be the way forward. This technology is yet not licensed, but Kerala may develop its own version.

One product one village model (OVOP) for select villages

5.4.4.13 The OVOP model was initiated in the province of Oita of Japan, but was later adopted by other South East Asian countries. Crops were identified based on the local specialty. The government provided assistance in product development and distribution through the establishment of research institutions and extension services. Distribution routes were opened

and expanded by the efforts of the local governments who organised numerous fairs in major Japanese cities and abroad. Also, regional markets were set up throughout the province to encourage local consumption of OVOP products. Moreover, groups and individuals with outstanding achievement in OVOP were honoured with rewards. This project may be initiated in select villages, particularly in backward regions such as Wayanad and Idukki.

5.4.4.14 Mono-crop culture may not be the best option. It may affect soil productivity adversely. In fact, new "Integrated Forming Systems" (as discussed later) have emerged, which are based on systematic crop rotations to avoid such problems. However, it may be suitable for adoption in Idukki.

Action Plan 2: Promote knowledge- intensive agricultural practices

Adoption of revolutionary technologies

5.4.4.15 There has been a technological explosion in agriculture to counter the social and economic constraints that it has been facing across the globe. In the knowledge economy, the conventional methods will be discarded to adopt the best methods available. Technologies that have changed agriculture forever are biotechnology and genetics, which are discussed below.

5.4.4.16 *Plasticulture*: It has revolutionised agriculture. Plasticulture is the use of plastics in agriculture, horticulture, water-management, food grains storage, and related areas. A variety of plastic material and end products are deployed in plasticulture applications - for water conservation, irrigation efficiency, crop and environment protection, as well as end product storage and transportation. Plasticulture technology involves Plastic Mulches, Drip Irrigation, Fertigation, Soil Sanitation, Windbreaks, Stand Establishment Technology, Season Extension Technology-Row Covers and High Tunnels, Pest Management, Weed, Insect and Disease Control, and disposal of plastic bags.

5.4.4.17 *Hybrid rice technology:* It is a genetic approach that has huge potential to break the yield barrier in rice. This was amply demonstrated by China during the last three decades. Nearly 46 hybrid varieties of rice have been released so far in India also that have significant yield advantages over the traditional varieties and an estimated area of 12 lakh hectares of area are under them presently. However, till now, India has not been able to capitalise on this technology in a path-breaking manner as China has, due to various constraints. One major challenge is to develop hybrid rice varieties that are suited to the tastes and preferences of consumers. Most of the rice hybrids released so far are found to be less preferred in south India. However, there are several rice hybrids in their advanced stage of release with better grain quality traits. Research thrust is required to develop hybrid red rice varieties that are better suited to the taste and

palatability preferences of consumers in Kerala. Rice may also be produced to export like "Japanese" rice may be produced in Wayanad to be exported to Japan.

5.4.4.18 *Mini-chromosome technology:* Corn trait technology could be in for a revolution, and it's coming in a small package. Mini-chromosome technology promises to deliver multiple stacked traits in a single corn hybrid faster and more efficiently than today's stacking technologies.

5.4.4.19 *Drought-resistance traits:* The decades of work to develop drought-resistant plants are producing results.

5.4.4.20 *Soil and crop sensors:* Farm equipments are being fitted with smart sensors that can read everything from plant health and water needs in the crop to nitrogen levels in the soil. The newest area of sensor use is in irrigation, where the sensors measure water needs. Sensors help optimize water use and avoid yield loss.

5.4.4.21 *Farm machinery:* Manufacturers have been investing substantial engineering time and money into machinery designing for them to be more effective, comprehensive, and smokeless.

Leverage ICT

5.4.4.22 *Mobile computing:* Portable computers and smartphones are destined to be a part of farm tractor cabs, pickups, and offices in the future. Some companies have recently introduced new Windows Mobile rugged handhelds with enhanced features, which can be used more efficiently.

5.4.4.23 *4G applications:* Farmers will find themselves in the Internet fast lane in the next couple of years, because of 4G (fourth generation) cellular communications networks. Although a variety of technologies will be harnessed, the new 4G networks will be the most important in deploying high-speed Internet services in rural areas.

Telematic products: These products will allow navigation, prescription application, location, and other data to be transferred easily to and from farm machinery. These systems help farmers improve efficiencies on high-priced equipment.

Farmers training and entrepreneurial skills development

5.4.4.24 Development of entrepreneurship in the areas of agriculture requires special skills like knowledge of technological changes, knowledge of markets, and knowledge of global conditions for the successful growth of their farming businesses. A major challenge for the agricultural

sector will be to enable farmers to develop their entrepreneurial skills. Farmers of all types will require economic support and greater emphasis on education and training. Courses in agricultural management and entrepreneurship will be offered to the younger generation. In addition, 'Comprehensive Entrepreneurship Development Programmes' for agriculture are proposed to be developed for those who adopt agriculture as their occupation. This transformation in agriculture will make agriculture an attractive area of employment. Career opportunities abound within today's agriculture industry in advanced countries. Career Development Events (CDEs) are being set up for students to develop the abilities to think critically, communicate clearly, and perform effectively in a competitive job market. In the US, the National Future Farmers of America offers 24 CDEs, covering job skills in everything from communications to mechanics. Such moves will change the perception of the young generation towards agriculture.

Promotion of R&D

5.4.4.25 Even though Kerala has a strong network of research and extension institutions and infrastructure, there is extensive scope to improve the functioning of its agricultural research and extension system. The system is presently languishing with inadequate funding, suboptimal human resources, lack of focus on key areas of future importance, limited interactions with other centres of excellence, etc. The share of expenditure on agricultural research and education in GDP agriculture in Kerala was nearly 0.38 per cent in 2009−10. This has to be gradually raised at least to the present all India level of 1−2 per cent in the next two decades. Sufficient expenditure allocations should be set apart to strengthen research in frontier areas like genetics and plant breeding, biotechnology and tissue culture, nano-technology, precision farming, etc., to bring about perceivable outcomes that contribute to sustained improvements in crop productivity. The Science and Technology (S&T) department may initiate a scheme to fund innovation projects.

5.4.4.26 **Revitalise R&D**: R&D has been mostly supply-driven. Scientists in the public sector create new technologies, which are then disseminated by extension officers to the farmers. Farmers are seldom involved in the governance of research organisations, particularly in setting priorities for R&D, apart from token consultations. Farmer organisations will have to have a critical role to play in voicing demand for technology research and development. Important questions need to be asked about accountability, outcome, and governance of R&D organisations. Revitalising research institutions as genuine learning and partnership organisations requires change in both organisations and individuals. Action is needed on several fronts:

- Promoting theme- based and location- based research projects based on sharing of ideas and reflections on working with farmers,
- Initiating joint programmes with farmers' organisations, producer companies, field visits, and workshops,

- Shifting mindsets – through new forms of agricultural education (embracing diverse sources of knowledge and knowledge systems) and professional reward (incentives, awards, promotion),
- Establishing strong networks of practitioners, encouraging mentoring, and pushing partnership approaches into mainstream research.

5.4.4.27 In addition, we recommend establishing two Biotech Parks – one, dealing with plant biotechnology, having emphasis on genetic improvement and mass multiplication of planting materials and another, dealing with animal biotechnology, primarily focused on animal genetic enhancement, vaccine development and mass production, disease diagnostics and other related activities.

5.4.4.28 **Demand driven extension services:** Kerala has a very strong agricultural extension system in terms of density of Krishi Bhavans, KVKs, veterinary poly clinics, Artificial Insemination Centres, etc. However, the field level extension of new technologies is still weak in the state. There are a number of promising technologies that are shelved without popular acceptance. The scope of agricultural extension in bringing about a transformation in Kerala's agricultural sector is vast and appropriate policy interventions are required to fill the gaps. Drivers for change include:

- Concerns to make services more accountable to users,
- The emergence of multiple extension providers:
    i. Establishing Frontier Agricultural Technology Training Centres (FATTC) in every district with special focus on (i) high-tech/protected agriculture and livestock rearing, (ii) resource conservation and precision farming technologies, (iii) bio-control, (iv) use of modern agricultural implements, (v) micro propagation, (vi) organic agriculture, and (vii) certified seed production;
    ii. Establishing High-tech Farming Facilitation Centres (HTFFC) with a dedicated corpus fund for encouraging high-tech farming that includes protected cultivation, commercial dairy and poultry farms, goat farms, hatcheries, etc. at the district level. This fund has to be used for providing various back- end and support services for kick starting high-tech farming in the state;
    iii. Linking subsidised credit with prospective investors through the interface of HTFFCs;
    iv. Outsourcing dissemination of specific promising technologies from research stations through private service providers with benefit sharing contracts.
- User fee for the services.

5.4.4.29 **Develop private consultancy firms in agriculture:** Graduates in agricultural sciences will be encouraged to start consultancy firms in agri-businesses. These firms offer a

comprehensive range of agricultural and rural business consultancy and regeneration services to both private and public sector clients. There will be highly specialised firms as well. For instance, some firms will help with farm paperwork: accounts, cattle & sheep records, field records, and keep the clients in line with statutory legislation and farm assurance or grant/subsidy applications. Other firms will focus on marketing, technology, and investment. This will call for adoption of a business approach towards agriculture, with the institutional requirement of the adoption of best practices.

Set up Field Farmers Schools

5.4.4.30 Field Farmer Schools (FFSs) are about practical hands-on training in field situations. A group of people with a common interest form the core of the farmer field school. Central to the FFS programmes is training of the people who organise and facilitate farmer field schools. The group could also be an established one, such as a self-help group, women's group, or a youth group. Each FFS needs a technically competent facilitator to lead members through the hands-on exercises. There is no lecturing involved, so the facilitator can be an extension officer or a farmer. In most programmes, a key objective is to move towards farmer facilitators, because they are often better facilitators than outside extension staff. All facilitators need training. Extension facilitators need season-long training to (re)learn facilitation skills, learn to grow crops with their own hands, and develop management skills such as fund-raising and development of local programmes. The alumni of these schools can carry this idea forward and organise such schools. The first wave of FFS was conducted in 1989 in the rice fields of Indonesia. Since then it has been extended in form and scope across the world. In the Punjab province of Pakistan, Field Farmer Schools are being used to augment the value chain in horticulture. In a programme initiated with Australian Aid, exporters are identified for direct training. These exporters then organise FFS to train all the actors through the value chain. This project has been a huge success in promoting fruit exporters from the region.

Action Plan 3: Address factor market constraints

5.4.4.31 Factor conditions refer to factors of production, availability and quality of natural resources, level of input prices such as labour, diesel, pesticides, machinery, knowledge, and infrastructure. These factors are necessary for the sector to be globally competitive and profitable.

Creation of rural employment exchange

5.4.4.32 Solutions like bringing cheap labour from neighbouring states, isolated efforts to organise agricultural labour through co-operatives, channelizing labour through MGNREGA to undertake agricultural activities, etc., have met with limited success so far. One of the experiments in this direction was 'Labour Bank', which was created for regularising employment

of farm labourers and for smoothening out work patterns over the farm year. It involved establishing a 'labour army' under the aegis of the local *panchayat*, with pre-determined wage rates, fixed work schedule and norms, recruitment of registered labourers, purchase of machinery and implements, sub-contracting of public works, training of members, etc., with certain level of guaranteed employment and subsidised services. Even though this initiative thrived for nearly half a decade in *Kunnathukal* village in Thiruvananthapuram District in Kerala, organisational weaknesses arising from conflicting interests of stakeholders resulted in its early demise. However, given the acute nature of the problem and the inherent strengths of the labour bank model, the experience gained from the *Kunnathukal* experiment will be used to revisit the concept, with adequate support and patronage from the state government. In the new form, these labour banks will be set up as "Rural Employment Exchange" attached to the local *panchayats*. The service and resources of these exchanges will be utilized to undertake public works related to agriculture as well as operations in private homesteads. It can bring together the scattered labourers and give them professional, state-sponsored organisational backing, with certain level of assurance of employment and other benefits.

Land-cum-labour banks (LLBs)

5.4.4.33 Under this scheme owners of idle land will deposit their land and people with willingness to work in agriculture will deposit their surplus labour with the rural employment exchange. These initiatives will create a healthy labour market in rural areas.

Improving Farm Mechanisation

5.4.4.34 Farm mechanisation is another solution to the problem of labour shortage. It is also a cost effective way to improve crop productivity to a considerable extent. Agricultural machineries like tractors, combine harvesters, planters, cultivators, power operated harrows, ploughs, laser levellers, etc., have limited use in Kerala due to their field crop orientation and their usage in large farms. Group farming along entrepreneurial lines will address the problem of affordability to a considerable extent.

Custom hiring of farm machines

5.4.4.35 It is recommended that private entrepreneurs enter the field of custom operation of farm equipment. Owners of tractors and threshers will be encouraged to provide custom service to other fellow farmers for tillage, thrashing, transport, etc. This will give access to mechanisation to all groups of farmers, irrespective of the size of their holdings.

Promotion of the use of farm implements in plantations and wetlands

5.4.4.36 There are several small-farm friendly implements like coconut climbers, power operated levellers, ridgers, harrows, furrow/bund formers, seed and fertiliser drills, planters, weeders, shellers, harvesters, etc., that are suitable for the agriculture sector in Kerala and, hence, need to be popularised.

Developing Certified Seed Supply Chains and Seed Villages

5.4.4.37 Barring a few private nurseries, certified seed production in Kerala is completely within the realm of the public sector. While this limits the scale of quality seed production in the state, it also throws open a huge opportunity to develop this sector. There is vast potential in crops like rice, vegetables, roots and tubers, ornamental plants, etc., for developing a viable seed supply chain. With effective tie-up between research institutes, KVKs, and farmers' collectives like co-operative societies and producers' companies, SHGs, NHGs, etc., innovative models for certified seed production can be developed without much effort. Successful models like the 'One Village, One Product (OVOP)' movement being practiced in Thailand, Japan, Nepal, etc., can be emulated in Kerala for seed production if found suitable. Along with encouraging the production of seeds, proper backward linkages with research stations for supplying breeders seeds and forward linkages with distribution channels have to be developed to ensure the success of the programme. More than being a medium for improving the livelihood opportunities for the farmers involved, such initiatives can simultaneously improve the crop productivity of the state to considerable levels.

Action Plan 4: High value added products

Horticulture and floriculture

5.4.4.38 As seen above, the cropping patterns of Kerala are highly skewed. A few traditional crops dominate agriculture. Under the Horticulture Mission, new products will be identified which are high value products added in international markets and their cultivation will be promoted in the state.

Organic Farming

Promotion of exports of organic products: The demand for organic products is growing at a 5.4.4.39 very fast pace across the world. The majority of organic products consumed in the European Union and other developed country markets are imported. Being a leading exporter of many agricultural products like spices, tea, coffee, etc., Kerala can capitalize on the huge demand-supply gap existing in international markets for organic products. Through developing a

niche organic supply chain for the most sought after exported products, Kerala can substantially improve its competitiveness in the global markets as other competing countries are still in the process of shifting to organic agriculture. However, compliance to international certification procedures and quality adherence is extremely important to sustain in this market. There will be a need to build an inspection and certification system of organic products. The future thrust should also be to give extensive training and demonstration programmes that enable the producers to meet the global quality standards so that they can take advantage of the price premium being offered to such products.

Enhance Consumption of organic products: Apart from global markets, there is a gradually 5.4.4.40 enlarging pool of organic conscious domestic consumers within the state and the country. In this case, the advantage is that there is a wider range of both perishable and non-perishable commodities that can be organically produced and sold within the state. Therefore, while planning for developing organic agriculture, both sets of global and domestic consumers and their specific requirements need to be taken care of.

Harnessing Biotechnology

5.4.4.41 Kerala has so far not been successful in harnessing the multi-faceted benefits of biotechnology in its stride at a perceivable scale. As in other biological fields, biotechnology has tremendous potential in agriculture and veterinary science, especially in developing high yielding varieties/breeds of crops and animals, mass culture of improved planting materials, manufacture of bio-pesticides, food additives and vaccines, developing disease and stress tolerance in plants and animals, etc. The Kerala Biotechnology Policy was unveiled in the year 2003 following the setting up of the Kerala Biotechnology Board and the Kerala Biotechnology Commission. Through the policy, it is targeted to establish world- class educational and R&D institutions in the field, and to put in place administrative, regulatory, legal, and financial frameworks conducive for investment and for growth of biotech- related enterprises. There is a strong perceived need to implement the policy in letter and spirit, so that Kerala can capitalize on its educational dividend, invest the money generated from other thriving businesses and foreign remittances, and effectively utilize the entrepreneurial skills of its labour force for realising benefits in future agriculture.

Medicinal plants

5.4.4.42 Globally, the demand for medicinal plant- based raw material is growing at the rate of 15-20 % annually, and by 2050 this demand is likely to grow to US$ 5 trillion. In 2007-08, India's share of exports in herbal medicine was 0.5 % globally, as compared to that of China which had a share of 55%. Under this scenario and given the flora and fauna potential in Kerala, the state can make efforts to contribute towards global exports of medicinal plants. In the state,

there is potential for developing linkages to cultivation and primary processing through sub-contracting, in collaboration with manufacturers and other market arrangements. Such linkages can make sustainable development of medicinal plants possible.

Action Plan 5: High value added activity

5.4.4.43 **Agro-processing:** Agro-processing is gaining importance with rapid increase in demand for processed food products and is going to be a lead activity under micro-enterprises in future. Producers will be encouraged by establishing better linkages with agro-processing firms, to motivate entrepreneurs to initiate new agro-processing ventures. Encouraging food processing will increase profitability of crops as perishable commodities can fetch better prices in the presence of a thriving processing sector. There is a vast potential in processing of locally grown crops like coconut, cashew, arecanut, tapioca, banana, other tuber crops, fruits and vegetables, etc. There are a number of value added products like coconut milk powder, vinegar, preserved tender coconut water, coconut chips, coconut cream, etc., that have markets within and outside the state. It will be important to recognise the reciprocal relationship between crops and the processing industries that depend on the inputs from these crops to promote new industries based on these products. In India, two major initiatives in this direction are: food parks and mega food parks, and agri-export zones.

5.4.4.44 **Mega food parks and food parks:** These are exclusive value addition parks for major crops in their primary production centres. These parks are industrial estates dedicated to agro-processing and are being set up in the Public-Private Partnership mode. In Kerala, KINFRA is setting up these parks. The objectives are to facilitate:

i. Backward integration of these parks with the primary producers through buy-back arrangements, extension support, input delivery facilitation, etc.
ii. Forward integration of the products with the markets through establishing supply contracts with domestic retail chains, restaurants, hotels, etc., and through export facilitation measures.

5.4.4.45 **Agri-export zones in India:** The government has established 60 fully equipped agri-export zones (AEZs), in addition to food parks, to provide a boost to agricultural and food processing exports. There are two Agri- Export Zones in Kerala. These are: horticulture and medicinal plants. These projects have met with limited success due to their macro-management. It is expected that implementation of the proposed action plans will give a major push to these zones as well.

Action Plan 6: Strengthening Agricultural Marketing Systems

5.4.4.46 There has been tremendous improvement in agricultural marketing infrastructure in Kerala during the last decade. According to a study by National Institute of Agricultural Marketing (NIAM), Jaipur, between 2005-06 and 2010-11, investment in agricultural marketing infrastructure witnessed a surge of 265 per cent in Kerala. Several new initiatives and innovative institutions like that of VFPCK, HORTICORP, etc., brought about considerable improvement in the agricultural produce supply chain in the state. But there is tremendous scope for improving agricultural market infrastructure, market information and intelligence systems, and the post-harvest management sector in Kerala. Renovation of existing wholesale markets and establishing state-of-art wholesale and retail outlets for both agricultural and livestock commodities are called for. To realize long- term development, several initiatives like fostering public-private partnerships, improving governance of local self-government markets, developing warehousing and cold chains, periodic training and awareness drives for various stakeholders, etc., will be explored. Together with this, the government can also encourage innovative marketing models like contract farming, farmers' markets (Like *Uzhvar Sandhais* of Tamil Nadu; *Rythu Bazar* of Andhra Pradesh, etc.) need to be established so that the farmers of Kerala can also become equal stakeholders of the market development initiatives.

5.4.4.47 It is recommended that every local self-government market will have adequate cold storage, modern weighing, grading and packaging facilities, warehousing infrastructure, computerised record keeping facilities, waste management solutions and other modern amenities by 2030.

Involvement of local governments in marketing initiatives

5.4.4.48 A research project on collective farmers' marketing initiatives reveals that the growing scale of operation of food supply chains and the concentration of processing and retailing industries within globalizing food regimes have undermined increasingly the strength of the classic co-operative model. Most initiatives have moved beyond the co-operative model. The new collective marketing initiatives apply a diversity of strategies. A differentiating factor is the nature of skills and incentive structures required for such strategies. A special emphasis has been on the importance of creating coherence between different categories of actors along the food chain, irrespective of the specific strategic orientation of the initiative. Against this backdrop, it is proposed that the local government should take initiatives in developing models for collective marketing based on the assessment of local conditions.

Direct sales to consumers leveraging ICT

5.4.4.49 There have been new paradigm shifts in agricultural marketing with the emergence of a 'direct sales system'. Direct contact with consumers has been developed through direct delivery of the product at the consumers' homes. This system can be managed by private companies or farmers' collectives (producer companies and others), which buy these products from the members and are in charge of the packaging and delivery of the orders. New enterprises are emerging that focus on agricultural marketing by leveraging IT. In Switzerland for instance, a company, Bio-Direct has been founded by three organic farmers and two IT specialists who have launched a web-shop for agri-products. Bio-direct directly links the producers with the consumers. In addition, the farmers working in this initiative have assumed further supply- chain activities. They have thus enlarged their scope of activity from purely producing to trading and marketing.

5.4.4.50 *Brand Building* of Kerala food products starting from primary food products to agro-processed goods are must.

Pillar II: Social development

Action Plan 1: Food Safety

5.4.4.51 The issue of food safety is generally identified as a matter that is related to exports. However, in the recent years, it is emerging as a major concern among the domestic consumers of Kerala. With rapid increase of food demand and failure of internal supply to keep pace with it, the merchants and middlemen are rampantly resorting to widespread adulteration. Recently, there have been several reports of food poisoning in the state that resulted from faulty practices of suppliers and inadequate enforcement mechanisms to check them. Presently, the matters related to food safety are governed by the Food Safety and Standards Act, 2006 and the Office of the Commissioner of Food Safety, Kerala, is the implementing agency in the state. The agency has already commenced its activities to strengthen the food safety regime, by introducing licensing procedures, grading of businesses, classification of food items, setting of hygiene and safety standards, etc., based on scientific principles. Given the importance of ensuring food safety to a population that is increasingly getting aware of the risks of complacency, the future development agenda for Kerala will be highly weighed towards establishing a foolproof food safety regime.

Promote Good Agricultural Practices (GAP) in food production

5.4.4.52 Quality and safety of food commodities can be ensured by encouraging the farmers to adopt GAP and follow recommended package of practices in cultivation. Promoting GAP compliance can be done by the following:

i. Developing a compendium on GAP for all major food commodities (both agricultural and livestock) produced in the state. Kerala Agriculture University may participate in this.
ii. Setting GAP guidelines for the production of rice, vegetables, fruits, spices, roots and tubers, milk, egg, meat, etc., by 2015.
iii. Setting domestic quality standards (on minimum residue limits for pesticides, allergens, natural toxins, micro-biological contaminants, etc.) for fresh agricultural commodities, in conformity with the existing legal framework and based on emerging requirements[10].
iv. Launching awareness drives among producers on GAP guidelines and among consumers on the need to demand safe and healthy food through mass media, Krishi Bhavans, SHGs, co-operatives, farmers' associations, NGOs, and through regular training programmes.
v. Promoting organic farming by designating identified villages as 'Organic Villages' for production of specific agricultural products under organic cultivation practices.
vi. Encouraging reputed certifying agencies with adequate expertise to start operations in the state.

Check adulteration / contamination in food supply chain

5.4.4.53 The enforcement mechanism for preventing food adulteration will be strengthened by:

i. Identifying the major adulterants / contaminants used in agricultural and livestock products, both fresh and processed, and developing / adapting testing protocols to detect them.
ii. Developing a network of analytical laboratories for quality testing of both fresh and processed food for adulterants as well as chemical/physical contaminants.
iii. Developing a cadre of food safety, biochemistry, and microbiology experts, who are well trained for undertaking quality testing of food samples.

[10] AGMARK quality standards are already available for processed food products.

5.4.4.54 The roadmap involves:

- *Developing an elaborate network of biochemical laboratories:* Every district to have at least one fully functional, quality- testing laboratory, with advanced facilities by 2020 and every laboratory to be provided with adequate numbers of trained personnel.
- Setting up of regulatory protocols by 2015.
- *Initiating Capacity building measures:* Human capacity that includes well-trained food safety, biochemistry, and microbiology experts will be created.

Action Plan 2: Farm Insurance

5.4.4.55 Crop/livestock insurance has not received due attention in Kerala, as is evident from the available statistics. In the year 2010-11, nearly 40,400 hectares of area under crops were covered under insurance schemes, which benefitted an estimated number of 44,400 farmers (CMIE, 2012). In terms of share of area covered, this amounts to a mere 2 per cent of the net sown area in the state. The figures are even worse in case of livestock insurance. This means, a substantial majority of marginal and small farmers in Kerala who are already under pressure from various agrarian crises are unprotected against weather, price, and other types of risks and uncertainties. Though State Crop Insurance Scheme and National Agricultural Insurance Scheme (NAIS) are improving their coverage each year, a major impetus has to be given to this important area in future. Private insurance companies that are present in other states may be given a chance to enter this field in Kerala too. Beyond cultivators, other small farm/micro entrepreneurs involved in agriculture- related activities also need to be put under the ambit of the insurance schemes. Such initiatives would considerably increase farmers' confidence to stay in the farming profession and would pay rich dividends in terms of enhanced farming activity in future.

Improve accessibility and affordability of basic food by upgrading the public distribution system (PDS)

Some of the objectives of the policy will be:

- Reduced leakages from PDS.
- Targeting the most needy.
- Higher efficiency and reduction in the economic cost of distribution.

5.4.4.56 This will be achieved through technological up-gradation of PDS by:

i. Introducing biometric cards for fool proof identification of PDS beneficiaries.

ii. Enabling GPS tracking of vehicles that carry PDS grains from the warehouses to Fair Price Shops (FPS).
iii. Sending regular SMS alerts to beneficiaries on stock position, entitlement status, etc.
iv. Enabling end-to-end computerisation and networking of the PDS channel.

Action Plan 3: Boosting micro-enterprises in Agriculture

5.4.4.57 Kerala has been successful in nurturing a variety of micro-enterprises related to agriculture that have a proven track record of providing livelihood opportunities to umpteen numbers of rural households. They include, agro-processing, bee-keeping, crop nurseries, vermi-composting, small-scale dairy and poultry units, hatcheries, vegetable farming, mushroom cultivation, coir units, agri-marketing units, etc. In recent years, micro-enterprises received a further fillip under the *Kudumbasree* programme. Presently, there are more than fifteen thousand Neighbourhood Groups (NHGs) functioning across the state involved in any of the above mentioned activities and beyond. One major reason for the success of such enterprises is that they work under the principles of collective farming and benefit sharing, with collective resource pooling. The proactive role taken by women of Kerala in making these initiatives a huge success, and in turn gaining social acceptance, is also worth noting. However, there are still many unsolved constraints that pull down the progress of these micro-enterprises. As these small-holder initiatives would undoubtedly occupy an undisputed place in the future of Kerala's agriculture, case-specific remedies for their day-to-day problems need to be put forward from time to time. Accordingly, the state government should take special care in allocating sufficient resources in successive plan programmes for enhancing and protecting these enterprises.

Pillar III: Environment

Action Plan 1: Resource conservation

5.4.4.58 Given the fast pace of urbanisation that impose high pressure on natural resources like soil and water, special focus on conservation technologies is of utmost importance to drive future agriculture in Kerala. Several proven resource conservation technologies like micro-irrigation, precision farming, conservation agriculture,[11] System of Rice Intensification (SRI), etc., can markedly improve resource use efficiency and sustainability of farming. Departmental schemes will be launched to give impetus to faster adoption of identified conservation technologies in each potential location with special emphasis on:

- Training farmers through the proposed Frontier Agricultural Technology Training Centres (FATTCs).

[11] Includes a set of farming practices that focuses on minimum soil disturbance, conserving the top soil, crop rotation, etc.

- Targeting collective farming groups to adopt identified technologies.
- Giving special emphasis on implements and tools required for adoption of resource saving technologies through the proposed RCTPF.
- Conserving common property resources (CPRs), especially water bodies, based on participatory action approach with collective responsibility through initiatives like introducing Water Users' Associations (WUA) at Gram Panchayat level. This is based on the Participatory Irrigation Management (PIM) concept for managing local water bodies and irrigation systems with collective responsibility. WUAs are to be set up at the panchayat level at identified locations.

Action Plan 2: Agro-ecology: Principles and Strategies for designing sustainable farming systems

5.4.4.59 Sustainable agriculture will, however, go beyond the adoption of technologies. Agro-ecology has emerged as the discipline that provides the basic ecological principles on how to study, design, and manage agro-ecosystems that are both productive and natural resource conserving, and that are also culturally sensitive, socially just, and economically viable. According to this science, a field is a complex ecosystem that can be manipulated to improve production and to produce more sustainably, with fewer negative environmental or social impacts, and fewer external inputs. The design of such systems is based on the application of the following ecological principles:

- Enhancing the recycling of biomass, optimising nutrient availability, and balancing nutrient flow.
- Securing favourable soil conditions for plant growth, particularly by managing organic matter and enhancing soil biotic activity.
- Minimising losses due to flows of solar radiation, air, and water by way of microclimate management, water harvesting, and soil management through increased soil cover.
- Ensuring species and genetic diversification of the agro-ecosystem in time and space.
- Enhancing beneficial biological interactions and synergies among agro-biodiversity components, thus resulting in the promotion of key ecological processes and services.

5.4.4.60 This requires increase of plant species and genetic diversity in time and space, enhancement of functional biodiversity (natural enemies, antagonists, etc.), enhancement of soil organic matter and biological activity, increase of soil cover and crop competitive ability and elimination of toxic inputs and residues. The strategies have the following components:

5.4.4.61 **Crop Rotations:** Temporal diversity incorporated into cropping systems, providing crop nutrients, and breaking the life cycles of several insect pests, diseases and weed life cycles.

5.4.4.62 **Polycultures:** Complex cropping systems in which two or more crop species are planted within sufficient spatial proximity to result in competition or complementation, thus enhancing yields.

5.4.4.63 **Agroforestry Systems:** Agricultural systems where trees are grown together with annual crops and/or animals, resulting in enhanced complementary relations between components and increased multiple use of the agro-ecosystem.

5.4.4.64 **Cover Crops:** The use of pure or mixed stands of legumes or other annual plant species under fruit trees for the purpose of improving soil fertility, enhancing biological control of pests, and modifying the orchard microclimate.

5.4.4.65 **Animal integration: Animal integration** in agro-ecosystems aids in achieving high biomass output and optimal nutrient recycling.

5.4.4.66 **Pest regulation: Promoting pest regulation** through enhanced activity of biological control agents achieved by introducing and/or conserving natural enemies and antagonists.

5.4.4.67 **Regular supply of** organic matter: Ensure regular supply of organic matter through the addition of organic matter (manure, compost, and promotion of soil biotic activity).

Box 5.4: Nature Management Farms in Japan

Since the 1990s, Japan has moved from safety and security of food to a new stage of nature protection movement. The objective is not only securing agricultural products not dependent on pesticides and chemical fertilisers but also to build an agriculture and rural area, which protects nature and biological diversities from being contaminated by modern farming methods. This concept is defined as Nature Management Farms and the products produced under it are recognised as "high nature value". Individual farms formulate the farm management plan, including land utilisation toward nature management (i.e. land management in which agricultural and forest lands are utilised for protecting natural and ecological systems), and the loss (or decrease) in income caused by the implementation of the plan should be socially compensated. Actual compensation would be carried out through a variety of contracts and agreements between producers and consumers (reflected in the prices of direct transaction of food between producers and consumers), taxpayers (in the forms of fiscal subsidies of local, prefecture and central governments), or fund contributors (as fund trusts, etc.).

Source: http://www.trnres.com/ebook/uploads/rsxu.pdf

Action Plan 3: Organic Waste Management

5.4.4.68 In recent times, popular media in Kerala are highlighting a disproportionate number of reports and analyses on the problems and implications of waste management. A considerable part of garbage consists of recyclable biological waste that includes kitchen disposals, remnants from poultry and meat abattoirs, fish markets, farm organic waste, hospital waste, effluents from processing units, etc. In the absence of proper disposal mechanisms, theis junk is not only not properly recycled, but also allowed to decay in common water bodies and highways causing great public nuisance and degradation of common property resources. On the other hand, the demand for farmyard manure and compost for agricultural purposes is rising without proper reciprocation from the supply side. To convert this challenge into an opportunity, a detailed road map that enlists initiatives such as separation of organic from non-organic waste by households, collection and transporting waste by civic bodies, establishment of recycling plants by local self-governments, and production and distribution of organic manure by public and private entrepreneurs, is required. In order to avoid public resistance to opening and functioning of large dump yards, a decentralised collection and handling system needs to be worked out with the interface of most advanced technological solutions. Public-private partnerships in all spheres of waste management can also be explored.

5.4.4.69 The recycling system must be realised by integrating the agri-food supply chain and good garbage management chain. The food industry is also required to make efforts in reducing damage to the environment caused by their operations, through waste reduction and recycling. A certain mechanism needs to be developed so that the food industry, farmers, consumers, and national and local governments can work together in the socio-economic system founded on cyclical use of resources with proper role sharing. This mechanism should:

i. Incentivise and popularise biogas plants in households, farms, food processing units, slaughter units, etc., to enable onsite management of biological waste.
ii. Encourage production and use of compost from household and farm waste. Decentralised waste treatment- cum- recycling plants are to be established in suitable locations in every district under PPP mode.
iii. Make biogas plants mandatory for every farm-household-processing unit, slaughter unit, etc., that produce waste beyond certain agreed upon quantity.
iv. Develop supply chains to link the compost-producing units with organic farms through regular supply arrangements.

Action Plan 4: Integrated Farming Systems (IFS)

5.4.4.70 Integrated farming has revolutionised the concept of farming. It refers to agricultural systems that integrate livestock, crop production, and fisheries and may sometimes be known as "Integrated Biosystems". In this system, an inter-related set of enterprises are used so that the "waste" from one component becomes an input for another part of the system, which reduces cost and improves production and/or income.

5.4.4.71 The ancient combination of livestock and crop activities had helped farmers in the past, almost all over the world, to use the manure as fertiliser for crops, and the crop residues as feed for livestock. However, most of the manure usually lost up to half of its nitrogen content before it became nitrate and was readily available as fertiliser to plants. This led to constrained productivity growth, resulting in increasing use of the chemical fertilisers and artificial feeds. The latest technological changes have made it possible to get back to these systems once again and maximize the production without affecting the ecosystems adversely. The recent integration of fish with the livestock and crop has further augmented the system. Crops-livestock-fish system was initially practised in China, but is now being promoted all over the world. The basic principles are as follows:

- **Mixed crop systems:** Various crops such as grains, root crops, coconut, fruit trees, fodder, and vegetables crops are systematically integrated into crop rotation in such a way that they are mutually compatible and complementary; minimize the occurrence of pests and diseases, reduce the use of fertilisers and energy; and decrease the rate of soil erosion, and incidence of climatic fluctuations.
- **Conservation tillage:** Traditional tillage is replaced by more scientific methods. Some of the emerging concepts are:
  i. "pig tractor" systems where the animals are confined in crop fields prior to planting and "plough" the field by digging for roots;
  ii. "chicken tractor";
  iii. poultry used in orchards or vineyards after harvest to clear rotten fruit and weeds while fertilising the soil.

- **Ecological compensation zones**: Provision of natural spaces such as green dividers, hedges, and woodlands. These spaces have multiple functions of weed and soil management.
- **Livestock – pigs, cattle, poultry, and small ruminants - management:** Cattle or other livestock are allowed to graze cover crop between crops on farms that contain both cropland and pasture.
- **Use of animal waste:** Animal wastes are utilised as resources. It not only eliminate wastes but also ensures overall increase in productivity for the whole agricultural system. Environmental impacts caused by wastes from intensive activities such as pig farming are

also avoided. The most significant innovation is the introduction of the "**Digester and Basin"** in the waste treatment processes of the integrated farming system. One big problem with livestock waste, which contains very unstable organic matter, is that it decomposes fast and consumes oxygen. In digesters, digestion of the livestock waste under closed anaerobic conditions is followed by oxidation in open shallow basins, with natural algae providing the free oxygen through photosynthesis. This can convert almost 100% of the organic matter into inorganic matter, which will not consume any oxygen. The daily increase in readily usable nutrients can be beneficial to the system, provided they are totally utilised in both fish and crop cultures. Theoretically, it is possible to increase the quantity of waste ten-fold in the pond without any risk of pollution after its processing. Increased fertiliser and feed supplies, plus the high market value of fish as feed and/or food has increased the incomes substantially.

- **Integration of fisheries:** Processed livestock wastes are added to ponds as fish feed. And, a second cycle of nutrients from fish wastes is used as soil nutrients, which has enhanced the integration process.

5.4.4.72 Integrated farming systems have proved to be highly successful in China and other countries. They have transformed traditional agriculture into highly knowledge- intensive economic activities.

5.4.5 Implementation issues

5.4.5.1 On-field implementation of the new agricultural paradigm will be a daunting task for the state. This will require a change in the mindset and institutional reforms. Entrusting all these tasks to the existing institutions and departments may be challenging. As governance is a key factor in the success of any new programme, the state has to think of establishing innovative institutions and introducing innovative governance mechanisms to effectively implement the proposed programmes. Achieving each of these goals further depends on ensuring result-oriented action in a number of related areas.

Strengthening the database for monitoring

5.4.5.2 Strengthening the agricultural database in the state is one of the future thrust areas. This is because an up-to-date and comprehensive centralised data warehouse is of utmost importance to support policy studies that provide inputs to the plan process from time to time. A few areas that require focus are: data on crop-wise input use, number and distribution of various agricultural implements, area under high yielding varieties for major crops, production and productivity of minor crops, imports and exports (across state border) of agricultural commodities, area under protected cultivation, precision farming, and other resource saving cultivation practices, details of various micro-enterprises involved in agriculture and related

activities, assessment of meat production, animals slaughtered and productivity under unorganised sector, infrastructural details on wholesale and retail markets dealing with agricultural commodities, indices on input prices, sector-wise demand and supply of irrigation water, indicators on R&D, and data on the performance of extension services.

5.4.5.3 To conclude, the future of Kerala's agriculture would depend considerably on how the scarce resources of the state are put to best use and the way in which a judicious balance between the competing sectors is achieved.

5.5 Conclusion

5.5.1 Improvement in productivity of the agriculture to match international standards is the critical goal in the next fifteen years. Increased adoption of technology, investments in physical infrastructure, improved marketing techniques are a virtuous-cycle that Kerala can benefit from and indeed show the rest of India the path to attaining a developed economy status. Training is required at every stage because business-as-usual may not be sustainable. Training of the trainers and senior administration is also required for out of the box thinking for out of the box challenges. Agro-entrepreneurs should be encouraged to show the path forward.

Annexure A.5.1: Forecasts

A.5.1: Methodology for Computation of Total Factor Productivity (TFP) of crops

TFP measures the amount of increase in the total output, which is not accounted for by increases in the total inputs. TFP is defined as the ratio of an index of aggregate output to an index of aggregate input. One of the most defensible methods of aggregation in productivity measurement is Divisia aggregation. Divisia indices have two important attractive properties: (i) They satisfy the time reversal and factor reversal tests for index numbers, and (ii) It is a discrete of the components, so that the aggregate could be obtained by the aggregation of sub-aggregates. For discrete data, the most commonly used approximation to the (continuous) Divisia index is the Tornqvist approximation. The Divisia-Tornqvist or translog index of TFP which is used in the present study for computing the total output, total input and TFP indices by commodity/farm system/sector, etc., under different locations is as given below:

Total output index (TOI)

$$TOI_t / TOI_{t-1} = \prod_j (Q_{jt} / Q_{jt-1})^{(R_{jt}+R_{jt-1})^1/2}$$

Total input index (TII)

$$TII_t / TII_{t-1} = \prod_i (x_{it} / x_{it-1})^{(S_{it}+S_{it-1})^1/2}$$

where,
Rj t is the share of 'j'th output in total revenue,
Qj t is the output of 'j'th commodity,
Sit is the share of 'i'th input in total input cost,
xit is quantity of 'i'th input, and
t is the time period

The cost estimates and other data on the quantity and value of inputs provided by the Department of Economics and Statistics, Government of Kerala corresponding 2000/01 to 2009/10 were used for TFP estimation. The estimated growth rates in TFP were subsequently used for supply projections.

A.5.2. Estimation and future projection of demand

The estimation of future demand of major agricultural commodities is an essential pre-requisite to set realistic production targets for these commodities. This involves estimation of demand for the base-year of projection, estimation of income elasticity of demand for the specific commodity in question and projecting the future demand for the period for which the plan is to

be framed. The base-year total demand for the commodity is generally estimated from the sample survey estimates on household per capita consumption. National Sample Survey Organisation (NSSO) collects and compiles household data on consumer expenditure and consumption pattern by conducting nationwide surveys in India. The latest NSSO data on household consumption for Kerala is available for the year 2009−10. This data was utilised to estimate base-year demand of major food commodities like rice, pulses, vegetables, fruits, milk, etc. Projected population is shown in Table A.5.1. The income elasticities of demand for these commodities were collected from published literature and are given in Annexure 6 (Table A.5.2). Finally, the projected demand for the commodity for the future period (2030 in this case) was estimated using the following formula:

$$d_t = d_{t0} \ (1+y_g \times e_i)$$
$$D_t = d_t \times N_t$$

Where, d_t is the per capita consumption at projected year t, d_{t0} is the per capita demand for the base-year, y_g is the growth in income and e_i is the income elasticity of demand. D_t is the total demand at the projected period and N_t is the projected population for the future year t.

Table A.5.1: Projected population and per capita income in Kerala, 2010−2030

Year	*Rural ('000 nos)*	*Urban ('000 nos)*	*Total ('000 nos)*	*Annual growth rate (%)*	*Per capita income (Rs. at 2004/05 prices)*	*Annual growth rate (%)*
2010	25,539	8,778	34,317	0.75	56,107	8.33
2015	26,475	8,998	35,473	0.61	76,859	5.71
2020	27,250	9,160	36,410	0.47	97,674	4.45
2025	26,560	10,572	37,132	0.35	1,18,485	3.64
2030	24,557	13,152	37,709	0.27	1,39,296	3.08

Source: Report of the Technical Group on Population Projections, Office of the Registrar General & Census Commissioner, Government of India. Per capita income was projected using ARIMA model.

Table A.5.2: Income elasticity of demand used for demand projections

Commodity	*Income elasticity of Demand*	
	All India	*Kerala*
Rice	0.02	-0.06
Wheat	0.08	0.12
Pulses	0.22	0.05
Edible oil	0.29	0.29
Vegetables	0.26	0.26
Fruits	0.36	0.46
Spices	0.52	0.55
Milk	0.43	0.20

Egg	0.88	0.52
Meat	0.54	0.60

Sources: All India elasticities were taken from Kumar *et al.* (2011); Shinoj and Mathur (2007) and Gandhi and Zou (2010). Kerala specific elasticities were derived through calibrations based on NSSO consumption data for Kerala.

A.5.3: Projection of production/supply

Supply projections were undertaken for all major agricultural commodities, for which cost of cultivation data was available. The cost estimates and other data on the quantity and value of inputs provided by the Department of Economics and Statistics, Government of Kerala were used for supply projections. This data was used to estimate supply growth of the commodities for the past 10 years. Other than inputs/price driven growth, crop area (AREA) and total factor productivity (TFP), are the major sources of supply growth. The following framework was used to estimate supply growth.

The supply growth equation for commodity can be expressed as:

$$S_g = E_S^P P_g + \sum E_S^{p_i} p_i g + AREA_g + TFP_g$$

Where,

S_g = Supply growth for the commodity

E_S^P = Output supply elasticity with respect to the product price, and

P_g = Output price growth

$E_S^{p_i}$ = Elasticity of factor demand for i^{th} input

$p_i g$ = Input price growth of i^{th} input

$AREA_g$ = Acreage growth of the commodity

TFP_g = TFP growth of the commodity

The supply growth equations given above were used to predict the supply of various commodities under the base line assumptions of input-output price growth, area, and TFP growth. The supply growths were estimated under the following scenarios:

(i) Base-line Scenario: The growth in area, TFP and price-driven growth of supply to be continued at the same rate as that corresponding to the period 2000−01 to 2009−10.

(ii) Pessimistic Scenario: Area growth to continue as the same and TFP growth at half of the base-line scenario; Price-driven supply growth to continue as earlier.

(iii) Interventionist Scenario: Decline in area arrested and growth in TFP maintained at the current level if positive and reduced to half if negative. Price-driven supply growth to continue as earlier.

(iv) Optimistic Scenario: Area to grow at a rate at which the crop area is restored to the level as that of TE 2000−01 by the year 2030. TFP growth maintained at the current

level if positive and brought to zero if negative. Price-driven supply growth to continue as earlier.

The average production during 2007−2010 (TE 2010) was used as the base year domestic supply. The domestic supplies of major commodities were projected till 2030 using the following formula;

$$S_t = S_0 * (1+S_g)^t$$

where,

S_t is the supply for a commodity at future period t , S_0 is the base year production and S_g is the predicted supply growth under various scenarios.

Assumptions of annual growths in area, TFP, Price driven growth and supply growth under alternative scenarios of supply projections for major crops in Kerala (Table A.5.3).

Table A.5.3: Supply Projections

(Per cent)

Crop	*Scenario*	*Area growth*	*TFP growth*	*Price driven growth*	*Supply growth*
Paddy	Pessimistic	−4.29	0.90	−0.07	−3.46
	Base-line	−4.29	1.80	−0.07	−2.56
	Interventionist	0.00	1.80	−0.07	1.73
	Optimistic	1.88	1.80	−0.07	3.61
Coconut	Pessimistic	−1.86	0.38	1.52	0.04
	Base-line	−1.86	0.76	1.52	0.42
	Interventionist	0.00	0.76	1.52	2.28
	Optimistic	0.50	0.76	1.52	2.78
Tapioca	Pessimistic	−4.12	1.80	1.01	−1.31
	Base-line	−4.12	3.60	1.01	0.49
	Interventionist	0.00	3.60	1.01	4.61
	Optimistic	1.75	3.60	1.01	5.35
Banana	Pessimistic	−1.00	0.41	0.23	−0.37
	Base-line	0.00	0.81	0.23	1.04
	Interventionist	1.00	0.81	0.23	2.04
	Optimistic	2.00	0.81	0.23	3.04
Pepper	Pessimistic	−2.62	-10.17	3.85	-8.99
	Base-line	-2.62	-6.78	3.85	-5.60
	Interventionist	0.00	-3.39	3.85	0.41
	Optimistic	0.58	-1.69	3.85	2.69
Ginger	Pessimistic	-5.05	-1.15	3.07	−3.13
	Base-line	−5.05	−0.77	3.07	−2.75

Crop	*Scenario*	*Area growth*	*TFP growth*	*Price driven growth*	*Supply growth*
	Interventionist	0.00	−0.38	3.07	2.69
	Optimistic	2.35	0.00	3.07	5.44
Turmeric	Pessimistic	−3.37	0.25	1.21	−1.92
	Base-line	−3.37	0.49	1.21	−1.67
	Interventionist	0.00	0.49	1.21	1.70
	Optimistic	1.50	0.49	1.21	3.20

Source: Computations by NCAER

CHAPTER 6

ANIMAL HUSBANDRY AND DAIRYING SECTOR: LIVESTOCK FOR BETTER LIVES

Kerala is home to a range of livestock species. The livestock in Kerala are raised both in backyards and commercial farms. Cattle, buffaloes, goats, pigs, ducks and fowl, rabbits, etc., are the main livestock categories raised for milk and meat. The sustainable livestock strategy will aim at reducing the environmental footprint of farms, while improving milk, meat and eggs production, farm profitability, and the well-being of people and animals involved. Integrated farming is the recommended solution for Kerala. Sustainable practises and technological skills will be adopted or adapted along with branding and marketing skills to promote the products of Kerala.

6.1 The Background

6.1.1 Livestock have been an integral component of the agricultural and rural economy across the world. They supply energy for crop production in terms of draught power and organic manure and in turn, derive their own energy requirements from crop by-products and residues. Livestock are valued as a source of food and other raw material/by products, such as hides and skins, blood, bone, fat, etc. The rate of increase in global demand for animal products is higher than most food items and consumption is projected to double by 2050. The livestock sector is a major livelihood provider to the world's poor. Dairying has become an important secondary source of income and employment for millions of rural families and requires sustained growth. Animal Husbandry and Dairying is a state subject and the state Governments are primarily responsible for the growth of this sector.

6.2 Contribution to the economy

6.2.1 "The livestock sector covers breeding and rearing of animals and poultry, production of milk, slaughtering, preparation of meat, production of raw hides and skins, eggs, dung, honey and increment in livestock"[1]. The share of livestock sector in the value of output of agriculture and allied services at the national level is 25.4 per cent in 2010−11 at constant

[1] Department of Economics and Statistics. Gross Domestic Product of Kerala and India from 2004−05 to 2011−12. Government of Kerala, Thiruvanthapuram.

2004−05 prices[2]. Kerala is lower at 21.7 per cent. There is consideration variation at the state level. The share of livestock in "the value of output of agriculture and allied activities is less than 20 per cent in Assam, Goa, Karnataka, Maharashtra, Odisha, Sikkim, Tripura, West Bengal, Daman & Diu and Lakshadweep; between 20−25 per cent in Arunachal Pradesh, Gujarat, Manipur and Dadra and Nagar Haveli; 25−30 per cent in Himachal, Madhya Pradesh, Mizoram, Rajasthan, Tamil Nadu, Uttar Pradesh, Puducherry, Jharkhand and Uttarakhand; and more than 30 per cent in Andhra Pradesh, Bihar, Haryana, Jammu & Kashmir, Meghalaya, Nagaland, Punjab, Andaman and Nicobar Islands, Chhattisgarh, Chandigarh and Delhi"[3]. At the national level, the share of livestock in GDP in 2010−11 was 3.9 per cent and in agricultural GDP was 26 per cent in constant prices (2004−05)[4].

6.2.2 The Animal Husbandry sector provides large self-employment opportunities. According to the State Poverty Eradication Mission through Kudumbasree, in Kerala, 5 lakh out of 70 lakh families are dependent solely on livestock for their livelihood, while another 5 lakh depend on livestock as a subsidiary means for supporting their livelihood. More than 55 per cent of bovine keepers maintain 2−3 cow units, while about 32 per cent maintain one-cow units. More than 60 per cent of livelihood enterprises set up by Kudumbasree are in the Animal Husbandry sector. Out of 37 lakh women in the suburbs of the poverty line, 70 per cent opted for enterprises in the animal husbandry sector, as the major basis of livelihood[5]. It indicates that further progress in the livestock sector would directly be reflected in the balanced development and upliftment of the rural economy.

6.3 Government support

6.3.1 Livestock are an important element of the livelihoods of rural households, and considerable efforts of the government of Kerala at economic development have focused on the livestock sector. The Government has created an elaborate administrative and research

[2] Central Statistical Office, Ministry of Statistics and Programme Implementation, Government of India. 2013. *Statewise Estimates of Value of Output from Agriculture and Allied Activities 2013*.www.mospi.nic.in.

[3] Planning Commission, Government of India. Report of the Working Group on Animal Husbandry & Dairying 12th Five Year Plan. http://planningcommission.gov.in/aboutus/committee/index.php?about=12strindx.htm. Government of India, New Delhi.

[4] Planning Commission, Government of India. Report of the Working Group on Animal Husbandry & Dairying 12th Five Year Plan. http://planningcommission.gov.in/aboutus/committee/index.php?about=12strindx.htm. Government of India, New Delhi.

[5] Kudumbashree-State Rural Livelihood Mission. *National Rural Livelihoods Mission: State Perspective Plan and Implementation Plan*. http://www.aajeevika.gov.in/SPIP/NRLM-SPIP-Kerala-Final.pdf . Government of India. December.

infrastructure to promote the sector. The Department of Animal Husbandry in Kerala is spearheading the developmental activities related to this subsector. The major activities of the Department are veterinary services; animal health care; disease eradication; development of cattle, goat, pig and poultry; control of zoonotic diseases; conducting and coordinating extension activities and training programmes for farmers and veterinarians; and production of Biologicals[6]. At present, about 2,698 institutions are operating under the Animal Husbandry Department that includes artificial insemination centres, disease control and diagnostic laboratories, epidemiological cells, breeding farms, hatcheries, feed testing labs, veterinary clinics and dispensaries, veterinary hospitals, poly clinics, training centres, etc., spread across the state.

6.3.2 Besides the Department of Animal Husbandry, separate Dairy Development is also functioning as the nodal agency for rural dairy extension, fodder resource development, and rural milk marketing in Kerala. Under the Dairy Department, 152 dairy extension service units, 14 district offices, 5 dairy extension centres, 14 quality control units, and 2 fodder farms are currently functioning.

6.3.3 The Kerala State Poultry Development Corporation (KSPDC) is primarily responsible for the promotion and development of poultry sector in the state[7]. The Corporation has implemented many projects to increase the domestic production of poultry products and reduce the import dependence from other states. Poultry has emerged as the fastest growing sub- sector of agriculture contributing sizeable output to the State economy. Modernising the poultry sector is the major thrust of the corporate strategy of the Kerala State Poultry Development Corporation Ltd.

6.3.4 The infrastructure of KSPDC farms include, a holding farm in Pettah to hold the layer and broiler birds before selling to the farmers, a Duck farm at Kottiyam, a Feed Mixing Plant at Kottiyam and a Meat Processing plant at Pettah, Thiruvananthapuram. Two layer breeding farms in Kottayam and Mala have been started. Further, the KSPDC seeks to establish more infrastructure:

- A hi-tech layer farm and meat processing plant at Kudappanakunnu in Thiruvananthapuram.

[6] Kerala State Animal Husbandry Department website. http://ahd.kerala.gov.in/docs/rti_2_3_12.pdf.
[7] The reference for the Kerala State Poultry Development Corporation is its website. http://kepco.nic.in/.

- A layer breeder farm at Kuriyottumala in Kollam.
- A poultry feed mill at Mala in Thrissur district.

6.3.5 The KSPDC has introduced backyard and small-scale poultry projects to enhance food security and contribute to poverty reduction through income and employment generation. The organisation has also introduced integration farming[8]. Here, the farmers having sheds sized 2,000 square feet and above for rearing chicken are eligible to apply. Once approved, they will be supplied chicks and feed and will rear the birds under strict protocol of vaccination and health care. In the case of layer birds, the birds reared are procured at 35−40 days and issued to selected beneficiaries of the local body through Veterinary institutions of the Panchayat or for various schemes. This provides backward and forward linkages to poultry farming. The evidence suggests that it has been successful, in the sense that production costs have come down and productivity has increased.

6.3.6 The Kerala Veterinary and Animal Sciences University (KVASU), established in December 2010, undertakes education, research, and extension services in the field of veterinary and animal sciences. Located in Pookode, Wayanad, the University comprises two Veterinary colleges– College of Veterinary and Animal Sciences, at Mannuthy and Pookode respectively; College of Dairy Science and Technology at Mannuthy; 15 Research Stations/Units/Farms; and 2 Veterinary Hospitals in different parts of Kerala[9]. The Directorate of Entrepreneurship, functioning under the University, promotes innovation and experiential foundations for enhancing farm income through entrepreneurship. It also focuses on research, outreach and extension activities.

6.3.7 Under the State Poverty Eradication Mission, the government has been trying to prioritise dairying and goat farming with a view that these are occupations preferred by the poorer people in the community. In 2008, the state government initiated the Samagra project under Kudumbashree Poverty Eradication Mission to develop a comprehensive production and marketing network of agriculture and livestock products[10]. This will also help attain

[8] This is different to the policy recommendation made in the agriculture chapter. Integration farming in KSPDC model is about forming backward and forward linkages whereas in the Kerala Perspective Plan 2030 it is about growing crops and rearing livestock and poultry together to benefit from the synergies

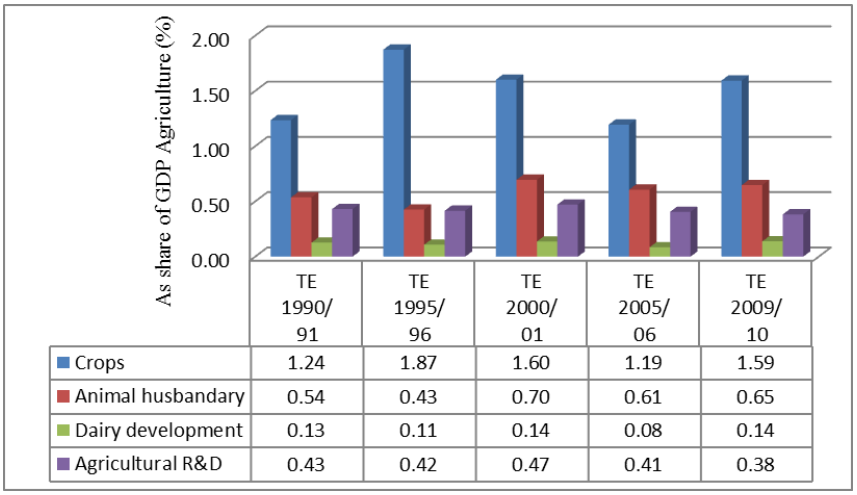
[99] Kerala Veterinary and Animal Sciences University (KVASU) website. http://kvasu.ac.in/about.

[10] National Rural Livelihoods Mission website. http://www.aajeevika.gov.in/SPIP/NRLM-SPIP-Kerala-Final.pdf.

self-sufficiency in the production of egg, milk, and vegetables within the state. There are two livestock projects under operation in this program: one for milk in Ksheerasagaram (Idukki) and another is a Goat Village in Kannur[11]. While these are poverty eradication programmes, an element of professionalism and technology has been built into these interventions, in order to increase the returns from and the sustainability of these programmes. Intensive training is organised in collaboration with the Animal Husbandry department and the Kerala Livestock Development Board. Production protocols have also been developed and propagated, and an extension system has been made operational, especially under the Samagra projects.

6.3.8 The government expenditure on animal husbandry is also found to have improved over the years. Government expenditure on dairy development received a share of around 0.13 per cent of the overall GDP agriculture during TE (Triennium Ending) 1990−91. It has improved marginally remained almost the same, except for a dip during TE 2005−06 (Figure 6.1).

Figure 6.1: Government Expenditure in Major Sub-sectors of Agriculture as a Share of GDP agriculture in Kerala



	TE 1990/91	TE 1995/96	TE 2000/01	TE 2005/06	TE 2009/10
Crops	1.24	1.87	1.60	1.19	1.59
Animal husbandary	0.54	0.43	0.70	0.61	0.65
Dairy development	0.13	0.11	0.14	0.08	0.14
Agricultural R&D	0.43	0.42	0.47	0.41	0.38

Source: Centre for Monitoring Indian Economy, Online database, 2012

6.4 Performance of the sector

Declining livestock population

[11] Kudumbashree website. http://www.kudumbashree.org/?q=samagraprojects.

6.4.1 Kerala is home to a range of livestock species. The livestock in Kerala are raised both in backyards and commercial farms. Cattle, buffaloes, goats, pigs, ducks and fowl, rabbits, etc., are the main livestock categories raised for milk and meat purposes in the state. As per the 2007 Livestock Census, there were around 1,740 thousand cattle in Kerala, out of which 1,621 thousand were cross bred and the rest were indigenous breeds (Table 6.1). However, in relation to the corresponding figures in 2003, total cattle population in Kerala suffered a drop of around 18 per cent. The percentage decline was higher in indigenous breeds (−69.3%) than in crossbred (−6.6%) cattle. The population of buffaloes and pigs also declined by −10.7 per cent and −22.3 per cent, respectively. On the other hand, the population of goats, and fowl and ducks increased during the same period by 42.5 per cent and 30.6 per cent respectively. Over the same period, the combined cattle and buffalo population at the national level increased from 283.1 million (185.2 million cattle and 97.9 million buffalo) to 303 million (198.3 million cattle and 104.7 million buffalo), by approximately 7 per cent.

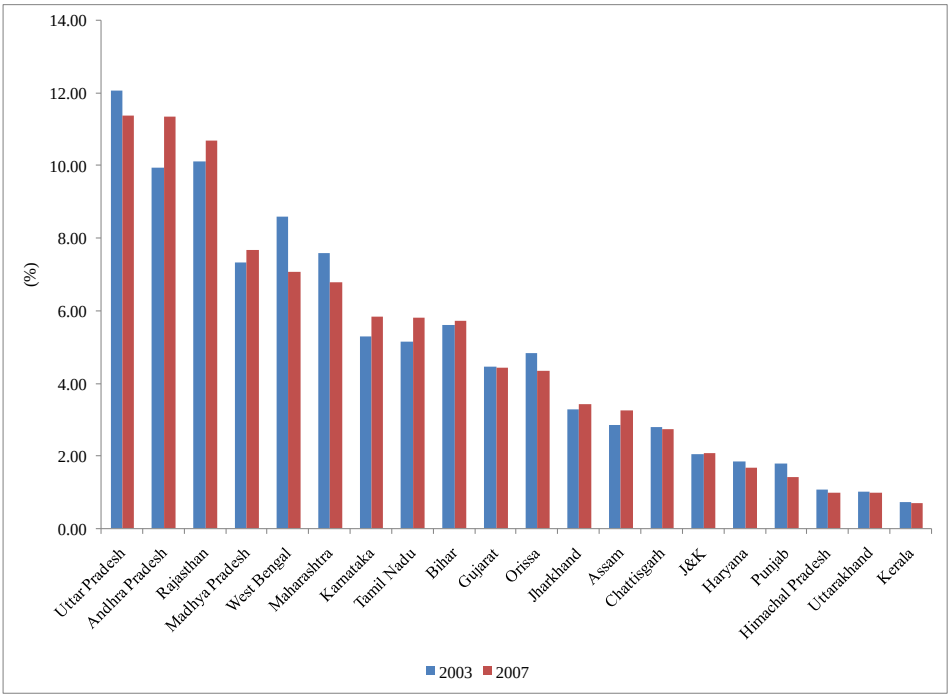
Table 6.1: Trends in livestock population in Kerala

Animal	***Type***	***Number in thousands***		***Per cent change***
		2003	***2007***	***(%)***
Cattle	Crossbred	1,735	1,621	−6.6
	Indigenous	387	119	−69.3
	Total	2,122	1,740	−18
Buffalo	All	65	58	−10.7
Goats	All	1,213	1,729	42.5
Pigs	All	76	59	−22.3
Fowls and ducks	All	11,653	15,214	30.6

Source: Basic Animal Husbandry Statistics, 2010

6.4.2 Between 2003 and 2007, Kerala's share in national livestock population has declined. Its share in total cattle population was slightly above one per cent in 2003 which declined to 0.8 per cent in 2007 (Figure 6.2). In terms of the share in total livestock, Kerala is at the bottom of non-North East Indian states. Its position is, however, better in poultry where the share was above 2.5 per cent.

Figure 6.2: Percentage Share in National Livestock Population: 2003 and 2007 (%)



Source: Livestock census, 2003 and 2007

Highly skewed distribution of livestock ownership

6.4.3 Like land ownership, the pattern of livestock possession in Kerala is also highly skewed, but skewed towards marginal farmers who own less than one hectare (ha) of land. Marginal farmers in the state owned nearly 87.7 per cent of total cattle in the state, followed by small farmers (8.4%). The other three holding categories owned the balance four per cent of cattle (Table 6.2). A very close similarity in ownership pattern was observed in the case of buffaloes as well. Goats, as is the case elsewhere, were found to be the property of small and marginal farmers in Kerala too. Marginal farmers owned a substantial majority (92.6%) of goats in the state. While marginal farmers possessed 57.5 per cent of the pigs, the rest was more or less equally divided among other categories of farmers, excepting large farmers. Marginal farmers also predominantly owned poultry (93.5%), followed by small farmers (4.55%).

Table 6.2: Farm size category-wise ownership of livestock in Kerala, 2006−07 (%)

Farm category	*Cattle*	*Buffalo*	*Goats*	*Pigs*	*Poultry*

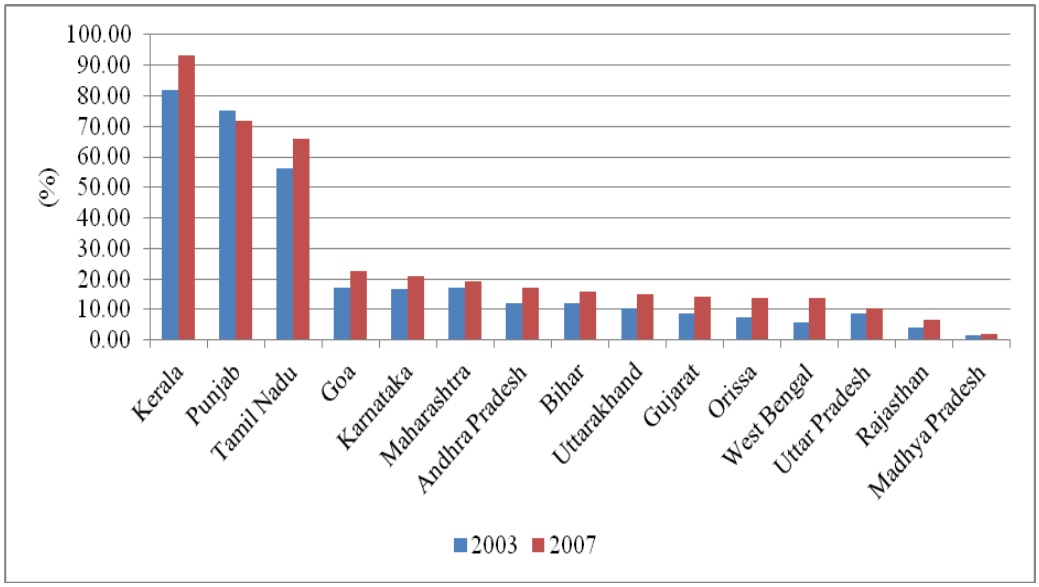
Farm category	*Cattle*	*Buffalo*	*Goats*	*Pigs*	*Poultry*
Marginal (below 1.0 ha)	87.70	86.57	92.62	57.48	93.54
Small (1.0 − 1.99 ha)	8.41	8.35	4.99	17.63	4.55
Semi-medium (2.0 − 3.99 ha)	3.09	3.95	1.85	10.28	1.54
Medium (4.0 − 9.99 ha)	0.72	1.02	0.47	14.60	0.34
Large (10 ha and above)	0.08	0.11	0.07	0.00	0.03
All groups	100.00	100.00	100.00	100.00	100.00

Source: Input Survey, 2006−07

Top position among major states in terms of the quality of livestock

6.4.4 While the state has the distinction of being at the bottom in terms of the cattle population, it is at the top in terms of the quality of livestock. Over 82 per cent of the cattle population was crossbred in the state in 2003, which increased further to 94 per cent in 2007, which is higher than all other states and union territories.

Figure 6.3: Share of Crossbred livestock in total livestock population



Source: Department of Animal Husbandry, Dairying and Fisheries, Ministry of Agriculture, Government of India. *Basic Animal Husbandry Statistics 2012*. April.

6.4.5 "Organised dairy development in Kerala commenced in 1951 through the Key Village Scheme (KVS). This scheme aimed at improving the genetic potential of cattle by

crossbreeding local cattle with superior indigenous breeds. The Department of Animal Husbandry was the implementing agency of the KVS. This was followed by the Key Farm Scheme in 1952 and 1954. In 1955, crossbreeding with exotic breeds was initiated. In 1963, the Animal Husbandry Department started the Hill Cattle Development Scheme. The Indo-Swiss Project Kerala (ISPK), a joint venture of the Government of India and Swiss Development Corporation started in 1963, which has played a major role in the genetic improvement of the cattle of the State. The project, located in Mattupetty on the high ranges of Idukki, aimed at developing a breed of dairy cattle suited to the local conditions. Frozen semen technology for artificial insemination (AI) was introduced for the first time in Asia through this project"[12].

6.4.6 In 1967−68, the Intensive Cattle Development Project (ICDP) was initiated with a view to implement the crossbreeding programme envisaged by the state Government[13]. In accordance with the proposal, 9 Project Offices, 37 Regional Artificial Insemination Centres (AI), and 1,482 ICDP sub-centres were established throughout the state.

6.4.7 The Dairy Development Department, which was formed in 1962, undertook a state-level crossbreeding programme in 1972 using Chilled Milk Extended Semen[14]. About 950 AI centres were opened in 721 panchayats and trained matriculate youth were deployed to deliver the service at the farmers' doorstep for the first time. The adoption of AI spread dramatically over the seventies and eighties because of the need to enhance animal productivity in the face of rising input costs.

6.4.8 In 1976−77, a Special Livestock Breeding Programme was started as a 100 per cent centrally sponsored programme[15]. The aim of the scheme was to provide female cross–bred calves below six months of age, supply good quality feed to ensure their health, and also to provide insurance coverage.

---

[12] Sasikumar, S. 2009. *A Brief Study on Diary Industry in India*. Assignment 1. http://icmimk.blogspot.in/2009/07/brief-study-on-diary-industry-in-india.html. Institute of Cooperative Management, University of Kerala, Thiruvanthapuram. July 26.

[13] Kerala State Animal Husbandry Department website. http://ahd.kerala.gov.in/index.php/livestockdevelopmentprogrammes

[14] Sasikumar, S. 2009. *A Brief Study on Diary Industry in India*. Assignment 1. http://icmimk.blogspot.in/2009/07/brief-study-on-diary-industry-in-india.html. Institute of Cooperative Management, University of Kerala, Thiruvanthapuram. July 26.

[15] Planning Commission website. http://planningcommission.nic.in/plans/planrel/fiveyr/5th/5planch5.html.

6.4.9 Currently, the Kerala Livestock Development Board is involved in designing and implementing planned breeding programmes for cattle throughout the state. The Board supplies frozen semen to 2,971 AI centres covering the entire state and is the largest frozen semen producer in the country[16]. Besides, it is also involved in activities like training programmes in various disciplines, promotion of fodder cultivation, research in cattle/goat/pig breeding, fodder development, etc. The technological developments in the field of livestock production and fodder development are conveyed to the implementing agencies. Cattle population in the state is mostly crossbred and these animals are highly prone to diseases. Due to diseases, the farmers incur losses. In order to compensate the loss, the Department came up with a highly subsidised insurance programme titled the Gosuraksha Insurance Scheme, jointly with United India Insurance Company. This insurance coverage is at a lower premium rate; at the rate of 1.6 per cent instead of six per cent.

Declining value of product

6.4.10 As with the population, livestock products also experienced a slump in its growth during the 2000s as compared with the 1990s as is demonstrated by a decline in growth of VOP (total livestock) from 3.87 per cent per annum to 0.55 per cent per annum (Table 6.3). Major livestock products, viz. milk and milk products and meat and meat products exhibited negative growth rates of −1.84 per cent and −4.16 per cent respectively in the latter period. VOP of eggs also suffered a reduction in growth momentum during this decade. Only minor products like wool and hair and other miscellaneous products showed positive growth, with negligible effects on the overall performance. In terms of physical units, milk production in Kerala increased from 1.89 million tonnes in the Triennium ending (TE) 1992−93 to 2.52 million tonnes in TE 2000−01 and declined thereafter to 2.41 million tonnes in TE 2009−10. In a similar fashion, egg production increased from 1,774 million in TE 1992−93 to 2,044 million in TE 2000−01 and then decreased to 1,508 million in TE 2009−10 (GoI, 2010). A major part of the meat in Kerala is produced in the unorganised sector; the data is sparse for a longer period. However, available data from the Animal Husbandry Department, Government

[16] Kudumbashree-State Rural Livelihood Mission. *National Rural Livelihoods Mission: State Perspective Plan and Implementation Plan*. http://www.aajeevika.gov.in/SPIP/NRLM-SPIP-Kerala-Final.pdf . Government of India. December.

of Kerala shows that meat production inclusive of that from the unorganised sector has increased from 0.18 million tonnes in 2002−03 to 0.32 million tonnes in 2009−10.

Table 6.3: Trend of Growth in Value of Output (2004−05 prices) of Major Livestock Products in Kerala, 1990−1991 to 2008−09, (%)

Sector	***1990−91 to 1999−00***	***2000−01 to 2008−09***	***1990−91 to 2008−09***
Milk and milk products	4.82	−1.84	1.56
Meat and meat products*	3.01	−4.16	−2.14
Egg	5.23	2.56	3.42
Wool and hair	0.72	7.24	2.87
Others	−0.38	2.47	−0.34
Total livestock	3.87	0.55	1.64

Note:*meat production from organised sector only is accounted for.

Source: National Accounts Statistics, Central Statistical Organisation.

High productivity

6. 4.11 Much of the decline in VOP could be due to decline in the population of cattle. However, the value of livestock product per adult cattle unit (productivity) in Kerala was found to be higher than that at the national average level. It was Rs. 69,294 in 2010−11 in Kerala as against the corresponding all India average of Rs. 9,872. Several programmes (sponsored by the central, state and local self-governments) are being implemented by the Animal Husbandry Department, Dairy Departments, Kerala Livestock Development Board, Kerala Poultry Development Corporation, etc. to increase productivity. Programmes in the Animal Husbandry sector have also been initiated by other departments, namely Rural Development and SC/ST Departments to improve the health and productivity of livestock. Following the interventions of the Animal Husbandry Department, which came into existence in 1956, there has been a uniform spread of veterinary institutions and milk co-operatives for procurement of milk. Every Panchayat has a veterinary dispensary with a qualified veterinarian. Basic infrastructure for an animal health care system has been set. The Animal Husbandry Department in Kerala has initiated programmes for Fodder Development, among

which the Fodder Mini Kit Demonstration Programme is implemented through the Integrated Co- operative Development project (ICDP). The objective of this programme is to supply "fodder mini kits" of various fodder seeds in the Rabi and Kharif Season to the farmers of the state through ICDP sub-centres and veterinary dispensaries/ hospitals.

Increasing consumption of livestock products

6. 4.12 Kerala's food consumption pattern has experienced a clear diversification towards high value commodities as has happened in the rest of India. Among the livestock products, milk consumption was to the tune of 37.7 kilogram (kg) per capita in 1999−2000, which improved to a level of 40.2 kg per capita by 2009−10. Similarly, egg and meat consumption also increased appreciably during the reporting period (Table 6.4).

Table 6.4: Per capita Consumption of Major Livestock Products in Kerala, 1999−2000 to 2009−10

Commodity	***Per capita consumption (Kg/capita/annum)***		
	1999−00	***2004−05***	***2009−10***
Milk	37.7	36.9	40.2
Egg*	33.3	30.4	42.1
Meat	3.4	4.4	5.6

Note:* Per capita demand of egg expressed in numbers

Source: Reports of NSSO for the 55th61st and 66th rounds of surveys

High levels of self-sufficiency

6. 4.13 Based on the latest estimates of per capita consumption, the total demand for major commodities at the state level was computed and is presented in Table 6.5. The total demand consists of both household demand (direct demand) as well as indirect demand. Indirect demand arises mainly from consumption other than from the households - from industrial uses, use on account of seed, feed, wastage, etc. It is found that the demand for milk in Kerala was relatively high at the level of 2,794.5 thousand tonnes and that for egg and meat were 2,188 million numbers and 456.6 thousand tonnes respectively.

Table 6.5: Base-year Demand for Major Animal Proteins in Kerala, 2009−10

Commodity	*Per capita household consumption (kg/capita/ annum)*	*Total household demand ('000 tonnes)*	*Indirect demand ('000 tonnes)*	*Total demand ('000 tonnes)*	*Production# ('000 tonnes)*
Milk	40.2	1,369.3	1,425.2	2,794.5	2489.0
Egg*	42.1	1,433.0	755	2188.0	1571.2
Meat	5.6	191.8	264.8	456.6	333.2

Notes: *Per capita demand of egg expressed in numbers and total demand (household, indirect and total) in million numbers.

Corresponds to BE 2009−10.

Source: Computations by NCAER

6. 4.14 It was observed that production fell short of demand in all major livestock product categories. In comparison to crops, Kerala has been at a higher level of self-sufficiency in livestock products. However, it sourced nearly 11 per cent of its milk, 27 per cent of its meat, and 28 per cent of its egg demand from other states in the year 2009−10.

6.5 Demand and Supply Projections and Future Scenarios of Self-sufficiency[17]

Milk

6.5.1 Growth rates in Value of Product (VOP) by livestock products are projected for the period up to 2030. These projections are based on four alternative sets of assumptions regarding the growth rates in in-milk animal population and milk yield per animal. These assumptions are provided in Table 6.6.

Table 6.6: Alternative Growth Scenarios in the Number of In-milk Animals and Milk Yield per Animal in Kerala (%)

	Scenario	*Assumed trend growth rates (%) in*

[17] Please look at Appendix A.5.1 for the assumptions behind supply and demand forecasts.

		Number of in-milk animals	*Milk yield/animal*	*Total supply*
Crossbred cows	Base-line	−3.32	2.31	-1.01
	Interventionist	0.00	2.31	2.31
	Optimistic	1.22	2.31	3.53
Non-Descript cows	Base-line	−5.54	0.77	-4.77
	Interventionist	0.00	0.77	0.77
	Optimistic	2.90	0.77	3.67
Buffalo	Base-line	−6.34	−0.07	−6.41
	Interventionist	0.00	−0.03	−0.03
	Optimistic	2.99	0.00	2.99
Goat	Base-line	−2.06	1.81	−0.25
	Interventionist	0.00	1.81	1.81
	Optimistic	0.85	1.81	2.66

Source: Computations by NCAER

6.5.2 The projections suggest that if the current growth trend in the number of in-milk animals and milk yield continues to be the same in the future, total milk production would decline to 1,913.7 thousand tonnes by the year 2030 from the present level of 2,489 thousand tonnes. The main reason for this would be the declining number of animals in all the categories, the pace of which would mask the prospective improvement in milk-yield. By countering the reduction in animal population and maintaining the yield dividends through various institutional and technological improvements, milk supply in the state can be elevated to a considerable extent as is shown under the interventionist scenario. It is therefore, possible to expand production to 3,917.8 thousand tonnes if this scenario prevails and even to 5,145.2 thousand tonnes if the assumptions under the optimistic scenario are realised (Table 6.7).

6.5.3 Milk demand would escalate to 3,519.5 thousand tonnes by 2030, from the base year level of 2,794.5 thousand tonnes. Currently, Kerala is relatively self-sufficient in milk production with nearly 90 per cent of the milk demand being met from internal production. Under the business-as-usual scenario, milk production would decrease to the level of 1,913.7 thousand tonnes by 2030. If sufficient corrective measures are taken as indicated under the

interventionist scenario, Kerala could emerge as a surplus producer of milk within a span of two decades.

Table 6.7: Supply & Demand Projections for Milk in Kerala under Alternative Scenarios, 2010−2030

Year	*Projected Supply in '000 tonnes*			
	Base-line	***Interventionist***	***Optimistic***	***Demand***
BE 2009/10 (Base-year)	2,489.9	2,489.9	2,489.9	2794.5
2015	2,300.1	2,832.0	3,063.2	3,115.5
2020	2,159.1	3,154.2	3,640.9	3,293.0
2025	2,031.0	3,514.6	4,328.0	3,421.3
2030	1,913.7	3,917.8	5,145.2	3,519.5

Source: Computations by NCAER

Egg

6.5.4 As in the case of milk, the base-line projections of egg supply also indicate an emerging situation of excess demand. Egg supply slowed down in the last decade, with production declining from 2,044.3 million numbers in biennium ending (BE) 2000−01 to 1571.2 million numbers as given in Table 6.5 by BE 2009−10. Following this trend, the projections under base-line scenario anticipate a far lower supply of 688.2 million eggs by the year 2030 (Table 6.9). However, with minor interventions such as arresting the drop in number of layers and through better management practices for sustaining the egg yield growth (Table 6.8), supply can be raised to (interventionist) 2,169.6 million numbers within a span of two decades (Table 6.9). On an upper contour of production possibility that is supported by improvements in both layer population and per layer productivity (optimistic scenario), egg supply may reach 3,647.4 million numbers within the same time span.

Table 6.8: Alternative Growth Scenarios in Number of Layers and Egg Yield per Layer (%)

Type of animal	*Scenario*	*Assumed trend growth rates (%) in*		
		No. of layers	*Egg yield/layer*	*Total Supply*
Fowls	Base-line	−5.69	1.62	−4.07
	Interventionist	0	1.62	1.62
	Optimistic	2.6	1.62	4.22
Ducks	Base-line	−0.34	0.08	−0.25
	Interventionist	0	0.08	0.08
	Optimistic	0.1	0.08	0.18

Source: Computations by NCAER

Table 6.9: Supply and Demand Projections for Eggs in Kerala under Alternative Scenarios, 2010−2030

Year	*Projected Supply in Million numbers*			
	Base-line	*Interventionist*	*Optimistic*	*Demand*
BE 2009−10 (Base-year)	1,569.9	1,569.9	1,569.9	2,299.7
2015	1,234.2	1,721.1	1,992.2	2,715.8
2020	1,012.7	1,858.8	2,434.1	3,008.0
2025	833.4	2,007.9	2,977.9	3,219.6
2030	688.2	2,169.6	3,647.4	3,381.4

Source: Computations by NCAER

6.5.5 By 2030, the consumers in the state would demand a total of 3,381.4 million eggs. Going by base-line projections of supply, the self-sufficiency in egg production would drop significantly from the existing level by 2030. Even under the interventionist scenario, Kerala would not be able to maintain its current status of self-sufficiency. Therefore, Kerala will

have to shift from existing models of production to achieve its growth potential and meet the emerging growth of demand from its population.

Meat

6.5.6 Presently, Kerala meets 73 per cent of its meat demand from its own production. As of now, more than half of the total meat production in the state comes from the unregistered sector. Together (with the registered sector), they contributed roughly 333.2 thousand tonnes of meat in the year 2009−10 (Table 6.5). Unlike with milk and eggs, the statistics on meat shows that its production has increased substantially during the last few years. Between 2002−03 and 2009−10, meat production grew at an annual rate of 9 per cent in the state. However, calculations show that Kerala can sustain its present level of self-sufficiency even if this sector grows at a rate of 2.5 per cent annually. At a higher rate of 4.1 per cent per annum, it is possible to achieve 100 per cent self-sufficiency in this sector. Therefore, the focus now should be to devise means that can sustain the existing momentum of growth so that the presently thriving sector can be sustained in the long run.

Table 6.10: Demand Projections for Meat in Kerala ('000 tonnes), 2010−2030

Commodity	***2010***	***2015***	***2020***	***2025***	***2030***
Meat	483.0	582.1	652.2	703.3	742.5

Source: Computations by NCAER

6.5.7 Theoretically, there are three phases of growth in livestock population. In the first phase of growth, the quality of livestock is low. In order to respond to the growing dairy supply gap, efforts are made to increase the number of cattle and buffalo herds. In the second phase, emphasis is on genetic improvements and hybrid crosses intended to increase the milk output. In the third phase, milk producers adopt more efficient practices and experience economies of scale. Kerala seems to be in the second phase of growth and will have to aim at transitioning to the third phase.

6.5.8 The animal husbandry farms are facing shortage of labour. Further, the livestock sector is a source of instability of various ecosystems and contributes to environmental problems. Greenhouse gas emission from livestock production and the consequent waste, and from pastures expansion into forests are major contributors to climate change. The presence of livestock affects bio-diversity and water quality. It is also a major consumer of energy and water. The challenge before the policy makers would be to maintain balance between growth on the one hand and environmental balance on the other.

6.6 Strategy Framework

6.6.1 Vision

"The livestock sector will be efficient, safe, and sustainable—ensuring better lives through livestock rearing. It will be competitive not only nationally but also on the international stage."

6.6.2 Mission

- Improving the sector's competitive position, including profitability and efficiency of the farm and enhanced competitiveness in dairy product markets, both formal and informal.
- Developing, adapting and promoting science-based practices.
- Supporting the smallholder sector to become more productive and more profitable.
- Incentivising the actors through the supply chain for ensuring the safety and quality of the product.
- Ensuring that the dairy sector develops in a socially and environmentally responsible manner.

6.6.3 Targets

- Self-sufficiency in supply to the local market, with fresh milk, dairy products, and meat.
- Meet internally about 80 per cent of the demand for eggs.

- Entry into export markets for milk products (cheese, for instance) and meat by 2030.

6.6.4 The strategic framework: Sustainable Dairy Farming

6.6.4.1 The new strategic framework will depart from the current policy framework, which treats this sector as a means of addressing rural livelihood. It will continue to place strong emphasis on people and communities, but within the wider context of farm production and productivity. While re-shaping the industry strategy, it must be clear that dairy farming's first priority must be to remain competitive. This means, producing safe and high quality dairy products at a competitive cost. At the same time, it must also take responsibility for the wider goals of environment protection, animal welfare, and people related outcomes. In a nutshell, sustainable livestock strategy aims at reducing the environmental footprint of farms, while improving milk production, farm profitability, and the well-being of people and animals involved. The new strategy will be five pillared.

Pillar 1: Enhance Competitiveness

6.6.4.2 The key constraints to improving productivity and profitability of milk production are common across the regions, namely: (i) feed availability, (ii) shortage of improved stock, (iii) insufficient knowledge of raising management skills, and (iv) access to affordable credit. A key element in addressing these constraints is to facilitate entrepreneurial initiatives, business linkages, and know-how to ensure competitiveness.

Action Plan 1: Adopt an enterprise-driven approach to development of the livestock sector

6.6.4.3 The sector has been perceived in policy circles as a source of rural livelihood and not as a source of generating economic value. That perception poses risks around attracting talent and introducing new practices and innovations. It is therefore important to change the way this sector is looked upon. Recognising the market opportunities associated with this sector, the perception will be to modernise the sector and upgrade its status. This will require transformation of small livelihood family farms in Kerala into highly competitive market-oriented small to medium sized family farms. At the same time, encouragement will

be given to the establishment of large commercial farms, at least one in each district. At present, the classical co-operative model is dominating the organisational structure of the sector. But many of the developing countries (even Anand co-operatives) have now moved beyond the classical co-operative models to introduce commercial and competitive elements. The co-operative sector now faces stiff competition and is starting to lose ground to more nimble competitors that are more professionally managed. The co-operative sector is responding by adapting its business model and legislation to the New Generation models. In India, co-operative forms of enterprises can now be registered as producer companies under the Company law. Many co-operative societies (including Anand) have been in the transitional phase. There is need to promote producer companies in the livestock sector in Kerala also. Graduation from subsistence, smallholder milk producers to small, commercial dairy farmers will be fundamental to actioning the strategy. Some of the alternative organisational approaches have been provided in Box 6.1.

Box 6.1: Selected successful, smallholder dairy chain business models in the countries studied include:

(1) **Contract farming model**: The processors remain a key driver of the dairy industry, with constant reinvestments in and diversification of the product portfolio. Private sector-smallholders are linked with them through contract farming, e.g. Pakistan (Halla and Haleeb models), Sri Lanka, andVietnam.
(2) **China dairy park model**: Dairy parks are developed by large processors, and are used by smallholders to keep and milk their cows. Number of cows in the Parks range between 300 to over 1,000, which are financed either by the processors, the local authority, or the smallholders themselves.
(3) **Philippines dairy zone model**: Essentially it is an enterprise-driven model that transforms smallholders into dairy farming entrepreneurs. Zones consist of around 100 smallholders, with about 300 dairy animals located in adjacent villages served by a processing plant located within a 30 km radius of an urban centre that is capable of absorbing 300 to 500 litres per day. This enables economies of scale for dairy input and output service providers.

Source: International Food Policy Research Institute

Action Plan 2: Paradigm shift in Sourcing of animals: Local is better

6.6.4.4 Kerala has a high share of crossbred cows amongst the livestock population. This may be adding to the demand pressures of fodder. Available literature recommends locally sourced animals for best productivity. The local Kerala cow may take longer to attain puberty and its inter-calving period may be higher than that of the crossbred cow, but the local cow is ecologically and fiscally sustainable in the long run. Breeding between local cows and cross-bred cows may also be encouraged. Artificial insemination techniques may help in local Kerala cows to reproduce faster. Locally produced goats, pigs, and ducks also may be reared. Further, one may examine from a long-run perspective whether buffaloes can be reared in Kerala for their milk, which fetches a higher price than cow's milk.

6.6.4.5 The role of the policymaker is very important in giving guidance to farmers and educating them about short run and long run consequences of breeding a particular breed of animal.

Action Plan 3: Increase fodder production

6.6.4.6 To develop fodder production for animal feeding, the following measures are anticipated within the framework of that Agricultural Sustainable Development Strategy:

- Increasing the volume of locally produced fodder through increase in field fodder production and improvement in fodder ratio.
- Introducing mechanisms to promote efficient use of pastures, and ensuring technical assistance to lessees and owners of pastures for the improvement of vegetation cover, rehabilitation of ecological balance and provision of watering points for animals.
- Raising fodder production through large scale, dairy co-operative society-based, fodder development projects and by encouraging intercropping.
- Enhancing cattle feed production capacity, both by setting up new plants and by raising capacity of existing plants.
- Trying out locally available materials like jackfruits and banana stems as fodder.

Action Plan 4: Promote infrastructure, marketing and finance

6.6.4.7 The following measures are anticipated to promote infrastructure and marketing.

- Enhance market access through both formal and informal market channels to better meet consumer needs and affordability.
- Facilitate financial development of the sector, including investments by smallholders, SMEs, co-operatives, governments, NGOs, community organisations, and corporations, as well as by public investment in infrastructure and support services.
- Focus on enhancing feed production, particularly feed for pigs, goats, rabbits and ducks, as there is a marked shortage in availability of feed, and launch special projects to augment production.
- Support small and marginal farmers to get organic and locally produced certification to ensure higher prices for their produce. The process of getting certification is typically an expensive one. For example, support to encourage the rearing of Malabari goat for meat may cater to the local palette and thereby fetch a higher price.

Goat Farming and Buffalo Rearing

6.6.4.8 Rearing of Malabari goats is encouraged in Kerala especially in integrated farms. Buffalo rearing may also be adopted if found sustainable in Kerala. Buffalo milk gets a higher price than cow milk.

Backyard Poultry

6.9.4.9 Empirical evidence from around the world suggests that backyard poultry has the potential to uplift people, especially women out of poverty. However, backyard poultry may be particularly susceptible to diseases. The South Asia Pro-Poor Livestock Policy Programme, which is a joint initiative of the National Dairy Development Board of India and the United Nations Food and Agriculture Organisation, has identified and documented a range of good practices along the poultry supply chain in Bangladesh, Bhutan and India[18]. These include interventions related to the provision of inputs, management and improved husbandry

[18] Pica-Ciamarra, U. and M. Dhawan. 2010. *Small-scale Poultry Farming and Poverty Reduction in South Asia. South Asia Pro Poor Livestock Policy* Programme.
http://sapplpp.org/lessonslearnt/smallscale-poultry-farming-and-poverty-reduction-in-south-asia. December.

practices, health service delivery, and the marketing of live birds and eggs. Kerala may partner with this programme to encourage backyard poultry. Specifically, the interventions are:

- Sourcing of Birds: Local breeds are preferable, as exotic species require exotic feed. Supply chains may be developed for this. KSPDC has already implemented this practice through the practice of integrated farms.
- Access to animal health and veterinary supplies: While this point is discussed in general in the next section, provision of animal health workers (AHWs) has been identified specifically for backyard poultry, as this reduces mortality rate in poultry. "Usually, rural villagers, often semi-literate women, are trained to provide vaccinations, de-worming, and first aid to poultry, small ruminants and large ruminants and are given access (for free or for a fee) to basic equipment and vaccines/drugs. These animal health workers (AHWs) charge a small fee for their service. The fee is affordable for farmers because AHWs live locally (reduced transaction costs) and have less income expectations than fully trained veterinarians or animal health assistants. The income derived from the provision of small animal health services, however, cannot be a primary source of livelihood for AHWs, who need to also rely on other sources of income"[19]. This is an area where *Kudumbashree* can play a strong role together with the KSPDC.
- Feeding and Housing Birds: Small changes in feeding like adding crushed snail shells available in fish ponds to poultry feed (as a source of calcium) or rearing termites in earthen pots (as a source of protein), and changes in cropping pattern, which result in the availability of crop residues, all increase the quantity and quality of feed for poultry birds and, hence, their productivity. This also is in consonance with the concept of developing integrated farms as proposed earlier in the Agriculture chapter. For housing birds, using low cost locally available material like bamboo, paddy straw, rice husk, and mud paste assures compliance with bio-security measures and keeps the birds away from the house.
- Livestock Extension Services
- Livestock Marketing Services

[19] Pica-Ciamarra, U. and M. Dhawan. 2010. *Small-scale Poultry Farming and Poverty Reduction in South Asia. South Asia Pro Poor Livestock Policy* Programme. http://sapplpp.org/lessonslearnt/smallscale-poultry-farming-and-poverty-reduction-in-south-asia. December.

Slaughter Houses

6.6.4.10 A well-defined strategy for slaughter houses would include the following:

- Adopt Dutch standards for slaughter houses
- Regulating and monitoring policy for maintaining sanitary conditions and the quality of the meat
- Setting up of physical infrastructure with mechanised slaughter houses
- Waste Management and disposal policies and setting up of physical infrastructure accordingly. Solid waste may be re-used for fertiliser wherever possible.

Pillar 2: Attract the best talent

6.6.4.11 Dairy farming currently has a low social and economic status. As a result, this activity does not attract talent. Economic intuition tells us that when the returns are higher than the costs, this will automatically attract people to take up jobs. The challenge is to make the sector remunerative. Currently, the production structure is dominated by smallholders whose principal activity is agriculture or by workers from marginalised sections of society. The strategy of facilitating livestock extension and development can be a deliberate and creative development vehicle that is sensitive to the needs of smallholders. Initially, livestock extension must be channelled through the existing extension services. The Food and Agricultural Organisation is promoting a strategy, wherein a small, multi-disciplinary task force is used within a selected area to promote livestock production through a combination of training and development activities. With Dutch bilateral assistance, the International Poultry Centre in Indonesia has taken its extension staff and farmer-training programme out of the Centre. Training is now being undertaken with small training teams in selected districts. The training teams travel around and hold training sessions for both farmers and extension staff in the villages, using village facilities. This is believed to be an extremely promising exercise that should be examined closely.

6.6.4.12 A few countries have developed successful, hands-on, knowledge-based, vocational training facilities. These are sustained, for example, by incentives provided by the public and private sectors. Others have developed outreach training systems, including farmer-to-farmer

learning that take training out to smallholders close to their homesteads and farms. This is particularly effective for disseminating improved technologies and promoting hygienic milk production, both vital elements of competitive market access.

6.6.4.13 India has followed the former approach of formal training in dairying. Courses in dairy development are well structured. Graduate and post-graduate courses are offered in this area. Over time, training to small and big holders in this sector will have to be mainstreamed by:

- Developing state-of-the-art, vocational training courses for best practices and models, including course material and practical lessons, which are sustainable and provide incentives for trainers and trainees.
- Introducing management courses in animal husbandry and dairying for increasing the number of qualified plant managers, quality control and product development officers, and AI technicians to be made available to growing enterprises.
- Developing short- term programmes that would include a pool of successful dairy entrepreneurs and plant managers who can be tapped as trainers or visiting coaches for promising dairy enterprises.
- Administering Entrepreneurial courses (EDCS).

6.6.4.14 Further, the approach of direct training through Farmers' field schools also need attention.

Box 6.2: Enterprise-oriented vocational training in Dairying in Mongolia

A permanent capacity building facility – the National Dairy Training Centre – was established within the campus of the Food Technology College, under the Ministry of Education. Six basic training modules were developed in the Mongolian dairy chain model. The Centre is equipped with: (i) state-of-the art adult learning and teaching aids, (ii) a commercial demonstration dairy plant, (iii) a mobile outreach training unit, (iv) a dairy product development facility, (v) a milk and dairy products quality control laboratory, and (vi) a small technical library and course administration office. Existing staff from the College was re-trained as core vocational trainers to run short residential and outreach courses. Other specialists from the private and publics

sectors were also trained as key trainer members of the Dairy Training Team, led by the College Training Manager. They also act as advocates out in the field for the training programme, now part of the current ten-year National Dairy Programme (2007−2016). The demonstration dairy is run on a semi-commercial basis and currently provides milk and dairy products to 600 school children in Ulaanbaatar under the Government's School Lunch Programme. Outreach training focuses mainly on enhancing milk production, productivity, including milk producer organisation, feeding, breeding and clean milk production, and involves tailoring the training session to each location.

Source: Improved market access and smallholder dairy farmer participation for sustainable dairy development prepared by Common Fund for Commodities- Animal Production and Health Commission for Asia and the Pacific Food and Agriculture Organisation ,United Nations (2008)
http://www.fao.org/ag/againfo/themes/documents/dairy_dev_strat.pdf

Promote the formation of farmers' associations along the lines of industry chambers

6.6.4.15 These chambers make a remarkable contribution in uplifting progression of business of its members. They help the business community to meet and find solutions to their problems and safeguard their interest. They can be instrumental in promoting information exchange on markets, best practices, and new technologies.

Pillar 3: Social welfare

6.6.4.16 ***Action Plan 1: Improve and maintain safety and quality and minimise losses***

- In order to strengthen the quality of the dairy co-operatives in the state, it is proposed to expand the infrastructure base of the societies for milk procurement by creating better cold chains.
- There is a need to design and establish common facilities and networks of resources at the state level that would enhance quality control.
- It is necessary to develop research programmes in improving safety and quality of livestock items. Kerala can draw on the experiences of the developed countries.

Australia, for instance, is one of the most food- safety conscious countries. It conducts a Microbiological Food Safety Research and Development Programme, which is designed to develop a sound scientific basis for food safety and microbiological risk management. It places importance on identifying knowledge gaps for food safety risks along the supply chain and conducting research to improve the understanding of food-borne hazards and maintain the status of Australian red meat as safe and healthy.

- Finally, it is proposed to create fair and transparent pricing systems with incentives to deliver quality milk.

Action Plan 2: Implement a livestock production identification programme

6.6.4.17 Livestock producers should be required to register a unique property code, formally assess their production and husbandry systems, and maintain accurate records to monitor the quality of products. The programme may also involve independent audits that are conducted to ensure the maintenance of the integrity of the programme.

Action Plan 3: Encourage accreditation and standards

6.6.4.18 An organisation responsible for quality standards and accurate description of livestock products may be set up. This organization will develop, maintain, and review accreditation standards to protect the industry's reputation and integrity in relation to sales, distribution, and exports.

Pillar 4: Animal welfare

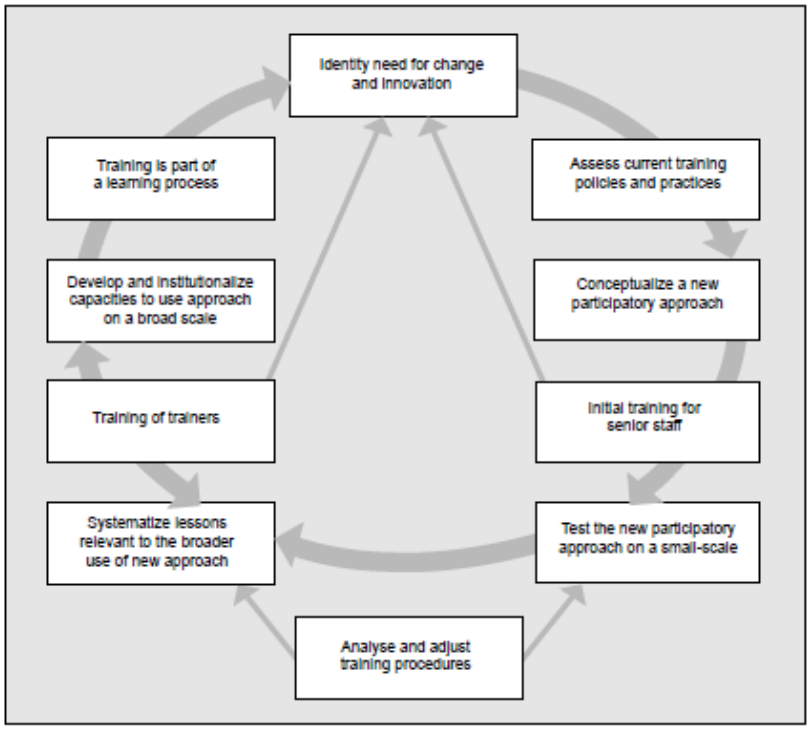
6.6.4.19 ***Action Plan 1: Strengthen veterinary services and up-keep of animals***

- Strengthen veterinary services and up-keep of animals through introduction of a veterinary doorstep service and by improving the facilities of veterinary hospitals and laboratories
- The state should ensure the protection and reproduction of the environment and the reasonable utilisation of natural resources. There will be a statewide

programme for animal identification and recording. The upkeep and safety of animals depend on the availability of a comprehensive system of animal identification and registration to improve livestock health and breeding systems.

- There is a need to deliver veterinary services to rural areas. Community- based animal health delivery systems are successful in improving health delivery services[20]. Information- based infrastructure also will be useful, especially in Kerala where mobiles can be used to deliver information and train small & marginal farmers[21].
- An institutional learning process should be set in place. Figure 6.4 shows the conceptual framework.

Figure 6.4: Institutional Learning Process and Training Cycle



Source: Thompson, J. 1998. Participatory approaches in government bureaucracies: facilitating institutional change. In J. Blackburn and J. Holland, eds. Who Changes? *Institutionalising participation in development*. London, Intermediate Publications cited in Animal Production and Health Division, FAO Agriculture Department. Improving Animal Health for Poverty Reduction and Sustainable Livelihoods. FAO Animal Production and Health Paper 153. ftp://ftp.fao.org/docrep/fao/005/y3542e/y3542e.pdf.

[20] Leyland, T. and A. Catley. 2002. Community-Based Animal Health Delivery Systems: Improving the Quality Of Veterinary Service Delivery. Paper prepared for the OIE Seminar *Organisation of Veterinary Services and Food Safety* World Veterinary Congress, Tunis, September 2002.

[21] Animal Production and Health Division, FAO Agriculture Department. 2002. *Improving animal health for poverty reduction and sustainable livelihoods*. FAO Animal Production and Health Paper 153. ftp://ftp.fao.org/docrep/fao/005/y3542e/y3542e.pdf.

Action Plan 2: Legal framework

6.6.4.20 It is required to have a legal framework to protect animals. There are to be legal instructions outlining the requirements for physical personnel and legal entities that deal with pedigreed animal breeding and procedures for reproduction of pedigreed animals. The law regulates the intensification of livestock breeding, receiving of pedigreed materials, creation of new pedigreed types of farm animals, conservation of their reproduction and utilisation, as well as the protection of critically endangered pedigreed types. There should be a regulatory system of veterinary medicine, related veterinary services and feedstock to protect animals from contagious and non-contagious diseases by applying preventive, anti-epidemiological measures, and mandatory diagnostic and hygienic measures.

Action Plan 3: Mechanised sanitation of animals

6.6.4.21 This sector has undergone technological revolution in terms of highly sophisticated machinery designed for the sanitation of cattle. These are, for instance:

- Automated footbath: Maintains an effective, environment- friendly hoof care programme.
- Feedtech Silage: Contains a range of products, which are tailor-made for different silage crops.
- Frequency- controlled vacuum pumps: Constant vacuum stability for smooth milking can improve cow udder health.
- Chlorinated alkaline detergent: This is used for cleaning milking installations.
- Herd Navigator: It is an analysis system, which identifies every milking cow in need of special attention.
- Hoof care disinfectant.
- Swinging cow brush: Swinging cow brush (SCB) starts to rotate on contact, at an animal friendly speed.

6.6.4.22 There is a need to enhance awareness and availability of these technologies and equipments through direct farmers' education.

Disease control programmes

6.6.4.23 A healthy livestock sector depends upon the health of the livestock. Considering that the livestock mortality rate is high, the State will undertake disease control programmes. This will also require focus on R&D to identify the causes and control methods.

Pillar 5: Environment:

6.6.4.24 This pillar highlights the need to preserve the natural heritage of Kerala through proactive environmental stewardship and wise use of natural resources in this sector. The major environment related issues of this sector are nutrient contamination of soil, groundwater pollution, surface water eutrophication, ammonia emissions, and loss of biodiversity. However, it is important to recognise that many of the complex relationships between the livestock sector and its impact on environment are not fully appreciated, even in developed countries. The most 'forward' examples of measures being taken to address the pollution problems can be perhaps drawn from the Netherlands and Denmark. In both the countries, pollution problems from intensive agriculture (mostly dairy farming and pig farming) have been an important target for many years and measures have been adopted to address the problem. These are widely perceived to have been reasonably successful. In Denmark, mandatory controls apply to almost all farms. In the Netherlands, however, the degree of compulsion is considerably lower.

6.6.4.25 Better management of nutrients, waste, and water may be one of the practical policy options in this direction. This can be achieved through training, R&D and mechanisation, and integrated farming systems.

Training and spreading awareness

6.6.4.26 The success of measures to reduce environmental impact through voluntary codes and legislation essentially depends on the awareness of the issues by farmers. Specific training and use of advisory services may raise the level of awareness of the agriculture/environment interactions on dairy farms. The provision of additional

environmental awareness training could be incorporated within the existing extension service provisions that are mainly funded at the central level with reasonable ease.

R&D and mechanisation

- Promote a Kerala Dairy R&D Centre, emphasizing outcome-based research. It may be set up in public- private partnership mode to design improved processes and develop product portfolio.
- Promote mechanisation in this sector, which ensures higher productivity and, better environment. Feed stations, for instance, conserve resources by regulating cows' feed. When a cow enters the station, the processor identifies her by an electronic transponder around her neck. Because the processor calculates every animal's daily ration continuously around the clock, it can immediately assess if the cow should eat, and how much. The station then blends and dispenses the feed right to the cow's mouth at a speed predetermined to match her eating speed. Similarly, pre-cooling transfers heat from the milk and cools it significantly before it reaches the cooling tank.

Promotion of Integrated farming

6.6.4.27 As discussed in the previous chapter, integrated farming has been successful in demonstrating how intensive growing systems can use organic and sustainable farming practices, while yielding high productivity. It integrates all the segments of the primary sector, namely crops, livestock, aquaculture, and forestry, and manages them as an ecosystem. This system comprises:

- Crop mix
- Fodder crops and tree production
- Livestock
- Bio-digesters
- Vermiculture
- Aquaculture

6.6.4.28 Integrated farming also has the additional advantage of providing cheap fodder to animals. As shown earlier in the poultry study, crop residue can be fodder for the animals. There is a cycle - like cow pee adds to the fertility of the soil and greater productivity means more output, which can then be diverted for fodder. Paddy cultivation may prove to be more remunerative if animal husbandry is combined with that.

6.6.4.29 The agro- ecological zone and the agro- ecological unit based approach for the development of livestock sector is followed for augmenting income of farmers.

6.6 Conclusion

6.6.1 Demand for protein food is forecasted to increase over the next twenty years. Kerala's strategic way forward involves changes which would improve the productivity while maintaining environmentally sustainability. Marketing its products to both within the state and outside the state is crucial. This involves heavy investment in physical infrastructure so that the state can improve the value-added of its products. At the smaller scale, people need to be trained to increase productivity and to learn sustainable practices. Again they need to be linked to marketing networks so that they can reap increased benefits of their efforts. Standard codes, integration farming techniques and waste management techniques are critical for the development of this sector. This will raise the demand for food: "Made in Kerala".

CHAPTER 7

FORESTRY: A SUNRISE SECTOR

Forests are vital for sustaining the life support systems on earth. The share of forests in total area is higher than the rest of India. The key challenges in forestry are that the share of forestry in total GSDP has been declining continuously. Moreover, there is a high share of plantations and declining trend in the "growing stocks". Thus, the strategy will draw on the principle of sustainable forestry development. Reserved forests have to be preserved for ecological balance and therefore should be protected with no conversion allowed. The goal is to improve both the quantity and quality of forests by adopting and adapting newer and better technologies, better forest management techniques and creating new products out of both forest and non-forest produce. Forests will have a multi-functional role in Kerala having a beneficial impact on the lives of people.

7.1 The key issue

7.1.1 There is a growing recognition all over the world that forests are vital for sustaining the life support systems on earth. Concerns over climate change, escalating energy prices and deepening water deficits have moved forestry into the spotlight of global and national development. The crucial role of forests in an effort to mitigate climate change has in recent years become the central issue in the global forest-related dialogue and policy processes. However, forest resources are of great importance not only due to their eminent contribution in maintaining ecological balance but also in promoting economic and social development. Forests play an important role in economic and social development in terms of their contribution to Gross Domestic Product (GDP), employment, and livelihood of the poor people, who are mainly dependent on forests. Besides, they are also the main source of meeting food, fuel, and fodder and timber requirements of the forest dwellers. This calls for re-orientation in the focus from forest conservation to achieving the following three objectives:

- Harnessing the potential of forests to promote growth;
- Empowerment of rural communities; and

- Protecting vital local and global environmental services and values.

A critical issue is how to manage forest resources for sustainable development.

7.2 An assessment of forest resources

7.2.1 Historical Review

7.2.1.1 Kerala has a long history of forestry which started right from the 19th century. Initially the British came down for the timber especially teak, rosewood and cardamom to export it to the United Kingdom[1]. The British appointed the first conservator in 1840 to extract timber and placed tax on forest products like cardamom and wax. The Indian Forest Act was enacted in 1865 and a forest school was set up in Dehradun in 1878. The Travancore Forest Act came into force in 1887.Konni in the Panthanmthitta district was declared as the first Reserve Forest in 1888 (October 9) under this Act. More areas were declared as Reserve forests in 1889. Mr. T F Bourdillon was appointed as the Conservator in 1891 who prepared the 'Report of the Forests of Travancore' in 1892. Large scale planting of teak was started during this period.

7.2.2 Forest area

7.2.2.1 An area of land recorded as forest in revenue records or proclaimed to be forest under a forest law or Act is defined as forest. This is officially recorded as "recorded forest area". The recorded forest area is categorised into "Reserved Forest", "Protected Forest" and "Un-classed Forest". While reserved forests are fully protected, protected forests are accorded partial protection. An un-classed forest is an area recorded as forest but not included in reserved or protected forest category. Ownership status of such forests varies from state to state.

7.2.2.2 The Forest Survey of India (FSI) which has been undertaking assessment of forest area and forest cover in the country since 1987 on a two-year cycle shows that the total recorded forest area at the national level increased, between 2001 and 2011, by 1,076 square kilometre

[1] Kerala Forests and Wildlife Department website. http://www.forest.kerala.gov.in/

(sq km) from 7,68,436 sq. km to 7,69,538 sq.km (Table 7.1). Over 21 per cent of this increase was accounted for by Kerala alone where the area under forests increased from 11,222 sq. km. to 11,265 sq. km. (28.1% of the land area). Another important observation to be made is that at the national level almost 55 per cent of the total forest area is reserved while 28 per cent area is protected. The rest comes under un-classed forests. In Kerala, over 98 per cent of the forest area is recorded as reserved forests. There are no un-classed forests. The final observation is that the increase in forest area at the national level over the past decade was essentially due to increase in un-classed forests. The area of both protected and reserved forests declined. In contrast, in Kerala, the expansion in forest area was due to reserved forests.

7.2.2.3 In reserved forests of Kerala there are five National Parks -Silent Valley National Park, Eravikulam National Park, Pampadum Shola National Park, Anamudi Shola National Park and Mathikettan Shola National Park. Apart from this, there are 11 Wild life Sanctuaries, 2 Bird Sanctuaries and a Tiger Reserve - Periyar Tiger Reserve.

Table 7.1: Recorded forest area in Kerala versus All India, 2001 and 2011

Region	***Year***	***Total area***	***Reserved***	***Protected***	***Un-classed***	***Total recorded***	***Share in total area (%)***
Kerala	2001	38,863	11,038	183	0	11,221	28.87
	2011	38,863	11,123	142		11,265	28.99
India	2001	32,87,263	4,23,311	2,17,245	1,27,882	7,68,436	23.38
	2011	32,87,263	4,22,536	2,13,982	1,33,020	7,69,538	23.41

Source: Forest Survey of India

7.2.3 Forest cover

7.2.3.1 Forest cover consists of all lands having tree canopy density of more than 10 per cent can be interpreted from satellite data. Forest cover in this assessment is interpreted from digital data obtained from remote sensing satellites IRS 1C/1D. The area included within forests, therefore, is determined by the resolution and limitations of its sensor. Taking into

account the spatial resolution of the data from sensor and technical limitations inherent in data processing, forest cover up to 25 hectares (ha) could be included prior to 2001. Since 2001, there has been technological upgrading and forest cover down to 1 ha only can be assessed. Thus the forest cover since 2001 includes all land which has a tree canopy density of more than 10 percent when projected vertically on the horizontal ground with a minimum area extent of one hectare. It covers all land irrespective of its ownership, land use and legal status. Thus, all land with tree crops, such as agro-forestry plantations, fruit orchards, tea and coffee estates have been included in forest cover.

7.2.3.2 The forest cover at the central level is classified into three major categories: dense forests, medium, and open forests. These are defined below:

- **Dense forests:** Dense forests include all lands with a forest cover of trees with a canopy density over 70 per cent.
- **Moderate forests**: These forests include all lands with a forest cover of trees with a canopy density between 40−70 per cent.
- **Open Forest:** All land with a forest cover of trees with a canopy density between 10−40 per cent is covered under open forest.

7.2.3.3 Table 7.2 shows state wise forest cover by type and magnitude as reported in the biennial reports of the Forest Surveys of India. Forest cover of India as per the 2001 report was 6, 75,538 km which increased to 6, 92,027 km by 2011. In Kerala, an average of 40 per cent of the area is under forest cover against the national average of 20.5 per cent. The National Forest Policy (1988) has laid a target of 33 percent of the geographical area to be brought under forest cover and the State has far exceeded this target. A sudden jump in the area under forest cover between 2005 and 2007 can partly be attributed to improvements in the assessment methodology. While at the national level it increased from 20.6 per cent to 21 per cent, in Kerala it jumped by 4.6 per cent from 40 per cent to 44.6 per cent. Notably however, Kerala’s share of open forest is almost twice that at the national level.

Table 7.2: Forest cover: All India versus Kerala, 2001 to 2011

	All India				*Kerala*			
	Area under forest (sq. Km)	***Dense and moderate (% share)***	***Open forests (% share)***	***Total (% share)***	***Area under forest (Sq. Km)***	***Dense and moderate (% share)***	***Open Forest (% share)***	***Area under forest (% share)***
2001	6,75,538	12.68	7.87	20.55	15,760	30.29	9.75	40.04
2003	6,78,333	11.88	8.76	20.64	15,577	24.77	15.31	40.08
2005	6,77,088	11.78	8.81	20.60	15,595	24.86	15.27	40.13
2007	6,90,899	12.25	8.77	21.02	17,324	27.93	16.65	44.58
2009	6,92,394	12.28	8.78	21.06	17,324	27.93	16.65	44.58
2011	6,92,027	12.30	8.76	21.05	17,300*	27.88	16.63	44.52

Note:* Adding scrubs (58 square km) and non-forest area of 21,505 square km to 17, 300 square km brings the total area under forests to 38,863 square km.

Source: Forest Survey of India, various issues

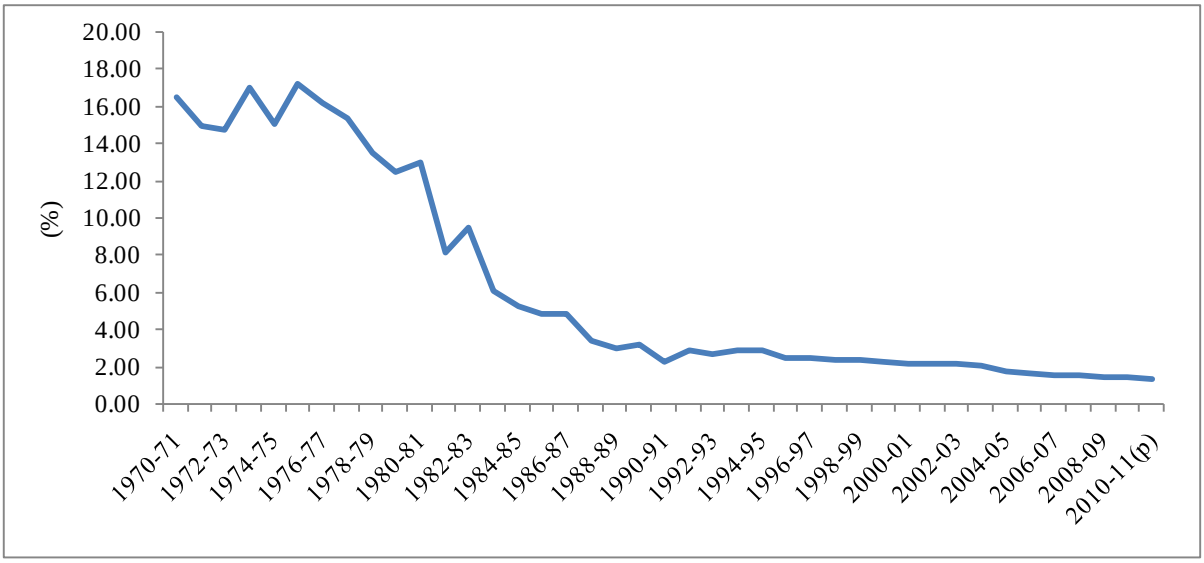
7.2.3.4 Over 51 per cent of the total state forest cover is in the southern districts and the remaining 49 per cent is in the central and northern regions. Wayanad, Idukki and Pathanamthitta districts have the largest area under forest cover. Alappuzha is the only district with little area under forest cover. Much of the forest cover of Kerala is spread over the Western Ghats. The Western Ghats, a sizeable portion of which is in Kerala, is one of the 34 global hotspots of biodiversity in the world and is considered to be a repository of endemic, rare and endangered flora and fauna.. There are about 550 species utilized as Non-wood Forest Products (NWFP). Teak and eucalyptus have been the principal forest plantation species.

7.2.4 Value added from forests

7.2.4.1 Forests produce services and goods that are vital for ecological stability and important for the well-being of an economy. In Kerala, value addition from forestry grew at a negative rate from 1970−71 through to 1989−90. In 1990−91, its growth shot up to 32 per cent. Since

then it has been growing at a rate of over 2 per cent. However, since the growth rate in the rest of the economy is rather high, the share of forestry has been declining continuously. It contributed as high as 16.5 per cent of GSDP in 1970−71 which declined to a mere 1.3 per cent by 2010−11 (Figure 7.1).

Figure 7.1: Contribution of Forestry and Logging to Kerala's GSDP (%), 1970−71 to 2010−11



Source: Directorate of Economics & Statistics, Kerala

7.2.4.2 Notably, the GSDP for the forest sector is based on the commercial value of the saleable products from forests like timber, firewood and minor forest produce; and forest services. All the intangible benefits like carbon sequestration, soil and water conservation, biodiversity etc. are presently unaccounted for in the computation of GSDP and thus the contribution from forestry remains underestimated.

7.2.4.3 The share of forestry sector in the value of output of agriculture and allied services at the Kerala level went up from 10.6 per cent in 2004−05 to 17.4 per cent in 2008−09 before coming down to 12.4 per cent in 2010−11 at constant 2004−05 prices[2]. The share in the value of output from the forestry sector of agriculture and allied services has stayed stable at the national level: 9.8 per cent in 2004−05, 9.2 per cent in 2008−09 and 8.9 per cent in 2010−11.

[2] Central Statistical Office, Ministry of Statistics and Programme Implementation, Government of India. 2013. *Statewise Estimates of Value of Output from Agriculture and Allied Activities 2013*.www.mospi.nic.in.

7.3 The success factors

7.3.1 The Legal framework

7.3.1.1 Clearly, India, in particular Kerala, has shown impressive achievements in terms of forest conservation. This could be attributed to government efforts both at the centre and state levels. The Constitution of India assigns fundamental duties to the citizens of the country and directs states for conservation and protection of forest, wildlife and the environment. A well developed legal framework is in place at the national level. In addition, most states in the country have promulgated separate legislations to meet the specific requirements of the respective states.

7.3.1.2 In India, a formal Forest Policy for protection, conservation and management of forests has been in effect since 1894. It has been subject to revision from time to time. Early forest policies tended to consider timber production as the primary function of the forest. The Forest Policy 1952 recognized the protective role of forests and stipulated that the country should aim at having at least one third of its total land area under forests. However, development imperatives after independence resulted in large scale diversion of forests for agriculture and other developmental activities. In the early 1960s, imperatives of industrial development prompted governments to boost investment in large-scale industrial plantations for ensuring supply to wood-based industries. This diverted vast natural forests into fast growing pulp, matchwood, plywood and other economically important hardwood species. In the mid−1970s, "Forest" was shifted from the state list to the concurrent list in the Constitution of India due to emerging ecological needs. On the recommendations of the National Commission on Agriculture in 1976, increasing productivity and the concept of social forestry emerged as the major objectives. The diversion of the forests was restricted in 1980 when the Forest (Conservation) Act 1980 was enacted. It is a regulatory Act and maintains balance between development and conservation. It establishes the primacy of environmental and social service functions for forests, while placing clear restrictions on commercial logging. It was a milestone step in the direction of forest conservation in the country. Since 1980s, the Government of India has promoted plantations under agroforestry and social forestry plantation schemes. The plantation area in India is 32.57 m ha, which accounts for 17 per

cent of the global forest plantation and is the second largest in the world after China. The Constitution of India puts the responsibility of social forestry on local panchayats.

7.3.1.3 India had taken a revolutionary shift in forest management from a regulatory to a participatory approach with the promulgation of the National Forest Policy 1988. With this, ecological security became the prime objective and the focus was on providing livelihoods for forest dependent communities. It called for stopping timber supply to forest industry at a concessional-price and recognized the rights and concessions of the communities living within and around forest areas, specifically the tribal people. This policy re-introduced the concept of community-based forest management institutions. Under the policy, local communities were involved in the conservation, protection and management of forests through Joint Forest Management (JFM) institutions. In Kerala, the Joint Forest Management councils at the village level are known as Vana Samrakshana Samithis (VSS).

7.3.1.4 In 1996, through a landmark judgement on the diversion of forests by the Apex Court, all matters related to diversion of forests, irrespective of ownership, came within the purview of the government. Besides, for any land use change from the forest category, prior concurrence of the central government was made mandatory. The stipulated mandatory provision of compensatory afforestation and payment of net present value has made the diversion process more stringent.

7.3.1.5 The Environment Protection Act was enacted in 1986 for improving the environment of the country. A legal regime for biodiversity conservation came into force with the promulgation of national level legislation i.e. the Biological Diversity Act, 2002. Another milestone was achieved in 2006 with the enactment of the Forest Rights Act 2006. It strengthened the institutional framework of village forest institutions by restoring traditional rights of forest dwellers and maintaining the ecological balance with a view to provide sustainable livelihood options.

7.3.1.6 Thus, the forestry sector has been undergoing distinct stages of transition in the past. During the 1960's, wood production was much higher due to large scale conversion of natural forests to plantations as part of the Five Year Plans. The 1980's showed a rapid decline in

production due to stoppage of clear-felling and selection felling from natural forests. Production caught up later as plantations raised around four decades earlier were coming to maturity.

7.3.2 Vana Samrakshana Samithis (VSS): Village Forest Councils

7.3.2.1 India‘s National Forest Policy (NFP) of 1988 created space for community participation and establishment of village forest councils (VFCs) in the management of forest resources of the country in 1990. An increasing focus on people-cantered policies, bottom-up planning processes, and decentralised governance are some of the key characteristics of this new paradigm. In many southern states of India including Kerala, the VFCs are called Vana Samrakshana Samithis (VSS). Each village (hamlets/settlements) forms a VSS bearing the same name as the village. These Samithis function under the Forest Development Agencies (FDA). These FDAs are registered under Travancore-Cochin Charitable Societies Registration Act of 1955.

7.3.2.2 Government retains the main authority but shares certain responsibilities with local communities under state-specific arrangements. The VFCs in Kerala are responsible for the management and protection of forests, harvesting of forest produce, prevention of grazing, fire, theft or damage, reporting of forest offences to the forest department, assisting forest officials in distribution of returns from forestry operations; maintaining and operating a village account; undertaking development activities using financial resources generated from forestry activities etc. VSS, along with the forest department, nurture degraded forests and take up conservation activities under long term agreements; and apart from gaining employment, the VSS members are permitted to share the benefits of forest produce under the State Forest Policy. They pool in a share of their profits raised through eco tourism and sale of non-timber forest produce (NTFP) and spend them for the development of their village. In Kerala, all the members of the village community are members of the VSS. However, VSSs are run by the Executive Committee elected by the village community. The VFCs are emerging as an important mechanism for addressing forest health as well as for the wellbeing of forest inhabitants. This is discernible from acceleration in the growth rate of forestry GSDP in the post 1990−91 periods.

7.4 Challenges

A high share of plantations

7.4.1 During the 1960's, there was a large scale conversion of natural forests to plantations as part of Five Year Plans. The reports of the Kerala Forests and Wildlife Department shows that the actual forest area in the State during 2003−04 was 9,400 sq km which forms 24.19 per cent of the total geographic area in the State. Of this 2,817 km ^{2} (29.97 per cent) was covered by plantations. According to the Forest Survey of India reports, the share of plantations has been as high as over 37 per cent (Table 7.3). The national average is 5 per cent. Box 7.1 elaborates on this issue.

Table 7.3: Composition of Forest Area in Kerala (%)

Type of Forest	***2009***	***2011***
Tropical Ever Green	26.21	23.19
Tropical Semi Green	22.86	20.20
Tropical Deciduous Moist	18.14	16.15
Dry	2.29	2.05
Plantation	29.97	37.92
Others	0.53	0.50
Total	100	100

Source: Forest Survey of India

Box 7.1: Forest Area and Cover, Kerala Methodology

The problem with using remote sensitivity to measure canopy density is that plantations are also counted in as forests. The state level forest department uses detailed statistics at the local level to exclude the plantations out of the forest area. Kerala's forests come under the following Acts[3]:

- **Reserve forests:** The forest reserved under Section 19 of Kerala Forest Act and includes forests notified under Section 4 of said Act. It comprised of 81.14 per cent of total forest area in 2010−11 i.e. 9,176.3 sq km. There is additional 295.4 sq km of land that is proposed as reserve forests. It consisted of 2.6 per cent of the total forest area in 2010−11.
- **Vested forests**: Any forest vested in government under section 3 of the Kerala Private Forest (Vesting & Assignment) Act, 1971.
- **Ecologically Fragile Land (EFL):** EFL means any portion of land held by any person and lying contiguous or encircled by a reserve forest or vested forests or any other forest owned by the Government and predominantly supporting natural vegetation; and any land declared to be EFL by the Government by notification in the official Gazette under Section 4 of Kerala Forest Act.
- **Vested Forests and EFL** together comprised of 16.3 per cent of total forest area in Kerala in 2010−11 i.e. 1,837.8 sq km.

Therefore, Kerala Forest Statistics, 2011 show that the forest area (11,309.5 sq km) forms 29.1 per cent of the geographical area. There are eight divisions out of which the Southern division headquartered in Kollam has the highest share in forest area (21.7%).

Source: Kerala Forest Department. 2012. *Forest Statistics 2011*. Government of Kerala.

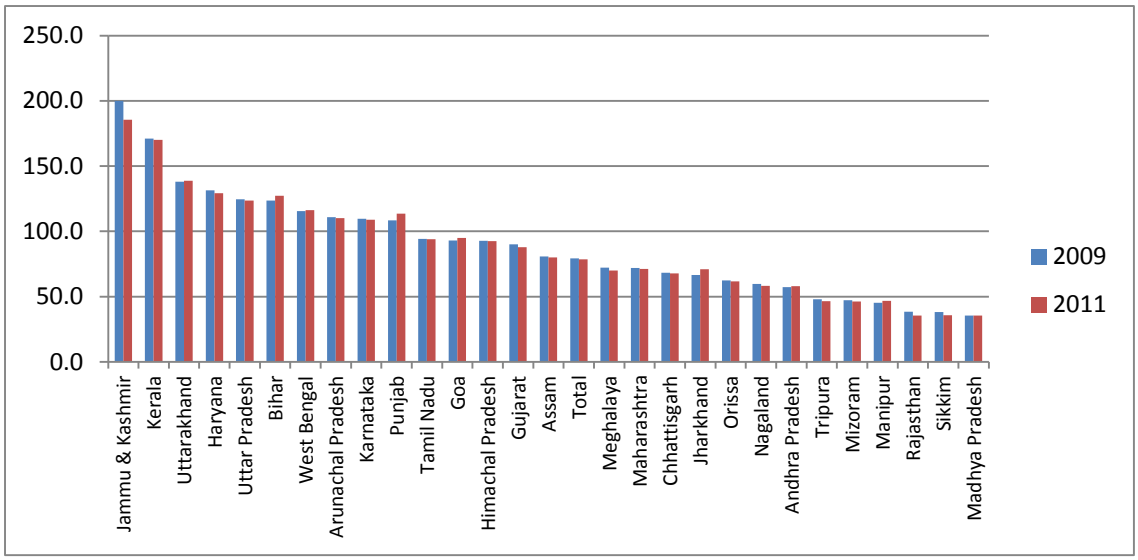
Decline in the "growing stocks"

7.4.2 The "growing stock" is a fundamental element in determining the productive capacity of the forest area. The knowledge of growing stock and how it changes over time is central to considerations of a sustainable supply of wood for products and the sustainability of the overall ecosystems that provide them. The growing stock (wood biomass indicating growing capital) of Kerala in forests/trees was estimated at 192.8 million m^3 with an average yield of 171 m^3/ha; it declined to 191.6 million m^3 (with average yield equal to 170m^3/ha) in 2011. In

[3] The source for this section is from the following reference and the definitions have been quoted from this document.

2010, the estimated total growing stock in the world's forest amounted to 527 billion m^3 with an average yield of 153 which is lower than that in Kerala. However, in some European and Latin American countries, it is as high as over 340 m^3 per ha. More worrisome is the fact that it has shown a declining pattern which is mainly due to non-recycling of biomass in forest soil, forest fire, grazing, over-exploitation, etc.

Figure 7.2: State-wise growing stock in India 2009 and 2011(million $m^{3)}$



Source: Forest Survey of India, 2011

Low production of timbers

7.4.3 Forest productivity in terms of annual production is also low. According to the Forest Survey of India Report, 2011, the total wood production from forests and outside forests is 1.7 million m^3 in Kerala, compared to a demand of 18.5 million m^3 (9%). Similarly only 15 per cent of the demand for fuel wood is met from forests. Wood comes from all parts of the world, even from South America. But the majority of the imported wood is sourced from Myanmar. Pincoda wood constitutes most of the import. People in north Kerala prefer this wood. In the south people prefer another variety that is called Violet.

Stagnation in the forest based industries

7.4.4 Major wood-based industries are sawmilling, packing case, plywood, splints and veneers, pulp and paper, etc. Of the total number of 2,214 registered units, 93 per cent are small-sized employing less than 10 workers. Examination of the year of inception of a cross section of the population showed that there has been stagnation in the growth of the industry with little or no addition in the number of units in recent times. This is largely because the Forest Department has stopped issuing NOC (no objection certificate) to new entrepreneurs. The recent liberalisation of rules on restricted felling of trees from homesteads has opened up avenues for more agroforestry options in the State. Home gardens and estates, particularly rubber plantations form the major source of wood supply in the state.

Shortcomings of VSS in Kerala

7.4.5 While VSS have made a substantial contribution to the health of forests in Kerala, the ambiguity regarding the recognition and legal status of *Vana Samrakshana Samithis* is considered a threat to institutional sustainability in the long run as they are treated as unregistered entities under the prevailing laws and rules of the country. VSSs are registered under the Forest Development Agency (FDA) and FDAs are legally recognised bodies with more of administrative and bureaucratic representation rather than village community participation. As of now, community stability depends mainly on economic benefits that are at the disposal of community members. The gender difference in benefit distribution may also hinder the institutional sustainability in the long run. It has also been observed that despite the increasing social harmony within the VSS, the social cohesion between the villages has declined due to boundary conflicts arising over demarcation of VSS land.

7.5 Sustainable forestry

7.5.1 Vision

7.5.1.1 The image of the forest sector tends to be that of a static, natural resource-intensive, mature sector. That vision will be replaced by a more dynamic approach. Forests will be a

sunrise industry contributing to the production of a continuous flow of desirable forest products and services without undue reduction of its inherent values and future productivity and without undue undesirable effects on the physical and social environment.

7.5.2 Goals

- Increase the share of forestry in GSDP to 0.5 per cent;
- Increase the productivity of forests through improved management of resources;
- Improve the forest resources in terms of increase in growing stocks to 345m3/ha;
- Combat the greenhouse effect and absorb carbon dioxide;
- Identify new technologies and implement them to make the sector dynamically more productive.

7.5.3 Strategic elements

7.5.3.1 The strategy will draw on the principle of sustainable forestry development. The key elements of the strategy will rest on four pillars.

7.5.3.1 Pillar 1: Increase productivity through improved management of resources

Action Plan 1: Promote new technologies to improve processes to use the potential of forests

7.5.3.1.1 The vision should be to expand, not reduce timber supply through a combination of enhanced productivity, improved forest management regimes and commercial programmes for private wood lot owners notably energy intensive ground wood pulp and paper mills. A wider perspective for forest biotechnology is needed that takes into account the huge challenges put forward regarding biodiversity and climate change. The three technologies – information and communication technology (ICT), biotechnology, and laser technology in inventory and monitoring – are likely to have revolutionary implications to the whole forest sector. Technological changes may alter forest industries, as well as forest management, utilisation, and growth. In North America and European Union countries, new forest sector-related technology programmes have been started in recent years. Forest bio-refinery

products and the merging of wood fibre manufacturing with ICT and nanotechnology can provide opportunities for new products, such as forest biomass-based biodiesel and wood fibre-based hybrid media products. Biotechnology has the potential to improve the quality and quantity of wooden raw material supplies in a long-term perspective and could also have a radical effect on pulping processes, waste-to-energy systems, and other aspects of the manufacture and use of forest products. Reduced costs and increased yields are the potential economic benefits of biotechnology, which implies that society could get more output from its expenditure of inputs.

7.5.3.1.2 New technologies and innovations applied to the forest sector are increasingly needed to enhance sustainability *through industrial transformation*, and *technological transitions.* The emphasis is on the development of new policies, institutional changes, and wide-reaching system changes that transform societies away from unsustainable patterns to sustainable ones. In North America and European Union countries, new forest sector-related technology programmes have been started in recent years. The forest sectors in these countries seek to innovate and re-direct their businesses in ways that provide new benefits from their forests. Typically, new technology is, to a great extent, developed in high-income countries, which are better placed for this development in terms of financial resources and scientific and technical know-how. That requires, in practice, a favourable institutional setting that encourages and endorses the flow of new knowledge and innovations through proper information channels, education and training, commercialisation by market mechanisms, and human and/or material resources support. This also puts the need for studying and analyzing technological development in developed countries. This is particularly relevant in the context of technology transfer from industrialised countries to developing countries. However, there is a clear need in developing countries to enhance their own technological capacity-building, and thus develop robust and competitive industries at the world level to allow them to face the challenges of building successful industrial branches and activities.

Action Plan 2: Better forest management

7.5.3.1.3 Coming under greater pressure, forests require more and more efficient means for growth and management. The Forest Service needs to be charged with protecting the inherent

capacity of the soil to sustain plant growth, and to monitor the consequences of forest practices to the end that this capacity is not endangered. Biotechnological applications using clone propagation, markers-aided selection and breeding, gene transfer, and beneficial microbes are already having an impact on how some trees are being bred, propagated, developed, and managed. It can contribute to increasing the efficiency with which we produce and use forest tree resource and thereby help make sure this resource is available for future generations. The transgenic method to improve plant growth, wood quality, and other aspects to be improved is one technique. Trees can be planted and consequently utilised in a much more effective way when their associated microbes are recognized to improve growth and ecological functions. Technological changes are having important impacts on the way forests are managed and on the various environmental and social services that forests provide. For example,

- **Biotechnology** has the potential to improve the quality and quantity of wooden raw material supplies in a long-term perspective and could also have a radical effect on pulping processes, waste-to-energy systems, and other aspects of the manufacture and use of forest products. Biotechnology could also have environmental benefits. Plants can be multiplied by clonal propagation and improved through gene transfer of valuable genes and the plant-microbe system. Thus technological innovation has made it possible to change the way in which, and where, tree species are grown. Increased use of biotechnology enables us to increase forest growth, introduce more climate-adaptable species, and facilitate pest management.
- **Phytotechnology** is beginning to offer efficient tools and environmentally friendly solutions for the clean up of contaminated sites, the development of renewable energy sources, and for contributing to sustainable land management.
- **Phytoremediation** is a way to remediate polluted environments by using plants to degrade, stabilize and remove soil contaminants. A combination of phytoremediation and microbial remediation, defined as rhizo-remediation is used to treat hydrocarbon-polluted soils. Phytoremediation and rhizo-remediation use woody plants to improve soil quality, and represent a more environmentally compatible and less expensive method to site restoration compared to traditional approaches. The management of today's forests has become increasingly complex.

In addition to timber production, new objectives of forest management have been introduced, such as preserving biodiversity, carbon sequestration, deforestation estimates, and creation of recreational opportunities, hunting considerations, and many others. Forest management decision support systems (DSS) have been developed to aid forest managers in their difficult tasks. At least 82 genera have been detected from a broad range of plants, including woody plants to contribute to the well being of the plant, acting as growth promoters synthesising phytohormones and enzymes, and by fixing atmospheric nitrogen. Potentially, they can protect the plant from pathogenic fungi by their anti-fungal activity.

- **ICT** which includes the design, development, implementation, support, and management of computer-based information systems also facilitates better forest management. In essence, the application of this technology deals with the use of computers and software to convert, store, protect, process, transmit, and retrieve information.

7.5.3.1.4 These and other technologies and innovations, along with their adaptation in the forest sector, have been closely related to general socio-economic development in recent times. There has been a growing need for these innovations, and their adaptation was encouraged by research and development (R&D) investments, policies, and entrepreneurial activities. Thus, the forest sector is continuously changing because of technological development and innovations. Technological development commonly increases productivity; that is, an increase in output per unit of input. This has been the case, for example, with the chainsaw (higher number of tree felling per man hour) and genetic engineering (higher tree growth per unit of land). However, technological processes may also produce unwanted results, such as loss of biodiversity, increased deforestation, and pollution. Another essential feature of technology is its dynamic nature. Forest management therefore needs to be updated.

Action Plan 3: Monitor the quantity and quality

7.5.3.1.5 Laser technology and precision forestry provide means to more accurately, more objectively, and more efficiently measure and monitor the quantity and quality of forest biomass. Precision forestry can be applied to increase the efficiency and information basis of

existing national forest inventories and operational forest management planning. In addition, precision forestry allows certification of wood origin, since the location of every stem is recorded by forest inventory and logging machines, and updated on to maps. Accurate information on stem dimensions and quality will aid in optimal cutting of stems, maximizing the value of the stem for both forest owners and raw material buyers, and result in better knowledge of the value of forest resources, both as a source for industrial raw material and as a provider of other services. Information obtained by laser scanning and digital photogrammetric images will be increasingly utilised. New technology allows a "Precision Forestry" approach. Precision forestry is a combination of methods by which it is possible to accurately determine the characteristics of forests, treatments, biodiversity preservation, or recreational opportunities at the stand, plot, or individual tree level, and to use individual tree level assessments for simulation and optimisation models of forest management. During the past ten years, three dimensional (3D) methodologies based on digital photogrammetry and laser scanning have experienced a major leap in conducting forest inventories and for evaluating their economic valuations and biomass and forest damage variables. Airborne laser scanning (ALS) has been shown to be an accurate remote sensing technique for stand-wise forest inventories. The current data acquisition and processing cost is less than that of conventional stand-wise field inventory. In addition to ALS, terrestrial laser scanning (TLS) and vehicle-based laser scanning (VLS) methods may provide measurements on individual trees in larger forest areas in the future.

7.5.3.1.6 Precision forestry technology is, however, comparatively expensive and its implementation requires human resources and institutions with the appropriate knowledge to use the technologies, all of which may be lacking in developing countries. Thus, technology transfers may be encouraged at the state level.

7.5.3.1.7 Technology can act as a catalyst that *destructs* old economic structures and simultaneously provides new opportunities that help to *create* new, more viable structures. An analysis of the development of information and communication technology shows that electronic media is replacing printing and writing paper consumption, and this, in turn, is resulting in the closure of pulp and paper mills. However, at the same time, the development of ICT clearly is essential for the advances that are taking place such as those in

biotechnology and precision forestry-based laser technology which are enhancing the prospects for the forest sector globally.

7.5.3.2 Pillar 2: Exploit economic opportunities

Action plan 1: Create new products

7.5.3.2.1 Forests have the potential to produce a wide range of bio-energy and bio-chemical products, most of these opportunities will be a commercial reality in the near future. The need is to take a strategic vision that forest products' manufacturing is an economically and environmentally sustainable growth industry. Forest products are a sunrise as opposed to sunset industry. Kerala can capture the greatest benefits from these opportunities related to bio-energies/bio-chemicals by promoting the forest industry. Bio chemical products include: acidulants, adhesives, agrochemicals, cosmetics, electronic chemicals, emulsions, flavours and fragrances, food additives, and industrial chemicals, pharmaceuticals, plasticizers, plastics, research chemicals, solvents, surfactants and petrochemicals fuel[4]. A bio-refinery is capable of producing one or several low-volume, but high value, chemical products and a low-value, but high-volume liquid transportation fuel or pulp product, while generating electricity (Box 7.2). It can process heat not only for its own use but also for sale of electricity. Other innovative products include: Lumber, Medium density fibreboard (MDFs), Particleboard, Engineered Lumber, Fabricated Structural Building Components, 2nd generation engineered wood product (EWPs), and 3rd generation Mechanical Publication Papers.

Box 7.2: Forest bio-refinery: An example of policy driven technology

The *forest biorefinery* (FB) is a facility that integrates biomass conversion processes and equipment to produce fuels (e.g., ethanol and biodiesel), electricity, power, and chemicals (e.g., polymers, acids), along with the conventional forest products (pulp, paper, sawn wood, etc.). The FB can use multiple feedstocks, including harvesting residues, extracts from effluents, fractions of pulping liquors, as well as agri-biomass, recycled paper, and municipal and industrial wastes. It can be a large-scale industrial facility, integrated into a pulp and paper mill, or a medium- or small-scale facility integrated into a

[4] Natural Resources Canada website lists some common household products that are made from wood components: bath towels, nail polish, make up, disinfecting wipes, medications, paints, LCD screens and ping-pong balls. http://cfs.nrcan.gc.ca/pages/340.

sawmill or plywood mill. Most of the discussions have focused on the former case. An essential part of FB is the objective to more efficiently utilise the various fractions of woody biomass. This biomass is lignocellulosic material, which is made up of three primary chemical fractions: hemicellulose, cellulose, and lignin. All of these can be converted to carbon-neutral renewable energy or chemicals. Some of the conversion technologies are already mature and commercial; others require development to move to commercial applications. Bio refineries are seen as potentially an important development that could enhance the profitability and viability of operations in the big forest sector countries. They generate renewable energy addressing the issues of greenhouse gas emissions, and concerns over energy import dependence. Forests and biorefineries are thus seen as potentially important sources and producers of carbon-neutral energy. There have been large scale R&D efforts in developing technologies and pilot projects that promise to open up new and more efficient ways to utilise forests and wood fibres in energy production. Within the forest biorefinery platform, there are a number of different output mix and technology possibilities. First, the policies are necessary to make the production of biofuels viable in current circumstances. Without the subsidies, tariffs, or other forms of policy regulation, there would be no or very little national production of biofuels in most of the countries. Countries may give subsides anywhere in the value chain – from growing the raw material (agri- or forest-biomass) to setting mandatory requirements for biofuels usage in transportation. The interest in forest biorefineries is a very recent phenomenon. Thus, more research is needed to understand the implications of FBs to the forest sector.

Source: Finnish Forest Research Institute website (METLA).

http://www.metla.fi/pp/LHet/hetemaki_Biorefinery_Box_161-162.pdf

Eco-tourism is already linked with Kerala Forests. Visitor fee is collected based on "polluter pays principle". The quantum of visitor fee collected is Rs 15 crore which is invested in the rural economy of the state. The VSS has taken up the responsibility of cleaning the forests and benefit from the above eco-tourism policy. Eco-tourism may further be linked to forests and wetlands tourism.

Action Plan 2: Support for Sustainable Commercial Production of Forest and Wood Products

7.5.3.2.2 Focus on creating economic opportunity, private investments in Sustainable Forest Management (SFM) and conservation, and rural forest industries. The state will promote catalytic investments in the full range of goods and environmental services available from well-managed forests. These investments will be able to include sustainable timber harvesting

and management, but only in areas outside critical forest conservation areas in situations that can be independently monitored through a system of independent verification or certification that meets nationally agreed and internationally acceptable standards. Harness the opportunities offered by:

- Silviculture, the practice of controlling the establishment, growth, composition, health, and quality of forests to meet diverse needs and values.
- Smallholder supply to pulp and timber mills, palm oil and rubber processors
- Agroforestry
- Natural forests and plantations

7.5.3.2.3 The state will emphasise the development of new markets and marketing arrangements for the full range of goods and environmental services available from well-managed forests. The major focus will be to support private investments in SFM, conservation, and rural forest industries. The clear potential to reduce emissions from forest lands and to use forest lands to sequester carbon stored in the atmosphere has led to considerable interest from some countries and companies in sponsoring forest conservation and management projects to offset their carbon emissions. However, while these offset projects could provide useful funds for forest conservation and management, they remain controversial[5]. Many environmentalists fear that offset projects might encourage bad forestry practices. This requires strong institutional framework.

7.5.3.2.4 **Action Plan 3: Diversify the sources of wood:** Since substitutes to wood have their limits as far as the practical applications are concerned newer sources of wood may be promoted. In this context the importance of rubber wood is to be seen as a reasonable and

[5] "How can timber extraction ever be sustainable, compared to the pre-harvest condition? Can forests ever recover completely to their natural state? Can commercial forestry ever be profitable with stringent environmental standards? Zimmerman and Kormos revisit these arguments and conclude that 'industrial scale' Sustainable Forest Management (SFM) is unsuitable as an element of national REDD+ strategies. However, they also conclude that SFM at the 'local-community scale' is indeed possible. In a critical response to the original article, Plinio Sist and colleagues point out some flaws in these conclusions. Firstly, the categories of 'industrial scale' and 'community scale' are not well-defined, and overlap to a certain extent. Secondly, in terms of both carbon stock and biodiversity, logged forests can indeed recover, with appropriate post-harvest management. And thirdly, to write off the entire tropical timber industry as a lost cause, rather than incentivizing improved practice, is likely to undermine, rather than reinforce, conservation efforts."
UN-REDD Programme. 2013. REDD+ and the Fundamentals of Forest Management Science: Is Sustainability Ever Possible? www.unredd.net. Special Issue # 5. February.
This quotation is to support the statement that there are alternative ways to think about forest management and one should adopt scientific ways of thinking about a very important topic such as forestry. Clearly Kerala needs to develop research and development on the subject to answer the question as to what approach or mixed approaches work for the state.

renewable alternative raw material for wood. It is found[6] that that the rubber wood has higher linkages than natural rubber in the state due to the presence of wood mills in the state. Further, there has been expansion in area under rubber in the state. There is need to promote the markets of rubber wood and promote its usage through R&D, marketing and branding.

7.5.3.2.5 Bamboo another source of wood needs a major push to R&D and marketing. The Kerala State Bamboo Corporation Ltd., a government of Kerala undertaking, established in the year 1971 is involved in the development of bamboo industry with a particular focus on the bamboo workers. It will need to give greater emphasis on R&D. The thrust should be on shifting demand from imported wood to domestically available wood in the state with impacting the forests. This can be achieved through rigorous R&D and marketing efforts in the area of alternative woods.

7.5.3.2.6 **Action Plan 4: Non wood Forest Produce (NWFP) or Minor Forest Produce (MFP):** Branding and better marketing of these products is recommended. The VSS directly benefit from this. Of course, this has to be managed in a sustainable manner.

7.5.3.3 Pillar 3: Institutional change

7.5.3.3.1 The Department of Natural Resources should ensure that the forest industry has the right of first refusal in using excess biomass. It should continue to remove impediments, such as appurtenancy rules and administratively-determined timber allocations. The department should also allow market prices and competition between private sector mill and plant operators to determine the best product-market for the province. But, it should retain a key long-term role in provincial timber supply by re-affirming that the Government is committed to being in the tree growing business. The government will place a high priority on facilitating the process of bio energy generation by removing various impediments.

[6] Oommen, Z. 2011. Performance and linkages of rubber wood industry in Kerala. *International Journal of Multidisciplinary Research*. 1(8). December.

7.5.3.3.2 A joint industry/government initiative should be undertaken to build analytical capacity, with an emphasis on market and strategic issues. Priority should be given to developing this capacity in the local government and private wood lot segment. Institutional capacity needs to be strengthened

- To reduce the losses from illegal logging and support for forest legal and regulatory reform and enforcement;
- To establish forest certification set of principles and criteria to assess the adequacy of different certification systems in relation to recognized standards of economically, environmentally, and socially sustainable development;
- For forest valuation, price setting, and taxation;
- For trade policy related to forest products.

7.5.3.3.3 **Institutional change in VSS:** After an era of rich experience with local knowledge, social forestry and the characteristics of forest use and management by local communities, more emphasis should be given to the superordinate institutional framework. Therefore, implementation of government driven institution building and capacity empowerment initiatives for the VSS could prove fruitful and effective in enhancing the effectiveness of sustainable utilisation of natural resources and in turn forest management. This is also linked to Chapter 22 on the topic of social justice.

7.5.3.4 Preservation of Forests

7.5.3.4.1The KPP 2030 has proposed in the chapter on land and urbanisation that a Regional Spatial Strategy needs to be developed which will zone out reserved forests and ecologically fragile land with no conversion allowed. This is in consonance with the Kerala State Forest Policy 2009.

7.5.3.4.2 Private Forestry is to be encouraged as per the Kerala State Forest Department Policy. This will encourage entrepreneurship and innovation. For sustainability of plantations, above polices have to be used to manage it well and coordination with other programs like plantation tourism will revitalise the sector.

7.6 Evaluation and monitoring

7.6.1 Following discussions and commitments at United Nations Conference on Environment and Development (UNCED), 160 countries participated and developed sets of criteria and indicators (C&I) for SFM, through regionally and internationally recognized 9 processes, that was specific to various forestry scenarios of the world. The Indian initiative to develop a national set of C&I for SFM was in the form of Bhopal-India (B-I) process. The B-I process developed a national set of 8 Criteria and 43 indicators. This set of C&I prepared for the national level is specifically relevant to the current forestry scenario in India. It has been accepted and validated by the National Task Force appointed by the Government of India, which also recommended it for adoption and implementation by all the respective state forest departments in the country.

7.6.2 Monitoring and evaluation requires a set of related indicators which is a quantitative, qualitative or descriptive attribute that when measured or monitored periodically indicates the direction of change within the criterion. The purpose of C&I is to provide a tool for monitoring, assessing and reporting changes and trends in forest conditions and management systems at the national and also at the forest management unit level. By identifying the main prerequisites of SFM, the C&I provide a means of assessing the progress towards SFM. The conceptual framework of SFM includes sustainability principle, criteria, indicators and verifiers. The definitions of these terms are as under. The state department needs to maintain data based on the following indicators for evaluation of the performance.

Table 7.4: List of criteria and indicators for monitoring the forest sector

Criteria	Indicators
Increase in the extent of forest area/cover	1.1 Area and type of forest cover under natural forest and man-made forest 1.2 Forest area officially diverted for non-forestry purposes 1.3 Forest area under encroachment 1.4 Area of dense, open and scrub forests 1.5 Trees outside forest area

Criteria	Indicators
Maintenance, conservation, and enhancement of biodiversity	2.1 Protected Areas 2.2 Number of animals, and plant species 2.3 Number and status of threatened species 2.4 Status of locally significant species 2.5 Status of species prone to over-exploitation 2.6 Status of non-destructive harvest of wood and non-wood, forest produce
Maintenance and enhancement of ecosystem function and vitality	3.1 Status of natural regeneration 3.2 Incidences of forest fires 3.3 Extent of livestock grazing (a) Forest area open for grazing (b) Number of livestock grazing in forest 3.4 Occurrence of weeds in forest (a) Area (b) Weed type 3.5 Incidences of pests and diseases
Conservation and maintenance of soil and water resources	4.1 Area under watershed treatment 4.2 Area prone to soil erosion 4.3 Area under ravine, saline, alkaline soils and deserts (hot and cold) 4.4 Soil fertility /site quality 4.5 (a) Duration of water flow in streams (b) Ground water in the vicinity of the forests
Maintenance and enhancement of forest resource productivity	5.1 Growing stock of wood 5.2 Increment in volume of wood species 5.3 Efforts towards enhancement of forest productivity: (a) Technological inputs (b) Area under Hi-tech plantations (c) Area under Seed Production Areas, Clonal Seed Orchards
Optimization of forest resource	6.1 Recorded removal of wood 6.2 Recorded collection of non-wood forest produce 6.3 Efforts towards reduction of wastages utilization 6.4 Aggregate and per capita consumption of wood and non-wood forest produce 6.5 Direct employment in forestry and forest-based industries 6.6 Contribution of forests to the income of forest-dependent people 6.7 Demand and Supply of wood and non-wood forest produce

Criteria	Indicators
	6.8 Import and Export of wood and non-wood produce
Maintenance and enhancement of social, cultural and spiritual benefits	7.1 (a) Number of JFM committees and area(s) protected by them (b) Degree of people's participation in management (c) Level of participation of women 7.2 Use of indigenous technical knowledge: Identification, Documentation and Application 7.3 Quality and extent to which concessions and privileges are provided 7.4 Extent of cultural /sacred protected landscapes: forests, trees, ponds, streams, etc. (a) Type and area of landscape (b) Number of visitors
Adequacy of Policy, Legal and Institutional framework	8.1 Existence of policy and legal framework 8.2 Number of forest-related offences 8.3 Level of investment in Research and Development 8.4 Human resource capacity building efforts 8.5 Forest Resource Accounting (a) Contribution of forestry sector to the GDP (b) Budgetary allocations to the forestry sector 8.6 Monitoring and Evaluation mechanisms 8.7 Status of information dissemination and utilization

Source: Bhopal-India (B-I) process

7.7 Conclusion

7.7.1 The share of forestry is going down in Kerala. There is low production of timber and forests based industries are stagnating. Forests in Kerala are dominated by plantations. It is important to view forests from a different perspective. Preserve the reserved forests and manage the others in a sustainable fashion. There is need to create new products and branding it will add further value to the product. The emphasis is on the importance of the multifunctional role of forests and sustainable forest management (SFM) by leveraging emerging technologies for the development of society.

CHAPTER 8

FISHERY: BUILDING A SUSTAINABLE FUTURE

Kerala has a natural comparative advantage in fishing due to its long coastline and presence of rich inland water bodies. However, while fish production has stagnated in Kerala, consumption both within and outside India is increasing and forecasted to increase further. Further, fishing industry in the state provides employment to 11.52 lakh fisherfolk especially women. The strategy forward is one of sustainable fishing and establishing fishing eco-system. One has to increase productivity without damaging the environment i.e. ensure growth rate in fisheries by improving productivity and value addition in input and output marketing chains while maintaining and sustaining healthy stocks of fish. For that one has to adopt and adapt new technologies, adopt new harbor management techniques, improve infrastructure like providing cold storages and cold storage networks, establish hygienic retail markets and increase use of ICT in fishing. Fisherfolk need to be re-educated on the modern, eco and environmental friendly fishing techniques/methods. Adopting insurance through traditional routes or new routes such as community insurance will help mitigate the risks to lives and livelihoods. Women entrepreneurs need to be encouraged in the fishing industry.

8.1 Background

8.1.1 Fish production plays an important role in the socio-economic life of Kerala. The state is endowed with a long coast line of 590 kms and rich inland water bodies consisting of 44 rivers (having an area of 0.85 lakh hectares, ha), 30 major reservoirs (0.30 lakh ha), fresh water ponds and tanks (0.25 lakh ha), 45 backwater bodies and extensive brackish water area (2.43 lakh ha). This makes Kerala a leading fish producing state in the country. Fishery is an important source of income and employment to rural farmers, particularly women. It contributes one per cent to the GSDP of the state and provides employment to 11.52 lakh fishermen. There are 335 fishing villages in the state, which include 10 fishing harbours.

8.2 The current status

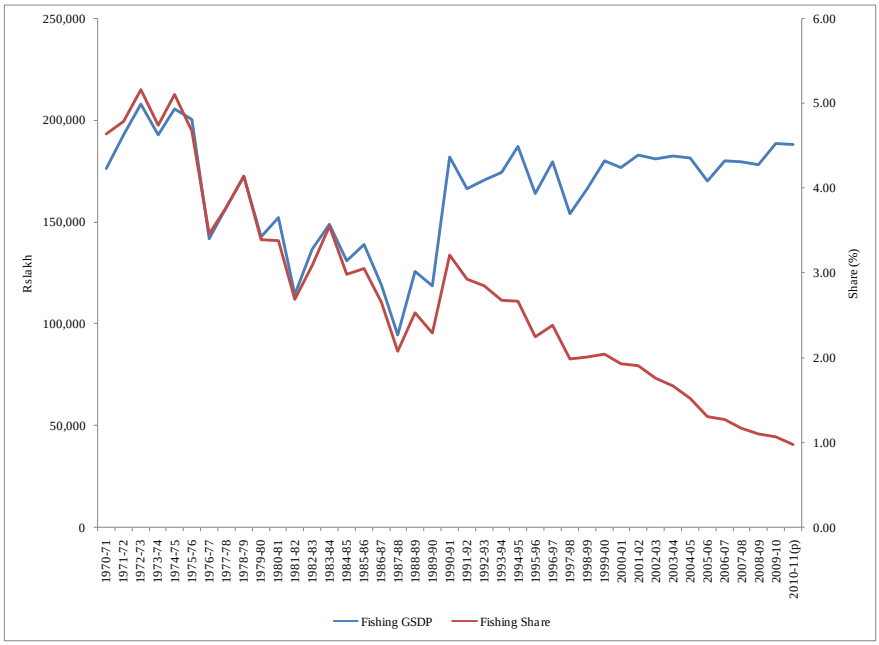
8.2.1 Contribution to GSDP

8.2.1.1 Until 1960, fishing in Kerala was entirely dominated by the non-mechanised, traditional country crafts – *kattumarams*, plank and dugout canoes – using a variety of tackle and gear. The catching was mainly meant to meet the daily consumption requirement. While there was a shift from cotton to nylon nets, it did not change the sector much. By the mid-sixties the modernisation oriented growth model was introduced in Kerala. The coastal line which was once known for the traditional gears and crafts used for the fisheries gave way to

larger vessels and mechanised trawlers. The introduction of mechanised boats and advanced nets changed the fishery sector altogether. Over time, this sector emerged as an important economic sector. In 1970−71 its share in Gross State Domestic Product (GSDP) stood at 4.7 per cent. Over the time it declined and remained at 1 per cent by 2009−10. But, in absolute terms, the GSDP from fishery has exhibited an upward trend since the mid 1980s (Figure 8.1). Fishery also contributes almost 12 per cent of the primary sector GSDP.

8.2.1.1 The share of fishing sector in the value of output[1] of agriculture and allied services at the national level has gone up from 4.3 per cent in 2004−05 to 7.2 per cent in 2010−11 at constant 2004−05 prices. The corresponding numbers for Kerala are 10 per cent in 2004−05 and 18.8 per cent in 2010−11.

Figure 8.1: Fishery GSDP (Rs lakh) and Share of Fishery GSDP in total Kerala GSDP (%), 1970−71 to 2010−11 (at constant 2004−05 prices)



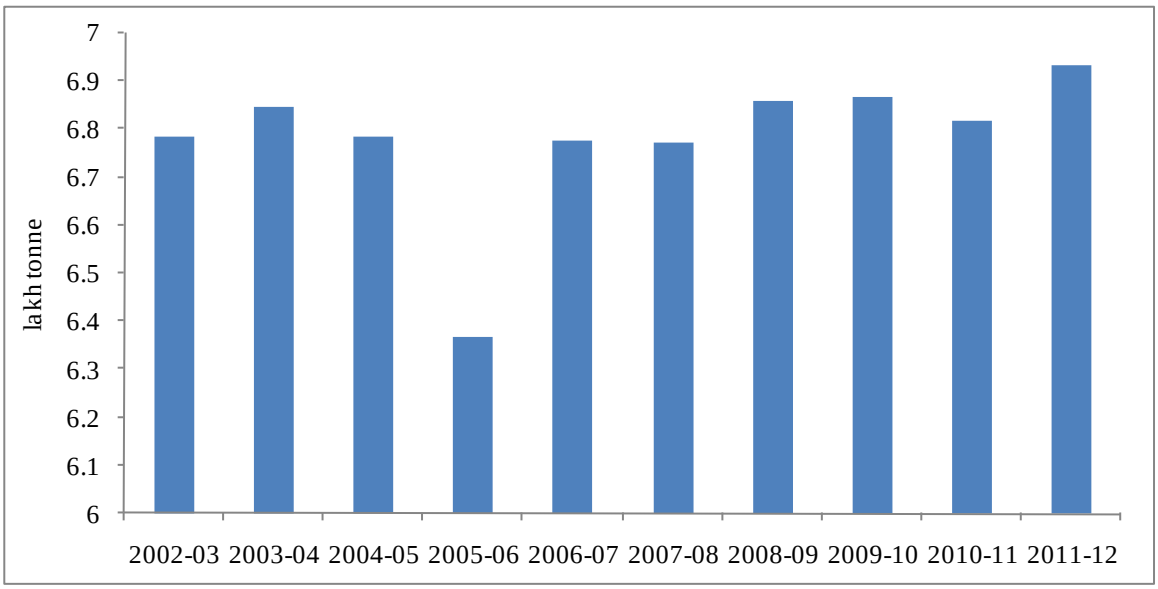
Source: Central Statistical Organisation (CSO)

8.2.2 Total fish production

8.2.2.1 The total production of fish increased from 0.75 lakh tonnes in 1950−51 to 6.8 lakh tonnes in 2002−03. Thereafter it fluctuated around this level (Figure 8.2). During this period, fish production at the national level increased continuously from 63 lakh tonnes to 86.7 lakh tonnes. As a result, the share of the state in national fish production declined from 10.7 per cent in 2004−05 to 8 per cent. Notably, Kerala water resources are around 7 per cent of the national water resources. Kerala's share in production has thus been higher than its share in water resources. Over time, however, the gap is closing.

[1] [1] Central Statistical Office, Ministry of Statistics and Programme Implementation, Government of India. 2013. *Statewise Estimates of Value of Output from Agriculture and Allied Activities 2013*.www.mospi.nic.in.

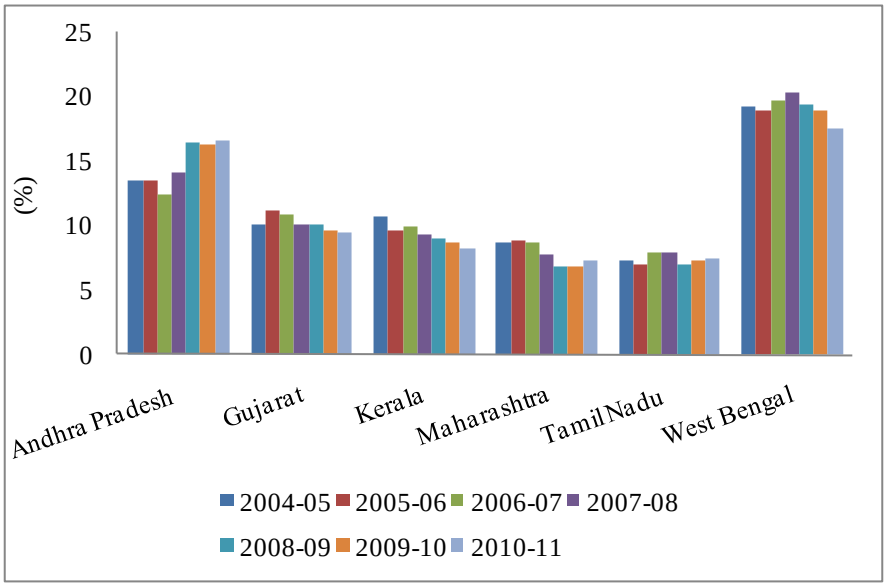
Figure 8.2: Trends in Total Fish Production in Kerala 2002−03 to 2011−12 (lakh tonne)



Sources: Department of Animal Husbandry, Dairying & Fisheries, Government of India. 2012. *Handbook on Fisheries Statistics 2011*. October and Department of Fisheries, Government of Kerala. *Facts and Figures 2012*. Thiruvanthapuram

8.2.2.2 Currently Kerala is the fourth largest state in India in terms of fish production after West Bengal, Andhra Pradesh and Gujarat (Figure 8.3). Over the past few years, the share of Kerala in fishing has declined and the state has lost the third position to Gujarat. Andhra Pradesh has increased its share in production significantly almost reaching the share of top ranking state of West Bengal in 2010−11.

Figure 8.3: Percentage Share of Top Six Fish Producing States of India, 2004−05 to 2010−11 (%)



Source: Department of Animal Husbandry, Dairying & Fisheries, Government of India. 2012. *Handbook on Fisheries Statistics 2011*. October

8.2.3 Domestic Household Consumption

8.2.3.1The national consumption surveys indicate that the per capita consumption of fish in Kerala is nearly 10 times the average at the national level (Table 8.1). The average consumption levels in both urban and rural areas are of similar order both in the state and also nationally. There was a significant increase in per capita consumption between 2004−05 and 2011−12 at the national level but not in Kerala.

Table 8.1: Average Monthly Consumption per Person of Fish and Prawns, 2004−05 & 2011−12 (kg)

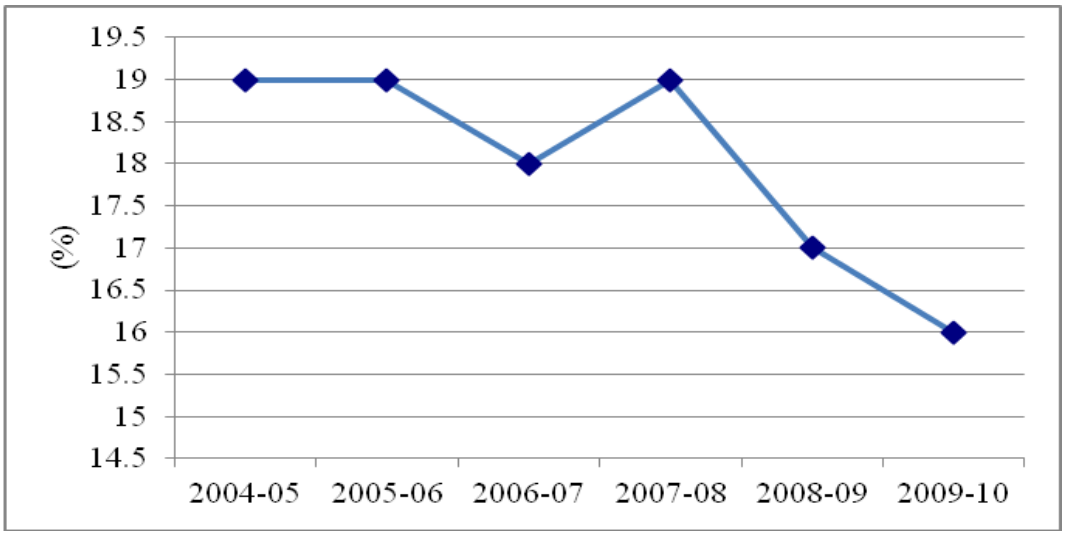
	2004−05		*2011−12*	
	Kerala	***India***	***Kerala***	***India***
Rural	1.91	0.08	1.992	0.192
Urban	1.95	0.09	1.904	0.196

Source: Household consumption expenditure in India, NSSO−61st Round (July 2004-June 2005) and 68th round(July 2011−June 2012)

8.2.4 Exports

8.2.4.1 Marine fish production is also one of the major contributors to foreign exchange earnings through sea food exports. Kerala contributed 19 per cent of the foreign exchange earnings through exports of marine products in 2004−2005. Since then it has declined to 16 per cent (Figure 8.4).

Figure 8.4: Percentage Share of Marine Export Products of Kerala in India (%)

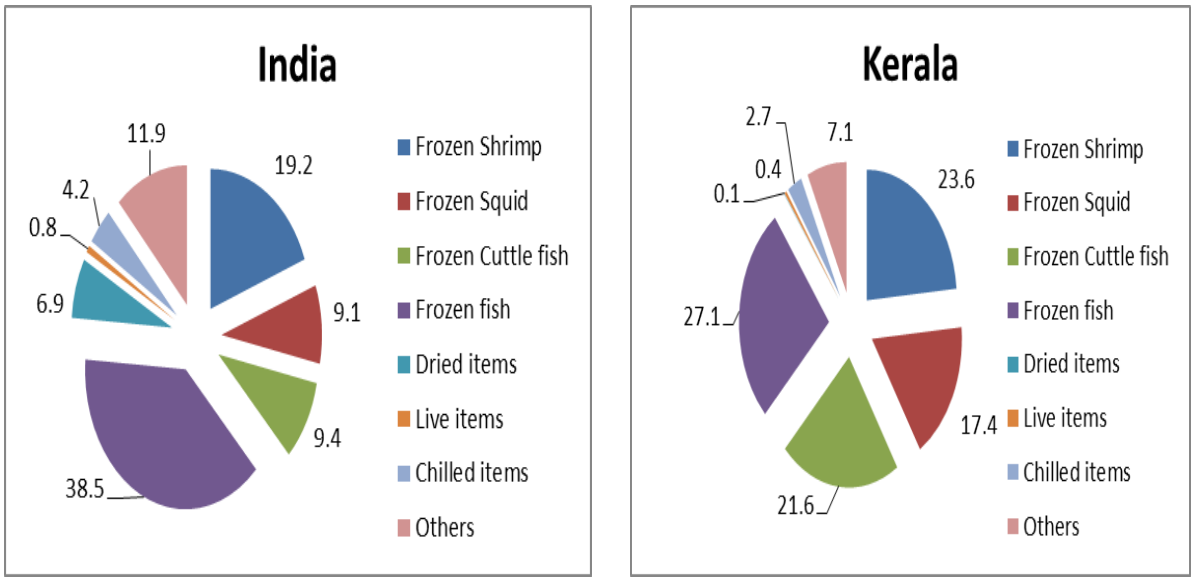


Source: Director of Fisheries. 2012. Marine Fisheries Statistics 2010. Statistical Cell, Directorate of Fisheries, Government of Kerala, Thiruvanthapuram.

8.2.4.2 Some migratory marine fish like Pelagic fin fish (71% of total fish landings), Molluscs, Demersal fin fish and Crustaceans are the most saleable items in the international

market. During 2009−10 Kerala's share in India's marine products was 15.8 per cent. Major export in marine products is frozen fish. Shrimps, which are the most saleable item in the international market, are also found in abundance in India including the Kerala coastline. However, excessive pollution has adversely affected shrimp farming in India.

Figure 8.5: Percentage Share of Item wise Export of Marine Products during 2009−10 (%)



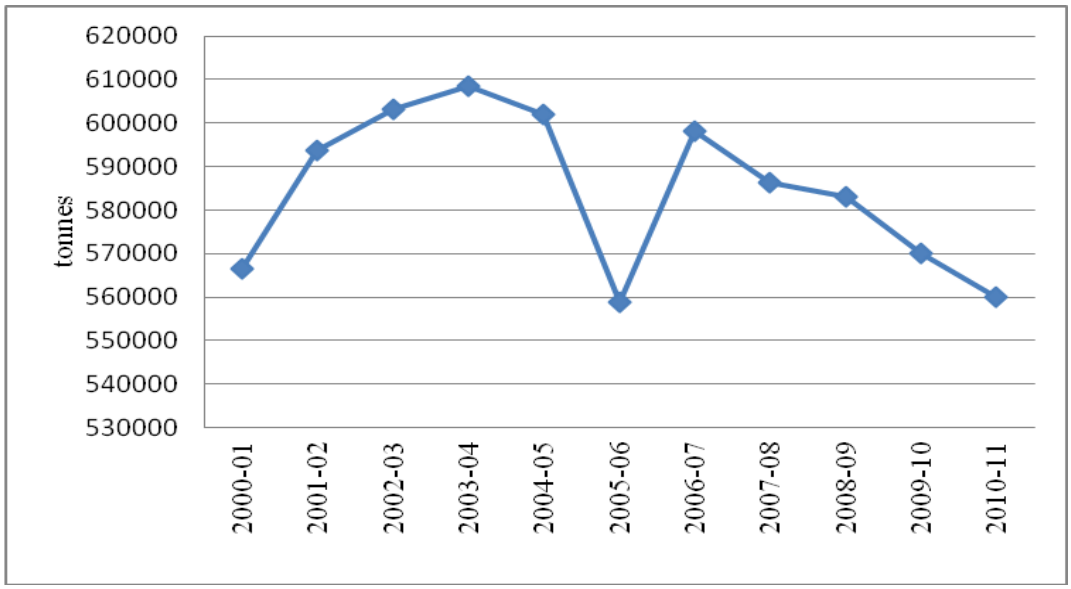
Source: Director of Fisheries. 2012. Marine Fisheries Statistics 2010. Statistical Cell, Directorate of Fisheries, Government of Kerala, Thiruvanthapuram

8.2.5 Patterns of fishing

Marine fish production

8.2.5.1 Kerala is the second highest contributor of marine fish after Tamil Nadu in India. During 2010−11, 5.6 lakh tonnes of marine fish were produced in Kerala accounting for 80 per cent of the total fish production in the state. It accounted for over 16.5 per cent of the national marine fish production in 2010−11. Considering that marine resources of Kerala are around 7 per cent of the national resources, marine fish production share of Kerala is higher than its share of marine water resources. Kerala thus has some advantages in marine fishing.

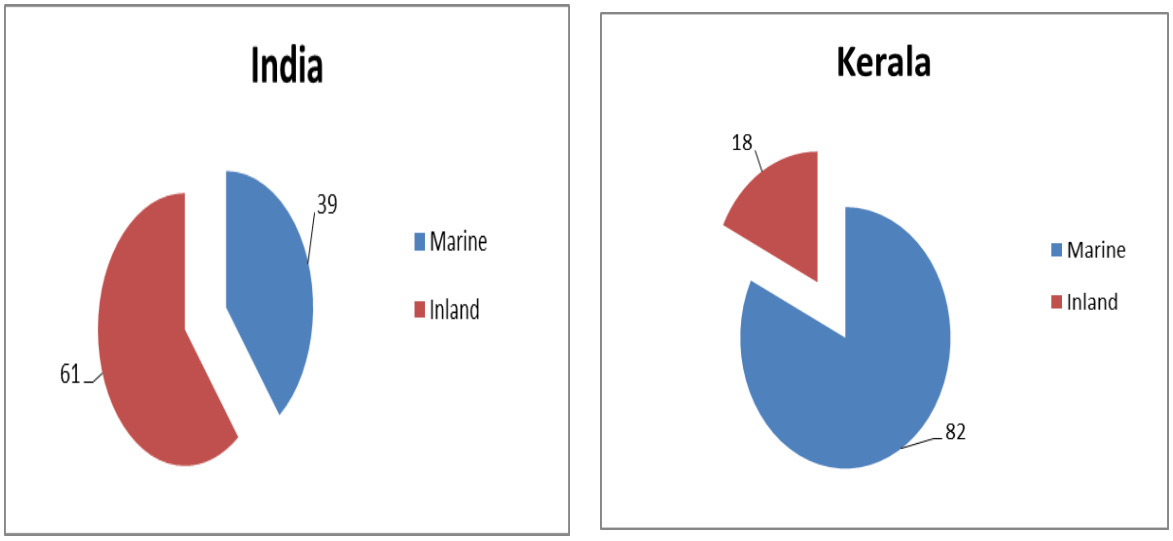
Figure 8.6: Trends in Marine Fishing in Kerala: 2000−01 to 2010−11 (tonnes)



Source: Department of Animal Husbandry, Dairying & Fisheries, Government of India. 2012. *Handbook on Fisheries Statistics 2011*. October

8.2.5.2 Further, the share of marine fish in total fish production in Kerala is higher than the national average. Over time, the share of marine fishing has come down but it still remains 80 per cent. At the all India level, marine fish production is less than 40 per cent of the total fish production.

Figure 8.7: Percentage share of Marine & Inland Fish Production (2010−11)



Source: Department of Animal Husbandry, Dairying & Fisheries, Government of India. 2012. *Handbook on Fisheries Statistics 2011*. October

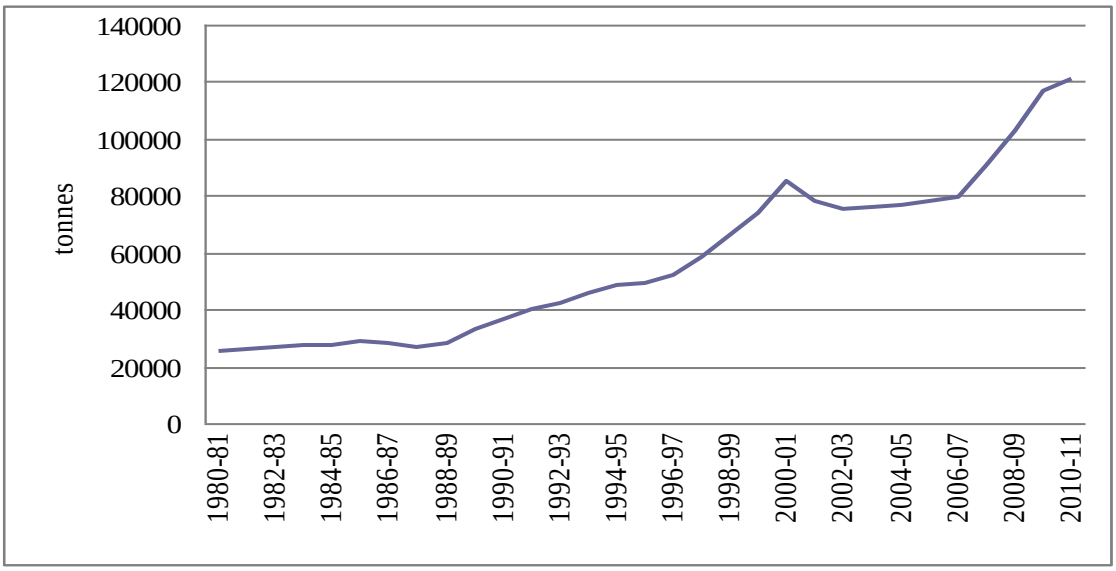
8.2.5.3 The high rate of rainfall and the large number of rivers make Kerala the most fertile for fish. A particular marine phenomenon that occurs specifically in the Kerala coast in which a large number of fish throng together as a result of mud bank formations, is known in

Malayalam as “Chakara.” It is the formation of clay and organic material in the coastal waters which often takes place soon after the monsoon in the calm sea area and results in a good harvest of fish. However, according to government sources, the actual catch is far below the potential which stands at 7.5 lakh and constitutes 29.4 per cent of the all India potential.

Inland fishery

8.2.5.4 Inland fish production has been growing in Kerala since the late 1980s. This is due to the rise of aquaculture (carp, molluscs, crustacean) in the state. The Agency for Development of Aquaculture, Kerala (ADAK) was established in 1989 to promote inland farming. With economic liberalisation in the early 1990s, the fishing industry received a major boost in investment and sustained the positive trends.

Figure 8.8: Trends in Kerala Inland Fish Production: 1980−81 to 2010−11 (tonnes)



Sources: Department of Fisheries. 2012. Kerala Inland Fisheries Statistics 2010. Government of Kerala, Thirvananthapuram and
Department of Animal Husbandry, Dairying & Fisheries, Government of India. 2012. *Handbook on Fisheries Statistics 2011*. October

8.2.5.5 A major push was given to inland fisheries and aquaculture in 2008 when the State Government, approved the project of ‘Matsya Keralam’ for the productive utilisation of inland water bodies which were till then lying by and large idle and under exploited. The target was to increase inland fish production from the then level of 75,000 tonnes to 2 lakh tonnes over a period of three years. It was an integrated programme implemented with the help of local bodies and farmers in all the 14 districts. Under the programme, about 505 Fish Farmers Clubs were formed all along the State and 450 Aquaculture Coordinators were selected by 773 Local bodies. The Fish Farmers Clubs facilitated aquaculture promotion through improved management practices, information exchange, timely supply of inputs, and

crop insurance. As a result, production increased sharply from 79,600 tonnes in 2006−07 to around 1.5 lakh tonnes by June 2012.

8.2.5.6 Currently fourteen Fish Farmer Development Agencies are functioning under the Fisheries Department to promote inland aqua−culture both in fresh and brackish water. There is an extensive infrastructure in terms of landing centres, fishing harbours, seed rearing units, markets, fishing schools, and testing laboratories.

8.2.5.7 The Matsya Keralam programme came to an end in 2012. Realizing the need to further promote aquaculture through direct intervention, the government has initiated another programme termed "Matsya Samrudhi". Under this programme 6,000 hectares (ha) of inland water areas are targeted to be brought under aquaculture. The fish production is targeted to increase from 1.5 lakh tonnes to 2.5 lakh tonnes. This three years' programme is envisaged to implement diversified aquaculture programmes for maximum utilisation of water bodies in the state. The important components are:

- Paddy and fish culture in Kole lands
- Integrated fish culture
- Fresh water fish culture
- Shrimp farming in Pokkali/Kaipadu fields/ private ponds
- Mussel farming
- Crab fattening
- Pearl spot seed rearing
- Kitchen ponds
- Pond culture of pearl spots
- Cage culture

8.2.5.8 While marine fish production has been declining (Figure 8.6) inland fish production shows increasing trend (Figure 8.8).

8.3 Challenges

Below potential inland fishing

8.3.1 Inland fish production potential is not fully captured in the state. Kerala has over 7 per cent of the inland water bodies but its share in inland fishing is just above 2 per cent nationally.

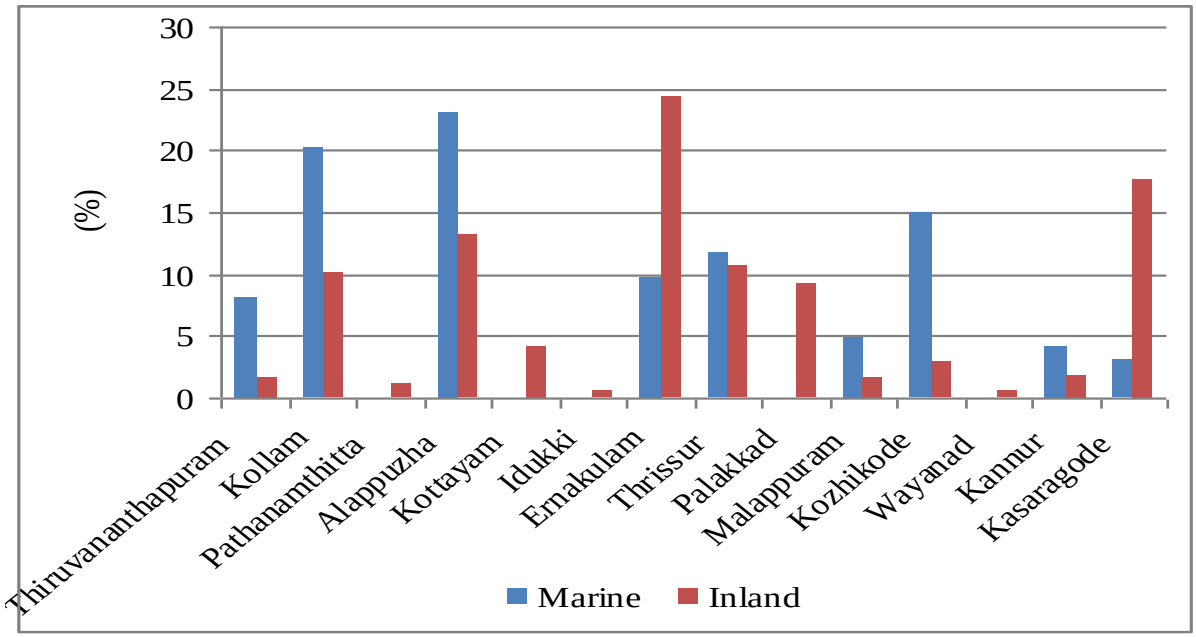
Table 8.2: Production, Area and Yield: 2011−12

	Total production (Inland)	*Total water bodies (Inland)*	*Yield (Inland)*	*Total production (Marine)*	*Approx. length of coastline (Marine)*	*Yield (Marine)*
	('000 tonnes)	*('000 ha)*	*(kg/ha)*	*('000 tonnes)*	*('000 ha)*	*(kg/ha)*
Andhra Pradesh	1,079.6	811.0	1331	288.6	97.4	2,963.4
Gujarat	86.0	426.0	202	688.9	160.0	4,305.8
Karnataka	204.3	740.0	276	295.6	30.0	9,852.3
Kerala	139.5	543.0	257	560.4	59.0	9,498.3
Maharashtra	148.6	348.0	427	446.7	72.0	6,204.2
Tamil Nadu	190.0	693.0	274	424.8	107.6	3,948.3
West Bengal	1,436.5	545.0	2636	1,971.1	15.8	12,4751.9

Source: Department of Animal Husbandry, Dairying & Fisheries – Annual Report 2011−*12*

8.3.2 Table 8.2 shows that Kerala's productivity (fish production in kg against the total water bodies in ha) in inland fishing is lower than in many other states. The inland water resource potential is, therefore, not fully exploited in Kerala. District-wise patterns indicate that the share of inland fish production is the highest in Ernakulam (24.4%) followed by Kasaragod (17.8%) and Alappuzha (13.2 %) respectively (Figure 8.9). In other districts it is insignificant,

Figure 8.9: District wise Percentage Share of Marine and Inland Fish Production in 2010−2011



Source: Fisheries Statistics at a Glance, 2011
Department of Fisheries, Kerala

Declining marine fishing and unsustainable fishing practices

8.3.3 Decline in marine fishing since 2006−07 is a worrisome trend. Within a short period from 2006−07 to 2009−10, fish production has declined by over 6 per cent. As a matter of fact, the world has been facing a global fishing crisis of unprecedented proportions. Marine ecosystems are on the decline worldwide. According to the U.N. Food and Agriculture Organization (FAO), 70 per cent of the world's commercially important marine fish stocks are fully fished, overexploited, or depleted. The global situation is mirrored in Kerala. The main reason for this scenario is unsustainable fishing practices. In general, over dependency on marine fisheries by the local population has resulted in excessive and indiscriminate fishing on the Kerala coastline. This in turn follows from a number of factors such as inappropriate incentives, high demand for limited resources, poverty, inadequate knowledge, ineffective governance, and interactions between fishery sector and other aspects of the environment. Some of the unsustainable fishing practices are as under.

- Intrusions by trawlers into artisanal zone were reported in all the coastal districts with higher frequency of violations in Allepey, Ernakulam, Kozhikode, Kollam and Kasaragod districts. Estimates of illegal catches by trawlers in the 5 nautical mile artisanal zone are about 2,100 – 3,320 tonnes for Kerala.
- Using estimates from fieldwork, it was found that almost 90 per cent of the stake-nets do not follow the legal statutory requirements of the Kerala Government on the distance and mesh size and hence are engaged in illegal fishing. Removal of illegal stake nets and Chinese dip nets by the Fisheries Department has been met with stiff resistance by fishermen in backwaters.
- Illegal operation of nets during high tide.
- The Government of India through State Governments of respective maritime States implements a fishing ban during the monsoon every year. The ban lasts for 45−60 days with each State using a different time period or criteria such as advancement of monsoon as an indicator. Absence of a uniform ban period throughout the coastline has led to fishing trawlers of several States using this legal technicality to fish where the fishing ban exists and land in an adjacent State where there is no ban, leading to low catches during the post-ban period. With most of the coastal States having weak enforcement, due to huge gaps in allocated infrastructure, manpower and monetary resources, illegal fishing persists through domestic fishing vessels in inshore waters. Moreover, it also leads to problems in misreported catches where fish caught in one jurisdiction is reported as caught in another location.
- It has also been reported that there is more fishing by small-scale fishermen during the ban period. So, the fishing effort from the mechanised sector is transferred to the small-scale sector every monsoon with more ring seines operating during this period, leading to overfishing of pelagic fish stocks.
- Every year a narrow stretch of water between Alleppey and Neendakara constitutes the breeding ground for the bulk of shrimps caught in the State. But less than one quarter of this area is protected from trawlers. Subsistence fishermen in this section of

the coast are not left with any option but to use smaller sized gillnets to catch juveniles.

- Traditional fishermen in Kerala are also to blame for the decline of fish catches as they have allowed operation of smaller meshed ring seines which catch 0 and 1 size classes of sardines and mackerels in larger numbers every year.
- The regulation that stipulates none of the deep-sea fleet are to enter the 22 nautical mile zone is not closely followed. Effective monitoring of the entire Kerala seacoast requires far more resources than presently available.
- The dominance of foreign and domestic trawling ships has changed the harbours into the war zones during the monsoon trawl ban period. The lack of machinery to monitor the sea line has led to night trawling.
- There is a high level of wasteful catch, destruction of egg bearing marine fish and juvenile fish.
- The mechanised boats are fishing invariably within the territorial sea using the banned gears resulting in the destruction of marine wealth. This also results in conflicts between small-scale artisan fishermen and the mechanised boat operators.
- The unemployment issue in Kerala may be another reason for the growing marine fisheries dependent population in the state. For the growing number of fishermen dependent on inshore fisheries, the use of offshore or deep-sea resources is one way to find additional employment.

Environmental issues

8.3.4 The health of marine fisheries is intrinsically linked with various natural phenomena. Environmental hazards that are encountered have also adversely affected marine stock in Kerala over the years. These are as given below.

a. Loss of marine bio-diversity and consequent decrease in the fodder on which the marine fisheries are generally dependent for their survival;
b. Water pollution and emission of effluents to the sea has also caused adverse effect on the overall health of marine fisheries;
c. The coastline of Kerala connecting the Bay of Bengal and the Indian Ocean through the Palk Strait and across it constitutes one of the major sea routes and there are numerous instances of effluent emission and spillage from the Ships. These have affected the marine bio-diversity, thereby causing decline in the marine fisheries;
d. Fish farmers and their communities are also often exposed to prolonged hazards such as the spread of fish disease due to effluents from mining, industry and urbanization, which ultimately affect aquatic life in the sea.
e. Some fishing techniques such as dredging and trawling cause widespread damage to marine habitats and organisms living on the sea floor.

In Kerala, species like White fish and White snappers, Cat fish, Sharks and Ribbon fish are becoming rare.

Inadequate fish processing

8.3.5 Fish processing in India is done almost entirely for export. Open sun dried fish and fish meal are the only major exceptions. The total fish processing and storage facility in Kerala is grossly inadequate compared to the potential for fish production and processing. Most exports are in the form of frozen fish. Also, the Indian brand does not exist in advanced countries' markets. Even at the national level, barely five per cent of India's seafood exports are in processed form. In fact, more than 60 per cent of India's exports to South East Asia are re-exported after processing. Vietnam a small country has created vast capacity in fish processing and is importing raw material to re-export it after processing.

Cooperative societies

8.3.6 Worsening livelihood situation of Kerala's fishermen due to decreasing fish catches led to massive unrest among the fishermen in the 1970s. Social and religious activists in several coastal localities motivated the creation of fishermen's cooperatives and unions, in an effort to direct the people's anger into organized actions to defend their interests. The Kerala Government created Matsyafed in principle to protect the fisheries' community of the state. The structure of the federation was envisaged in a way that each marine village would have a cooperative society to represent in the apex body. However, the issues remain.

Social issues

8.3.7 **Lack of infrastructure:** The lack of storage facilities and processing plants lead to inefficient supply chains of the sector.

8.3.8 **Safety and protection of fishermen:** There is a lack of fishing activities along the coastal line since the fish wealth there is over exploited, hence trawlers and large fishing vessels go for deep-sea fishing. This also compels the fishermen to go for deep-sea fishing. However, they are ill equipped to do so. Several years ago, the Food and Agricultural Organization (FAO) stipulated a kit with fourteen lifesaving tools to be kept on board the vessels in order to save the lives of fishermen. However, it has been found that more than ninety eight percent of fishing boats in Kerala lack these facilities on board.

8.3.9 The government also lacks the infrastructure in terms of lifeboats and patrolling. There are only a few patrol boats for the long coastal line of Kerala. Even the police machinery does not have proper equipment like GPS and life-saving tools. Very often, the fishermen do not have the sophisticated and technically advanced equipment to tackle the emerging situation. The accidents often occur during the rough seasons hence only the availability of manpower does not solve the crisis.

8.3.10 **Coastal Poverty:** The average population density along the Kerala coast is very high compared to the inlands of the state. The thickly populated coastal areas lack sanitary facilities. The monsoon season of Kerala from June to August is a nightmare for the coastal

fishermen. Almost every year, the sea washes away their possessions and driving them to relief camps.

8.3.11 As the fishermen belong to unorganised working class, the value of fish in domestic market at consumer level is about Rs. 4,500 crores, whereas the value realised by fishermen at shore is only Rs. 2,500 crores. The disposable income to the fishermen is less than Rs 540 crores i.e. per capita income of fishermen is less than Rs. 30,000. Thus, the income levels remain low.

8.3.12 **Competition between traditional and trawler fishermen:** The conflicts between the trawler crews and the *kattumaram* fishermen have grown in intensity over time. Many incidents are reported on the fighting between traditional fishermen vs. boat crew away in the sea. If trawling is carried out in the same area as katttumaram fishing there is great risk of damage to the latter fishermen's gear as well as to their lives. Moreover, since the catching capacity of the trawlers is very high, it affects the catch of traditional fishermen. Even though there is a law stipulating twenty-two kilometres depth of sea only for traditional fishermen, the trawlers may not obey this rule.

8.3.13 **Digital divide:** The development in the communication sector has brought both advantages and disadvantages to the sector alike. Since the price of fish is a fluctuating one, the communication divide helps the merchants and major players in the fishery sector to exploit the traditional fishermen. The price is dictated by the price of fish in the global market or at least in the nearby markets at that time. Those fishermen who have both transportation facilities and sustainable income to back themselves have the advantage over the rest by swift movement of the fish to the nearby markets that offer a higher price.

8.4 Projections

8.4.1 Extrapolation of NSSO data shows that household domestic consumption of fish is projected to rise. (Table 8.3)

Table 8.3: Projections for Domestic Consumption of Fish and Prawns: Average Monthly Consumption per person (kg), 2012−16 to 2027−30

	2011−12		*2012−2016*		*2017−2021*		*2022−2026*		*2027−2030*	
	Kerala	***India***	***Kerala***	***India***	***Kerala***	***India***	***Kerala***	***India***	***Kerala***	***India***
Rural	1.99	0.192	2.03	0.28	2.04	0.30	2.04	0.32	2.04	0.32
Urban	1.90	0.196	1.89	0.28	1.88	0.30	1.88	0.31	1.88	0.32

Source: Computations by NCAER

8.4.2 Extrapolation of available export data for Kerala fishes will show that exports will fall because it will be based on existing trends. While it is difficult to forecast the international demand for fish from Kerala, the Food and Agriculture Organisation of the United Nations

(FAO) 2010 reports that "the contribution of fish to global diets has reached a record of about 17.2 kg per person in 2009 on average, supplying over three billion people with at least 15 percent of their average animal protein intake. This increase is due mainly to the ever-growing production of aquaculture which is set to overtake capture fisheries as a source of food fish"[2].

8.4.3 In sum, on a Business-as-Usual scenario, while demand for fish is forecasted to increase both within and outside India, Kerala's production of fish is growing at very slow rate (0.4% between 2003−04 and 2010−11).

8.4.4 How can Kerala meet the increased demand for fish and get a rising share is what is outlined in the next section.

8.5 Vision, Mission and Strategic Policy

8.5.1 Vision

Kerala will be the leader in the world in sustainable utilisation and development of the fisheries sector, both marine and inland. People of Kerala will be able to enjoy the wealth and benefits of diverse and self-sustaining living fishery resources.

8.5.2 Mission

- To maximise economic benefits from living marine resources without compromising the long-term health of coastal and marine ecosystems through their scientific conservation and management, and promotion of the health of their environment;
- To build and maintain sustainable fisheries to ensure that fish stocks are available for commercial, recreational, and subsistence uses;
- To increase long-term economic and social benefits to the nation from living marine resources;
- To conserve and recover marine species protected by statute or international treaty through conservation programs listed as threatened or endangered under the Endangered Species that are based on sound scientific research and decision-making;
- To protect living marine resource habitat for the success of management and conservation efforts.
- Improve the economic status of fisher-families

[2] Food and Agriculture Organisation of the United Nations. 2011. *The State of the World Fisheries and Aquaculture 2010*. Rome, Italy.

8.5.3 Goals

- Ensure the growth rate of 1 per cent in fisheries by improving fisheries productivity and value addition in input and output marketing chains;
- Maintain healthy stocks important to commercial, recreational, and subsistence fisheries;
- Eliminate overfishing and rebuild overfished stocks important to commercial, recreational, and subsistence fisheries;
- Promote the development of robust and environmentally sound aquaculture;
- Protect, conserve, and restore living marine resource habitat and biodiversity;
- Credible, high-quality science supporting Fisheries mission and minimizing risk in management decision-making;
- Use of emerging technologies and products;
- Enhance public confidence in the safety of seafood;
- Increase processing and value-addition, and
- Fishery marketing and extension machinery.
- As the marine fish production is declining, due to over exploitation of resources, the state has to take responsibility for sustainable utilisation of resources, and boost aquaculture and inland fisheries.
- The state has created social infrastructure facilities like fisheries schools, dispensaries, fisheries roads, and water supply and sanitation schemes in the coastal belt to improve the living standards of the fishermen population under the Integrated Coastal Area Development Project (ICADP). The new schemes for the Modernization of Fish Markets with the assistance of NFDB will be completed.
- Housing schemes for homeless fishermen need further planning and formulation to fully benefit the needy.

8.5.4 Strategic Planning

8.5.4.1 Pillar 1: Increase productivity without damaging the environment

8.5.4.1.1 Human impact has increased dramatically on marine life with rapid population growth, substantial developments in technology and significant changes in land use, over-fishing, pollution etc. There is an urgency to carry out sea-friendly fishery. Fish being a renewable resource, the rate at which the resources are harvested should be in harmony with the rate at which they multiply. However, there should be proper checks and balances, as a large number of people have been dependent on fishing historically and therefore, livelihood concerns of the poor fishermen should be kept in mind. In other words, when on one hand, there should not be any exception to the protection of the marine eco system in the State of Kerala through introduction of suitable policy measures and legal framework, on the other hand, there should also be corresponding and alternative policies and laws, which would ensure the livelihood of the poor fishermen and their traditional and cultural rights in fishing should not be drastically affected. An overall assessment of the total fishery sector has to be

undertaken. As per the assessment, a comprehensible ecosystem approach to resource use and fisheries resource management is to be adopted.

8.5.4.1.2 Three approaches are required:

- Institutionally, a well drafted policy is required for ensuring a legal framework and increased people's participation.
- Technologically, it implies utilisation of the renewable energy resources and methods, which are environmentally appropriate and less destructive.
- From the human resource perspective, government will need to adopt all possible measures to promote practices so that rural fishermen can be trained to adopt and utilise such technology in fishing without damaging the environment.

8.5.4.1.3 ***Action Plan 1: Institutional approach***

- Adequate and applicable policies/legal framework should be made at the State level in order to address various concerns of the local fishermen and to safeguard their religious, cultural and natural practices associated with fishing.
- State should phase out destructive gear, such as bottom trawling. All the fishery equipment shall be under the monitoring of an independent local committee having the representation of all the interest groups related with the fisheries.
- There could be limits on the catch of certain species. In New Zealand, for instance fisheries are managed by a quota system that sets catch limits for commercially important species.
- The specifications and licensing procedures should be maintained. There is a necessary requirement for the coordination between various agencies in this regard. There is no official mechanism to do the same at present in Kerala. The rule is stipulated only on paper. No one is concerned about the licensing mechanism since there are no checks or inspections from the Government in this regard.
- Both the number of fishing vessels and hours at sea should be restricted for fishing trawlers during the breeding season to prevent capture of juvenile fish and shrimps.
- The pollution Control Board should initiate pollution-free water bodies in Kerala. It can be done through frequent monitoring of the water bodies and strict legislations. Fish being a renewable resource, biologically it would mean that the rate at which the resources are harvested should be in harmony with the rate at which they multiply. Humanly it means that the principles of equity and basic need to get a high priority.
- It is imperative that the hygienic condition of the harbours be modernised taking into consideration the issues in each harbor. They have to be managed in the view of post harvest management by implementing Hazard Analysis and Critical Control Points (HACCP) to promote export. Integrated harbour management societies may be constituted for each harbour. It also requires regular de-silting for smooth passage of boats. In a consultative and participatory way, provision for potable water, sanitation, night shelter, chilled and frozen storage facilities to benefit of women vendors and fish vendors shall be there.

- Coordination between water transport authorities and fishing industry is also recommended which will enable both faster movement of water transport and sustain fish.

Action Plan 2: Scientific Technology

8.5.4.1.4 Fishermen will be encouraged to adopt appropriate technologies to reduce the harm to the biodiversity of the sea.

- Reduce the amount of tickler chains, avoid excess weight in the beams, and use other stimuli (e.g. electric pulses) as an alternative to chains to scare the target fish off the bottom and into the net. The use of acoustics, light or any other additional stimuli to enhance encounters by target species within the catching zone of trawl nets is worth exploring.

- It has been observed that the use of improved location and targeting of fish with the help of **electronic seabed mapping tools** and **integrated global navigation satellite systems** has resulted in avoidance of sensitive bottom habitats and helped to minimize fishing effort and fuel consumption.

8.5.4.1.5 **Multibeam acoustic technology**, widely used in sea-bed exploration, has been successfully applied, for example, to mapping scallop beds off the east coast, thereby substantially reducing the time required to locate the grounds and the actual fishing time.

8.5.4.1.6 **Bottom seining:** Bottom seining (Danish, Scottish and pair seining) is generally considered to be a more environmentally friendly and fuel-efficient fishing method than bottom otter trawling. The gear is lighter in construction and the area swept is smaller than in bottom trawling. Moreover, because there are no trawl doors or heavy ground gear, there is less force on the sea bed. The light gear and low hauling speed mean that fuel usage can be significantly lower than for a comparable trawling operation. Bottom seine nets are generally also regarded as having low impact on benthic invertebrates. However, the high bycatch of both undersized individuals of the target species and individuals of non-target species can be a problem in some seine fisheries.

8.5.4.1.7 **Trap-net:** The pontoon trap was introduced in the late 1990s. It offers various advantages compared with traditional trap-nets such as being easy to transport, handle and haul, adjustable in terms of size, target species and capture depth, as well as being predator-safe. Future developments may include large-scale, ocean-based fish traps together with the technology to attract fish. Modern trap-net fisheries can be energy efficient, flexible, selective and habitat-friendly, providing catches of high quality as the catch is usually alive when brought aboard the vessel. Live capture provides the operator with a greater number of options to add value to the catch. However, designs and practices need to be developed to prevent the entangling of non-fish species in netting and mooring ropes of the trap.

8.5.4.1.8 **Pots:** A pot is a small transportable cage or basket with one or more entrances designed to allow the entry of fish, crustaceans or cephalopods, and prevent or retard their escape. Pots are usually set on the bottom, with or without bait. While pot fishing vessels in general have low fuel use, some pot fisheries have high fuel use owing to the need to tend fleets of many pots and lifting them more than once a day, necessitating travelling at high speed over long distances. Pots are extensively used in the capture of crustaceans such as lobster and crab. Recent tests with **collapsible pots** have shown promising results for Atlantic cod in Canada and for pink cusk-eel (*Genypterus blacodes*) in Argentina. A **floating pot** developed in Scandinavia provides another example of an innovative pot design that has shown significant potential. Floating the pot off the bottom allows the pot to turn with the current so the entrance always faces the down current, resulting in a higher catch rate of cod. It also avoids non-target catch of crabs and may also reduce the seabed impacts compared with a pot sitting on the bottom.

The above scientific methods present environment friendly fishing techniques.

Energy efficiency

8.5.4.1.9 The fishing sector should strive to further lower its fuel consumption and reduce the impact on the ecosystem. Despite a growing number of initiatives and experimentation with energy-reducing technologies, there is currently no viable alternative to fossil fuels for mechanically powered fishing vessels. However, it is well demonstrated that, through technological improvements, gear modifications and behavioral change, the fishing sector can substantially decrease the damage to aquatic ecosystems, reduce GHG emissions and lower operational costs for fuel without excessive negative impacts on fishing efficiency.

8.5.4.1.10 Bottom trawling or dragging, is one of the most widely used industrial fishing methods around the world. It involves towing a large net across the seabed targeting the species that live on the sea bottom. However, bottom trawling has been identified as one of the most difficult tasks to manage in terms of by catch and habitat impacts. There are many techniques and operational adaptations available to reduce the drag and weight of the bottom trawl gear and thereby, to reduce significantly fuel consumption and sea-bed impacts without marked decrease in the catch of the target. Fuel savings of 25–45 percent and gear-drag reductions of 20–35 percent have been reported.

Box 8. 1: CRIPS-Trawl

A new semi-pelagic low-impact and selective trawl gear (CRIPS-trawl) is under development in **Norway**. The new trawl design (CRIPS-trawl) has a reduced bottom contact and less drag compared with a conventional bottom trawl. The trawl doors and the footrope of the trawl are lifted off the bottom. The front panels of the trawl are replaced by herding ropes, and the aft parts are made of square-mesh netting. This will reduce the drag of the trawl while still maintaining the stimulation for herding the fish into the cod end. The extension piece and the cod end are made of four panels and include a net camera and various selection devices to release unwanted fish from the trawl. The four-panel design improves the stability of the trawl and the selection devices. The net camera gives real-time information of the fish species and sizes entering the cod end, and allows the skipper to make informed decisions regarding how to continue the fishing process. The trawl may also be fitted with an active mechanism to release unwanted catch. The trawl concept also includes a cable connection from the vessel to the trawl headline. The cable will carry the video signal from the net camera and acoustic sensors, and it will also increase the vertical opening of the trawl. The concept will later also include an independent system to adjust the distance of the doors from the sea bed.

Source: Food and Agriculture Organisation of the United Nations. 2011. *The State of the World Fisheries and Aquaculture 2010*. Rome, Italy

8.5.4.1.11 Also, energy-saving technologies need to be developed by public–private sector initiatives to commercialise economically viable alternatives.

Marketing

8.5.4.1.12 Steps are to be taken for the building up of marketing infrastructure and its maintenance. At present, the fish is either transported to faraway places or sold through the traditional markets. The traditional fishermen are subjected to the dictates of the big players because there is no alternative arrangement to sell their catch. In processing too, the condition is identical. There should therefore, be initiatives from the Government to run appropriate marketing mechanisms like fish outlets, processing plants etc. Retail outlets with modern facilities (clean water, storage, waste disposal etc) is the immediate necessity which can be constructed by local panchayats in each village and provided to fishermen on lease basis for ensuring supply of quality fish to local consumers. This would also generate employment in these villages.

8.5.4.1.13 Quality control in export marketing is highly emphasised in the WTO agreements of trade necessitating adequate care in all stages from catching of fish till the consumer point. The internal marketing and distribution system in the fishery sector of the country is not well equipped with quality maintenance mechanisms comprising essential marketing infrastructure and proper administrative procedures. Quality maintenance in the internal distribution system of fresh and processed fish is also essential. Fish is transported from the landing centres to far

off retail outlets without proper storage facilities causing deterioration in quality. Insulated carriers, cold storages, and cold chain networks need to be promoted to provide solutions to this problem.

8.5.4.1.14 *Infrastructure*

1. Explore the possibility of 90 per cent grant from National Fisheries Development Board (NFDB) in Urban areas or 50 per cent grant from Central Government for Hygienic retail markets.
2. Sufficient number of stalls with display of water, cutting &cleaning area, storage area, continuous supply of water, sanitary wares, ETP (Effluent Treatment Plant), waste utilisation facilities etc shall be ensured in Retail markets.
3. Provision of bathing facility in fish markets will provide dignity while boarding public transport.
4. Fish Mall may be established at Metro cities
5. Way side marketing can be modernised by establishing Fish bays
6. Ensure 10 per cent contribution from the Local Self Government

Use of ICT in fishing

8.5.4.1.15 In fisheries, new ICT is being used across the sector, from resource assessment, capture or culture to processing, and disaster management. There have been specialist applications such as

- Sonar for finding the big schools of fish
- General purpose applications
  - GPS for navigation and location finding: widespread use by mechanised boats
  - mobile phones for trading, information exchange and emergencies
  - radio programs with fishing communities and
  - Web-based information and networking resources

8.5.4.1.16 There has been a mobile revolution as well with

- Dramatic improvement in the efficiency and profitability of the fishing industry
- Boat crews cut deals on mobile phones for the day's catch while still at sea
- Reduced waste from between 5-8 per cent of total catch to close to zero, and
- Increased average profitability.

8.5.4.1.17 Major fishing states have taken some initiatives, some of which are listed below:

- ITC's aqua-choupal in Krishna and Godavari districts of Andhra Pradesh along the lines of e-chaupals
- Byrraju Foundation's V-Aqua ICT mediated service delivery / advisory services in West Godavari district of Andhra Pradesh

- MSSRF's VKCs in Puducherry & Tamil Nadu: M.S. Swaminathan Research Foundation (MSSRF) set up Village Resource Centres (VRCs) and Village Knowledge Centres (VKCs) in villages across Tamil Nadu and Puducherry. The VKC acts as a platform for the dissemination of information and is operated by a computer-trained local person. The available infrastructure is leveraged to provide mobile information.
- Mobile based advisory services of Surat Shrimp Farmers Association
- ISRO/INCOIS's weather and Potential Fishing Zone advisory services/Community Efforts
- Kerala Independent Fish Workers Federation's website - www.alakal.net
- SIFFS's online market intelligence network for selected marine fish - Fish Market Intelligence System (F-MIS) collects fish price information from the Fish Markets and Fish Landing Centres and continuously monitors several key wholesale fish markets in Tamil Nadu and Kerala, and publishes this information on their website
- Community radio: Kalanjiam Samuga Vanoli (Nagapattinam, Tamil Nadu) provides weather information, disaster management, advisory services
- Maharashtra state funded by Incois, Hyderabad, issues potential fishing zone (PFZ) advisories along the Mumbai coast, with the following objectives - to disseminate PFZ advisories to the fishermen community to indicate availability of fish; to educate the community and conduct awareness campaigns about usefulness of information available through PFZ advisories; and to collect biological, oceanographic and environmental data.

8.5.4.1.18 However, the potential has not been fully captured:

- Only pilots / small scale localised experiments have been conducted;
- ICT, as a powerful means of reducing people's vulnerability, of fostering equity and social inclusion, is yet to take shape;
- ICT has promising application in marketing efforts but so far has not had much effect by South Indian Federation of Fishermen Societies (SIFFS) and Central Marine Fisheries Research Institute (CMFRI).

8.5.4.1.19 Kerala will draw on the experiences of these states to create an integrated infrastructure to cover the entire fishermen community by 2030.

Action Plan 3: Human capital approach

8.5.4.1.20 The key features of the strategy proposed for implementing an ecosystem approach to fisheries and to aquaculture are as follows:

- Adopting participatory approaches at all levels of the planning and implementation steps;

- Ensuring that all the key components of the fishery/aquaculture system are considered, including those related to the ecological, social, economic and governance dimensions,

while also taking into account external drivers (e.g. changes in the supply of and demand for inputs and outputs; climate change; and environmental disturbances);

- Encouraging the use of the "best available knowledge" in decision-making, including both scientific and traditional knowledge, while promoting risk assessment and management and the notion that decision-making should also take place in cases where detailed scientific knowledge is lacking;

- Promoting the adoption of adaptive management systems, including monitoring performance and creating feedback mechanisms linked to performance, at different time scales, to permit the adjusting of the tactical and strategic aspects of the management/development plans.

- Ensuring maximum participation and support at the local level through the involvement of the coastal Panchayats.

- To further the said objective, there should also be the need to educate the traditional fishermen on the modern, eco and environmental friendly fishing techniques/methods through government and non government machineries and through community mobilisation among the fishermen group, the government and the large trawler owners.

- Offer Fishing and Acquaculture degree and diploma courses in Universities and link it up with internships in fishing communities. Link up fishing communities with MBA students where students can do internships. Exchange of knowledge between two different backgrounds may help attract younger people to this field especially if they see higher returns and fisherfolk may benefit from better technological and marketing practises. Science degrees should be clubbed with marketing courses. Vocational and diploma courses can also prove to be useful. Plus entrepreneurship in fishing may be encouraged.

- The Royal Forest and Bird Protection Society (NZ) publishes the Best Fish Guide to try and encourage us to make more sustainable choices when purchasing seafood. The list evaluates fish stocks and by catch levels and the fishing methods used.

- FAO has promulgated code of conduct for responsible fisheries for conservation and sustainable exploitation of fishery resources. Such type of awareness campaign should practice for the fishermen , through various modes including film shows, booklets, posters, group discussion, etc

8.5.4.2 Pillar 2: Increased economic value generation

Action Plan 1: Increase exports and high value added products

8.5.4.2.1 Shifting of focus to export oriented fisheries shall bring modernisation in fishing techniques, which would further boost fishing as a source of long term sustainable livelihood and food. Thailand is the highest exporter of shrimp. Thailand has been able to achieve this, merely by not producing shrimps, but also by making them value-added products, by undertaking processing activities such as filleting and canning. High value marine product should be given more priority in farming for export purposes. Aquaculture farming techniques for all shrimps species should be implemented, like artificial ponds near the sea coast.

8.5.4.2.2Exports of marine products have been erratic and on a declining trend which could be due to the adverse market conditions prevailing in the EU and US markets. The antidumping procedure initiated by the US Government has affected India's shrimp exports to the US. It is important to identify new markets and new products. In Japan, for example, the consumer supermarket price for Sashimi Tuna is very high. It should, therefore, be an objective to develop tuna in the form of Sashimi with a brand name in the international market. Further, facilities for production/ processing of value added products such as ready-to-eat, ready-to-serve breaded and battered products, etc. are necessary to realize maximum return. For this, it is, however, necessary to have proper MIS and market data.

Action Plan 2: Diversify aquaculture

Aquaculture in Kerala

8.5.4.2.3 Being the principle Marine fish producing and exporting State in the country for a long time Kerala occupies an inimitable position in the fisheries map of India. But in the last couple of years the state has lost its prime position due to the depleting fish stock from the conventional fishing grounds. In this context, aquaculture is viewed as a second option for increasing fish/shrimp/prawn production. The technological development in the inland fisheries paved way for making use of inland water recourses spread over the different districts of the State for aquaculture development. Aquaculture currently enjoys the distinction of being one of the fast growing food production sectors in the state.

8.5.4.2.4 Kerala has great potential in aquaculture fishery. The Agency for Development of Aquaculture, Kerala (ADAK) was established in 1989. Kerala government has also launched matsyakeralam scheme with the objective of increasing export of fish and fish products and to create new employment opportunities in rural areas through the development of inland and brackish water aquaculture. Though, the share of marine fish production in Kerala contributes 82 per cent of the total fish production of Kerala, however, fish farming under artificial conditions can be done in village ponds, tanks, or new water bodies in Kerala.

8.5.4.2.5 There are basically five types of aquaculture practices followed in India, which are:

- Freshwater aquaculture,
- Brackish water aquaculture,
- Mariculture,
- Coldwater aquaculture, and
- Ornamental fish culture.

8.5.4.2.6 Freshwater aquaculture and brackish water aquaculture are already practised in the Pokkali fields of Kerala. There has also been promotion of rice-fish farming. Kerala will need to promote Mariculture and Ornamental fish culture.

8.5.4.2.7 **Mariculture in Kerala:** Mariculture is a specialized branch of aquaculture involving the cultivation of marine organisms for food and other products in the open ocean, an enclosed section of the ocean, or in tanks, ponds or raceways which are filled with seawater. It has rapidly expanded worldwide over the last two decades due to new technology. It was introduced in Kerala in the recent past with shrimp farming being practiced at the commercial level. Some mariculture technologies for edible oysters, mussels, marine pearl production in pearl oysters, seaweeds, and marine ornamental fishes (damsels, clown fishes and seahorses) are also being practiced in the coastline of Kerala in order to meet the requirement of export abroad. However, these have not yet reached the commercial level. Their promotion will enable the required diversification into non-food fisheries in terms of seaweed cultivation, pearl farming, and so on, with high export potential.

8.5.4.2.8 Further, with application of bio-technology, lobsters and crabs culture can be developed in the coastal areas of Kerala, especially since lobsters and crabs are one of the most attractive and economically important premium seafood delicacies across the globe. States like Tamil Nadu, Gujarat, Andhra Pradesh, West Bengal and Maharashtra have already successfully developed and disseminated viable technology for fattening lobsters and crabs in their coastal areas. Also, there has been a substantial improvement in the earnings of their coastal fishermen. Therefore, lobsters and crabs culture has great potential in coastal areas and Kerala can adopt such bio-technology in marine fishery, with the objective of providing income-earning opportunities and fostering sustainable livelihood security for the poor fishing communities.

8.5.4.2.9 While shrimp farming has been a commercial activity in the country, the non-availability of disease free seed is a major bottleneck. There is a need to domesticate the shrimp and produce Specific Pathogen Free (SPF) seed to overcome the problems. While R&D efforts are in place in the country, establishment of bio-secure facilities and dedicated seed centers is an important requirement. Further, the mechanism of quarantine to screen the imported seed needs to be strengthened in the state.

8.5.4.2.10 **Coldwater aquaculture**: Finally, there will be promotion of cold water fish culture in the high regions of the state. These species include all species of salmon and trout. The most commonly cultured cold water species in the Midwest in USA is rainbow trout, whose optimal temperature range for growth is 48-65ºF. Species selection would be based on the temperature of the water supply.

8.5.4.2.11 In sum, the state will remove single specie dependence in brackish water aqua-culture, with diversified shrimps as well as brackish water fin fishes. Both seed production on one end and processing of new species at the other would address the need to achieve the desired diversification in the culture practices.

8.5.4.2.12 **Seed production**: Seed of pearlspot is available throughout the year along the east and south-west coasts of India. The peak season of abundance is during the months of May-July and November-February. It can be easily collected from both the brackish water and freshwater tanks and ponds. A simple method of seed collection is adopted taking advantage of the tendency of the fish to congregate in large numbers for feeding on epiphytic growth. In this method twigs or branches are kept submerged in the water a week ahead of day of collection. The juveniles congregating for feeding purpose are trapped using an encircling net or trap. Fecundity of pearl spot is low and has been estimated to be around 3000-6000; hence a successful hatchery production of seeds is difficult. However, Central Institute of Brackishwater Aquaculture (CIBA), Chennai using the technique of environmental manipulation, has successfully demonstrated the hatchery seed production of pearl spot.

8.5.4.2.13 **Ornamental fish culture:** Global ornamental fish trade is estimated at $4 billion and is said to be a fast growing sector. Kerala with its pleasant environment and huge fresh water reservoir has the potential to be an excellent player in the sector. Despite the huge potential offered by rich diversity and environment, export of ornamental fish from Kerala continues to remain negligible due to lack of knowledge and practices. Proper training and guidance on marine ornamental fish culture can improve the income of fishermen. The most positive part of ornamental fish culture is that it doesn't disturb the marine eco-system.

8.5.4.2.14 Special projects should be launched for commercial use of ornamental species, like:

- Training the technical aspect of ornamental fish farming to the local communities;
- Undertaking stock enhancement and sea ranching on commercially demanded species;
- Setting up backyard units for income generation;
- Promoting market potential and trade for ornamental fishery;
- Expanding ornamental fishery in households that can create additional livelihood.

8.5.4.2.15 Strengthening of ornamental fishing in Kerala's fishery sector, can directly generate additional employment, and at the same time generate additional income. During the monsoon period, when marine fishing is banned, ornamental fish rearing can be a beneficial measure for the sustainable development of fisheries in the state. Poor fishermen can sustain

their livelihood by practicing ornamental fishery in ponds, rivers, dams, springs, tanks etc. (all inland recourses).

8.5.4.2.16 **Other emerging aquaculture technologies:** New scientific opportunities are emerging in aquaculture. These include cold water fishery, ornamental fisheries, integration of seaweed farming, and culture of mullets into brackish water aquaculture, spirulina production, lobster fattening, sea ranching, small scale fresh water carp culture in seasonal ponds, and catfish culture. Notwithstanding their proven benefits, the adoption of aquaculture technologies have been found to be constrained by problems such as lack of skill, capital, infrastructural facilities, availability of water bodies, tragedy of commons, input (feed) scarcity, and high risk. These need to be addressed.

8.5.4.2.17 **Recreational fishery:** Recreational fishing, also called sport fishing, is fishing for pleasure or competition. The most common form of recreational fishing is done with a rod, reel, line, hooks and any one of a wide range of baits. Big-game fishing is conducted from boats to catch large open-water species such as tuna, sharks and marlin. Noodling, kayak fishing and trout tickling are also recreational activities. Recreational fishing competitions (tournaments) are a recent innovation in which fishermen compete for prizes based on the total weight of a given species of fish caught within a predetermined time.

8.5.4.2.18 Recreational fishing has led to the rise of a recreational fishing industry. It consists of enterprises such as the manufacture and retailing of fishing tackle, the design and building of recreational fishing boats, and the provision of fishing boats for charter and guided fishing trips. Recreational fishing is a multi-billion dollar industry. According to an estimate, in Sweden, the net value of recreational fishing has been estimated at almost 79.5 million EUR, exceeding the value of commercial fishing. In the USA, about 12 million recreational saltwater fishermen generate $30 billion in economic impact and support 350,000 jobs. Fishing tourism may be proposed. Fishing in Kerala is termed as open sea fishing, which is also carried on in other states of Odisha and in Lakshwadeep. A travel tour to Kerala locales where angling is carried on in the beautiful beaches of Hawah would show that it is home to modern fishermen and anglers who practice fishing only for commercial purposes. The southern most beach called as the majestic Samudra beach is one beach in the Kovalam series of crescent beaches where the fishermen still use the most ancient of boats and fishing nets in Kerala.

8.5.4.2.19 However, it needs to be recognised that freshwater recreational fisheries differ from commercial fisheries and aquaculture and that, they need to be dealt with in a way that reflects this difference. Best practices need to be fostered in recreational fishery. Further, the role of recreational fisheries in the sea should be discouraged so that its effects on marine life can be minimised.

8.5.4.3 Pillar 3: Social security

8.5.4.3.1 **Socio economic development:** The government and other agencies have already put forces in improving the social aspect of the fisheries industry in Kerala by implementing schemes and programmes like housing scheme, insurance cover for fishing implements, pension to fishermen, modernisation of country crafts, purchase of fishing nets, saving cum relief scheme for the poor fishermen. The Kerala Swathanthra Matsya Thozhilali Federation (KSMTF) established by the Kerala fishermen union works for the socio-economic, political development and education of the fishermen community in Kerala, who are involved in fishing and marketing of fish both of inland and marine species. It also works for the rights and benefits of fisheries' workers**.** There is evidence in the literature that the socio-economic yardsticks like education, employment, infrastructure development, recreation, means of ownership, per capita production, income and expenditure pattern etc, have undergone rapid changes in the coastal areas. To consolidate these improvements, appropriate policy measures and legal framework for the livelihood security of fishermen in the mechanized sector or commercial sector need to be framed. Traditional fishermen shall also be protected through training with use of trawling nets and modern techniques within the traditional sector. In addition, programmes of rural development will be initiated to improve their standard of living.

8.5.4.3.2 Besides social infrastructure, provision for safe shelter and drinking water, improvement of public health and education facilities and total sanitation & solid waste management, coastal roads etc needs special care and attention. For speed implementation and ensure future operation and maintenance, it can be brought under a state sponsored scheme for LSGs. Present housing scheme assisted by National Fishermen Welfare Fund can be implemented in an integrated approach along with state share and the contribution from Local Government Institutions or Non-Government Organisations.

8.5.4.3.3 **Protection from sea-erosion:** Coastal fishermen are highly vulnerable to sea erosion, cyclones and other disastrous weather events. Sea erosion and flooding requires a permanent solution. One suggestion is that two or three rows of huge hollow tetra pods can be planted in the coastal sea, upto a distance of 20-25 metres from the shore. They can be planted in the sea according to the depth. The forces of the waves and currents will be broken when they hit the tetrapods. As a trial, planting of tetrapods can be done in a 100 kilometre stretch from Cochin harbour to Purakkad. Being an area of very severe and disastrous sea-erosion, and due to proximity to the harbour, that area is likely to give spectacular results in a very short time. If successful, the project can be replicated to other areas, as well. Besides the benefits of prevention of sea – erosion it also regains the lost land and can help in mineral accretion, turning these areas into mineral deposits.

8.5.4.3.4 **Insurance**: Fishermen risk their lives and livelihoods every time they leave port. A centrally-sponsored national scheme for the welfare of fishermen is in operation since 2002 with group insurance as one of its components. Under the scheme, identified and registered fishermen are insured for Rs 1,00,000 against death or permanent total disability and Rs

50,000 for partial permanent disability- 50 per cent of which will be subsidised as grant-in-aid by the Centre and the remaining 50 per cent by the State Government. The annual premium payable by fishermen would not exceed Rs 15 per head. The scheme covers fishermen in both marine and inland sectors. Various alternative models may be adopted to extend them insurance facilities.

8.5.4.3.5 Kerala Fishermen's Welfare Fund Board is operating nearly 30 Welfare Schemes to benefit the fisher folk.

- Community insurance: The Kerala government can encourage a "community insurance scheme" for the fishermen in which fishermen themselves pay a small contribution for insuring their risks. In India, Yeshasvini health care programme is one such scheme that has provided protection to millions of farmers. In Bangladesh, the state-run Jiban Bima Corporation (JBC) has introduced a community insurance scheme in 15 coastal districts, and a significant number of fishermen have already enrolled in it, each paying Tk 1,240 ($16) a year for insurance cover of Tk 200,000 ($2,500).

- Commercial insurance: Fishermen can be encouraged to take up insurance on commercial basis as well. Sunderland Marine Mutual Insurance in the UK is a fishermen's own insurance venture. In 1882, a group of 100 fishermen in the UK got together to mutually protect each other. All members of the Total Loss Mutual Steamship Insurance Association (later to become Sunderland Marine Mutual Insurance - SMMI) pledged to give assistance to distressed vessels belonging to other members. Its membership grew steadily in the big fishing centres along the North-East coast. By 1916, it was the dominant commercial fishing insurance company in the UK. Once the domestic markets were saturated, the company expanded into international markets. As governments around the world began to impose stricter regulations to preserve fish stocks the fishing industry shrank. SMMI began to diversify into insurance of fish farms, which now makes up 20 per cent of its business.

8.5.4.3.6 **Women empowerment:** The role of women in the economic activities of coastal fishing communities supplements the region's livelihood. The degradation of coastal eco systems and the displacement of fishing communities from their living spaces have adversely affected the workload and quality of life of women in the communities. Involvement of Self Help Groups and NGOs in this field can create more opportunities for them. *Kudumbashree* can play a major role in this sector, teaching sustainable fishing techniques to women entrepreneurs in this area.

8.5.4.3.7 Treatment for the diseases like skin disease, rheumatic complaints, urinary tract infections, gynecological problems, fast aging for the poor fisherwomen should be available. Therefore, proper programmes for the awareness of hygiene and sanitation should be conducted, hospitals or special wards in hospitals should be allotted for such treatment.

8.5.4.4 Pillar 4: Food safety

8.5.4.4.1 Importers are applying stricter requirements in food safety and hygiene. Controlling food safety and hygiene in the production chain by enterprises to ensure quality, food safety and hygiene are causing barriers to seafood development. Some of the measures proposed are as follows:

- The government needs to support enterprises in establishing a testing system in the production chain, ensuring consistency in applying standards, practices in food safety and hygiene management from raw material producing, sourcing, transporting and processing to export.
- The government should raise awareness amongst farmers, enterprises and processors about their responsibilities in ensuring quality, food safety and hygiene. Administrative procedures must be simplified to save time and costs in testing exported consignments by competent authorities. Some countries have introduced state-mediated certification procedures to certify their safety and environmental credentials, in particular in their aquaculture industries for instance Thai Quality Shrimp. This can be seen as a proactive strategy to respond to safety and quality demands from import markets by promoting themselves as suppliers of safe and high quality fish and seafood.
- Training programmes on sea food need to be undertaken for quality assurance, microbiological methods, value added products preparations (such as fish pickles, cutlets, fingers, papads), hygienic handling of fish, fabrication of nets, skill development training for rural fishermen should implemented.

8.6 Conclusions

8.6.1 The strategy forward is to make fishing both economically and environmentally sustainable. A combination of investment in physical infrastructure like cold storage, human readiness i.e. changes in fishing techniques, training, changes in marketing techniques like processing and branding will propel increased returns for all the stakeholders. The fishing industry also may look to combine working with other sectors like tourism and other primary sectors to improve returns to the sector.

CHAPTER 9

INDUSTRY

Kerala suffers from low industrial growth. The share of manufacturing in industry is low and within manufacturing, unregistered manufacturing forms a disproportionately large part. The path forward is based on the idea of sustainable industrialisation. This would balance economic prosperity, environmental stewardship, and social sustainability. Kerala will create a good sustainable business environment. It will prioritise high knowledge activities and diversify the industrial structure. It will adopt Clean Production Systems to mainstream environment. A cluster development approach for Kerala is recommended with one town one industry and one village one product model. Kerala may promote logistic hubs given its unique location. Regional innovation systems will be built. Skilled development and entrepreneurship for sustainable development are to be encouraged. Kerala must pay special attention to small and medium enterprises. Enforcement of a social security system and strict compliance with decent working conditions are necessary for inclusive development. Every action must be benchmarked against international standards.

9.1 Why industrialisation?

9.1.1. Evidence suggests that the countries that manage to pull out of poverty and get richer are those that are able to diversify away from agriculture and other traditional products into manufacturing and other modern activities. Expansion of industry and services is essential to economic development and growth, as these are a major carrier of productivity increases. Higher productivity growth in these sectors results from increasing returns to scale and gains from innovations and learning by doing. As labour and other resources shift from agriculture into modern economic activities, overall productivity rises and incomes expand. Figure 9.1 shows sectoral inter-linkages based on the Kerala Input-Output (IO) model of 2009–10. It reveals that non-primary sectors score over their primary counterparts, in terms of both backward and forward linkages. This chapter focuses on "manufacturing", which has the strongest linkages with the rest of the Kerala economy and constitutes approximately 40 per cent of the industrial[1] Gross State Domestic Product (GSDP). The linkage factor for manufacturing is found to be greater than one for both backward and forward linkages[2].

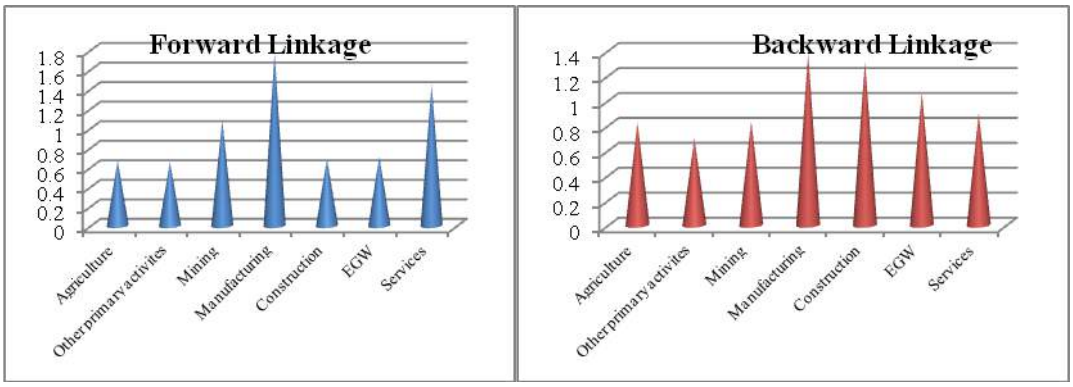
[1] Industry comprises of establishments engaged in manufacturing, construction of buildings or engineering projects, mining and quarrying, and providing utilities (gas, electricity and water).

[2] The Output Multiplier can be defined as the total increase in output for every unit increase in final demand of a particular sector. In the instance of backward linkage, use of a particular commodity induces demand for increased production of inputs which in turn require second stage inputs. These second stage inputs would require further inputs. The geometric progression of "output" at each stage is summed up to obtain the output multiplier effect.

Forward Linkage: On the other hand, an increase in production by other industries leads to an additional output required from industry i to supply inputs to meet the increased demand. This supply function is referred to as

Among other components, construction and utilities have strong backward linkages, while mining depicts strong forward linkages with the rest of the economy. It means that manufacturing is a key ingredient in the process of economic growth.

Figure 9.1: Sectoral inter-linkages based on the Kerala IO model 2009–10



Note: EGW- Electricity, Gas & Water
Source: Computations based on IO Table, NCAER

9.1.2. Strong linkages are translated into high income, employment and tax multipliers. Industrial stagnation in a consumption led growth scenario of the Kerala economy therefore, means that a significant amount of the income earned is leaked out of the economy through imports and inter-state purchases, thus reducing the income multiplier within the state**.** This also means that industrialisation can provide a long-term solution to the problem of unemployment, which remains unacceptably high in Kerala and may be further exacerbated by the slowdown in the demand for labour in the Gulf countries and the advent of return migrants.

9.2 Industrial Performance

9.2.1 Industrial development activities in Kerala started as early as in the mid–19th century with the pioneering efforts of missionaries and other Europeans who started textile and coir factories in the state of Travancore. Erstwhile local rulers of Kerala, particularly in the princely state of Travancore, also demonstrated industrial dynamism. The traditional cottage industries such as coir, yarn, spinning, handloom weaving, fibre extraction, and other cottage industries were employment-generating. According to the 1931 census, about 15.18 per cent

"forward linkage" and helps in analysing how a change in the rest of the sectors influences a particular one. An industry with higher forward linkages than other industries means that its production is relatively more sensitive to changes in other industries' output.

of the people were engaged in different types of industries in Tranvancore[3]; the proportion was only 10 per cent as far as India as a whole was concerned.
The period between 1934 and 1948 is generally considered as the golden age of industrialisation in Kerala's history. It was during this period that several industries were established in Travancore and Cochin areas. The foundation of chemical industries was laid during this period. The period 1935−48 saw the establishment of a number of factories engaged in the production of rayon, titanium dioxide, textiles, ceramics, aluminium, plywood, glass, and chemicals and drugs. This period also witnessed setting up of several power projects in Tranvancore, Cochin and Malabar, which gave a boost to and created a favourable climate for the development of modern industries. The most important landmark in the industrial development of Kerala was when the "Fertilisers and Chemicals Travancore" **(**F.A.C.T.) was commissioned in 1947. The base of chemical industries was further expanded with the setting up of the Cochin refinery.

9.2.2 In the 1950s, Kerala witnessed the emergence and growth of a number of power generating projects with very high potential. These projects generated a very high demand for transformers, cables, conductors, control panels, circuit breakers, steel wires, relays, and a wide variety of other products that led to the growth of the electrical machinery industry in Kerala. Many other industries were also set up in Kerala during that period with a view to making use of the availability of power.

9.2.3 However, Kerala could not exploit the early mover advantages in industrial development. Its industrial dynamism started petering off in the post state-formation period. Its manufacturing can best be described as a sector that is characterized by slow and poor-quality growth.

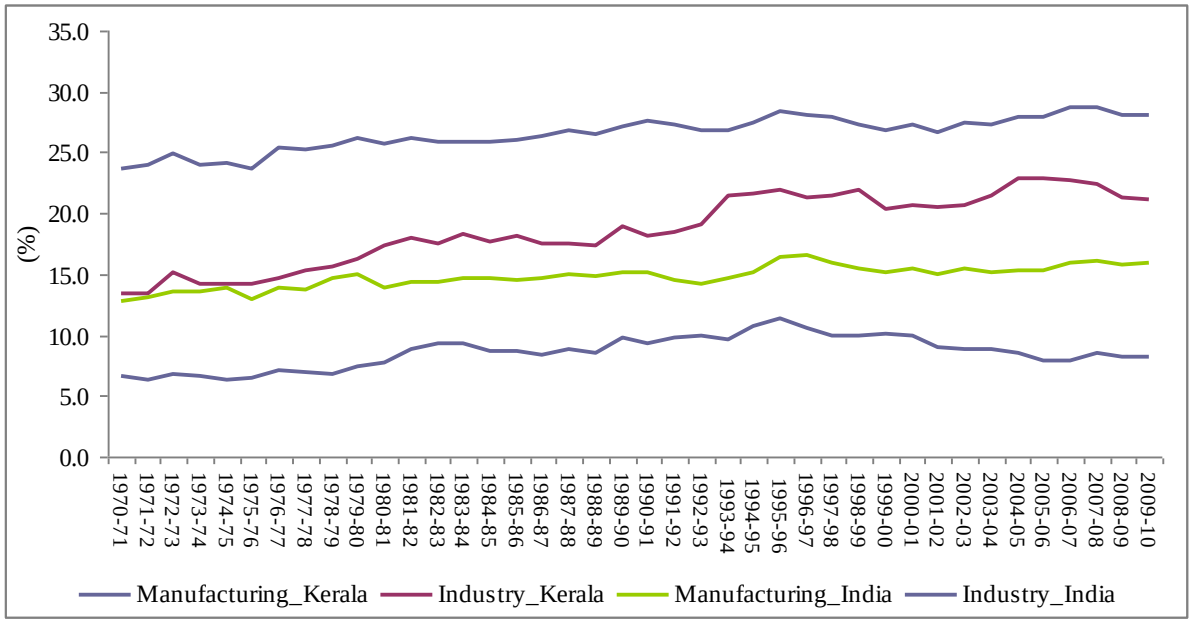
9.2.1 Slow growth

Low share of manufacturing in GSDP

9.2.1.1One of the most disappointing features of Kerala's economy is poor industrial growth, which is reflected in its low share in GSDP (Figure 9.2). While the economy has diversified, the overall contribution of industry, in particular that of manufacturing, to the GSDP remains disappointingly small. Industry accounts for 21 per cent of the state domestic product, which is significantly lower than the national average of more than 28 per cent. More disappointing is that the share of manufacturing in GSDP has been below 10 per cent, as compared with 16 per cent at the national level. Not only did the industrial sector never rise to its expected prominence but it has also been declining continuously since the late 1990s. This is despite several policy measures adopted by the government, particularly since 2001–02, to attract investment in manufacturing.

[3] Pillai, T.K.V. 1940. *Travancore State Manual*. Vol. III. Kerala Council for Historical Research (KCHR) Publications. pp.41.

Figure 9.2: Share of Industry and Manufacturing in GDP at the National and Kerala-state levels: 1970–71 to 2009–10 (%)



Note: These series are in constant terms with base year 2004–05
Source: Computations based on Central Statistical Organisation

9.2.1.2 A low share of industry reflects the relatively lower growth rate of industry. The State Development Report released in 2008 projected the growth of the industrial sector under three alternative scenarios[4]:

- The per capita industrial State Domestic Product (ISDP) of Kerala to be matched by the leading industrialised states of India, namely, Andhra Pradesh, Gujarat, Karnataka, Maharashtra, Punjab and Tamil Nadu, and India as a whole.
- The ISDP of Kerala to eliminate unemployment backlog in three to four years.
- The Industrial requirements of Kerala to correspond to the state's future projected power consumption needs.

9.2.1.3 A comparison of the minimum and the maximum growth targets of Kerala under the three methods reveal that the "Industrial State Domestic Product" of Kerala was to grow within a range of 6.69–11.7 percent at the minimum to 14–22 percent at the maximum. The actual growth rates presented in Table 9.1 shows that the actual growth remained at the minimum of minimum growth range. Indeed, the growth rate in the manufacturing sector has picked up strongly since the late 1980s and accelerated further since 2001–02. But it fell far short of the requirement, given a rather small industrial base. A strikingly disappointing trend is that the growth rates have been below the all-India averages for almost all the periods under review.

[4] Planning Commission, Government of India. 2008. Kerala Development Report. Academic Foundation.

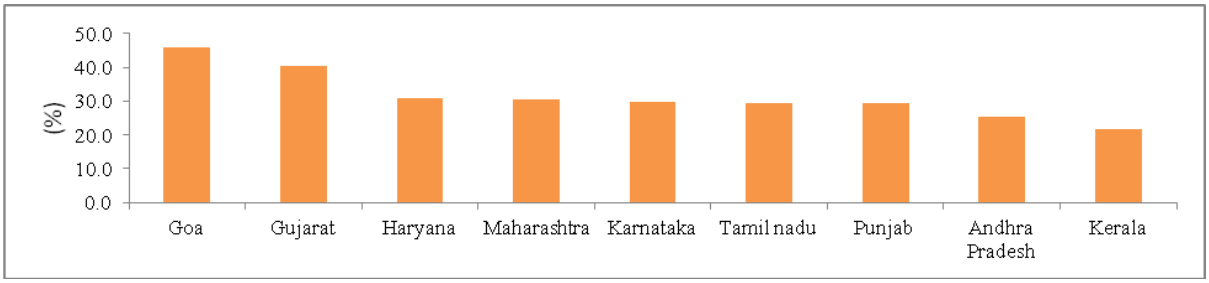
Table 9.1: Industrial SDP Growth rates in Selected Periods between 1970–71 and 2010–11(%)

Sector	*1970–71–1980–81*	*1980–81–1986–87*	*1986–87–2001–02*	*2001–02–2010–11*
Manufacturing	2.51	2.93	6.7	7.1
Registered	2.9	3.6	7.8	5.9
Unregistered	2.5	3.6	5.9	8.3
Construction	3.7	2.1	6.4	10.9
Water and electricity	11.3	–0.05	13.4	–0.17
Mining and quarrying	–2.27	6.5	11.6	11.9
Industry	3.27	2.12	6.35	7.8
Industry national	3.7	5.63	6.14	8.5

Source: Central Statistical Organisation

9.2.1.4 A comparative analysis of the top nine states, which contributed 52 per cent and 55 per cent to the total GDP of India in 2004–05 and 2009–10 respectively, shows that Kerala lagged behind all of them in terms of the average share of industry during 2004–05 to 2009–10 (Figure 9.3).

Figure 9.3: Average Industry Share in GSDP in Nine Indian states with Highest GSDP: 2004–05 to 2011–12 (%)



Source: Computations based on Central Statistical Organisation

9.2.2 Low quality industrial growth

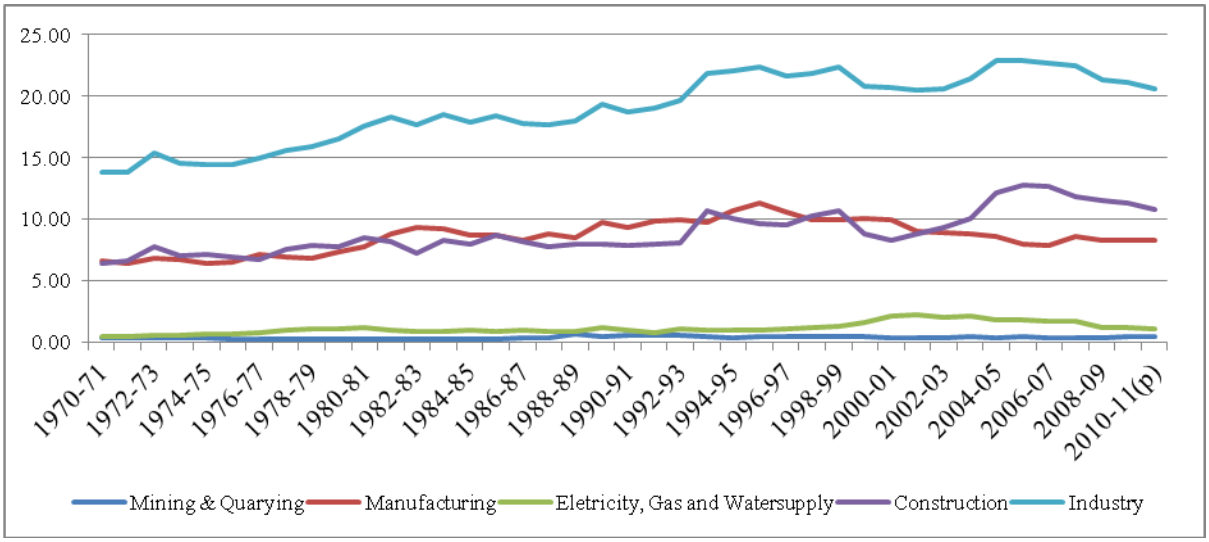
Low share of manufacturing in industry

9.2.2.1 More than quantity, quality of industrial growth matters. The quality is depicted by the composition of industrial growth. It is, for instance, well established that within industry, growth of manufacturing matters the most. This is because it makes crucial contributions to four objectives. One, it is scale intensive, is a major source of innovation and learning; and is a major driver of growth. Two, it creates high quality high wage employment, especially for those workers that otherwise would earn low wages. Three, it drives the service sector

growth. Four, it makes disproportionately large contribution to environment sustainability because a number of technologies and products that are critical to a clean economy are manufacturing intensive[5]. Utilities (such as water, electricity, and gas), another component of industry, are also crucial in any functioning economy. These must be developed and distributed adequately and affordably to the industry. The transmission of energy and water typically makes use of grid networks that are considered critical infrastructure. In contrast, mining and construction, in particular in the residential sector, are two relatively low-productivity, low-wage sectors.

9.2.2.2 While exploring Kerala's industrial sector within the above framework, it is observed that essentially construction, and mining and quarrying drive the industrial growth. Water and electricity also grew rapidly in the moderate-growth-regime of 1986–2002 but manufacturing has not shown signs of acceleration in any period. Its share has been declining both in industry and in overall GSDP since the late 1990s (Figure 9.4).

Figure 9.4: Share of Sectoral Growth Rates in Industry in Kerala: 1970−71 to 2010−11 (%)

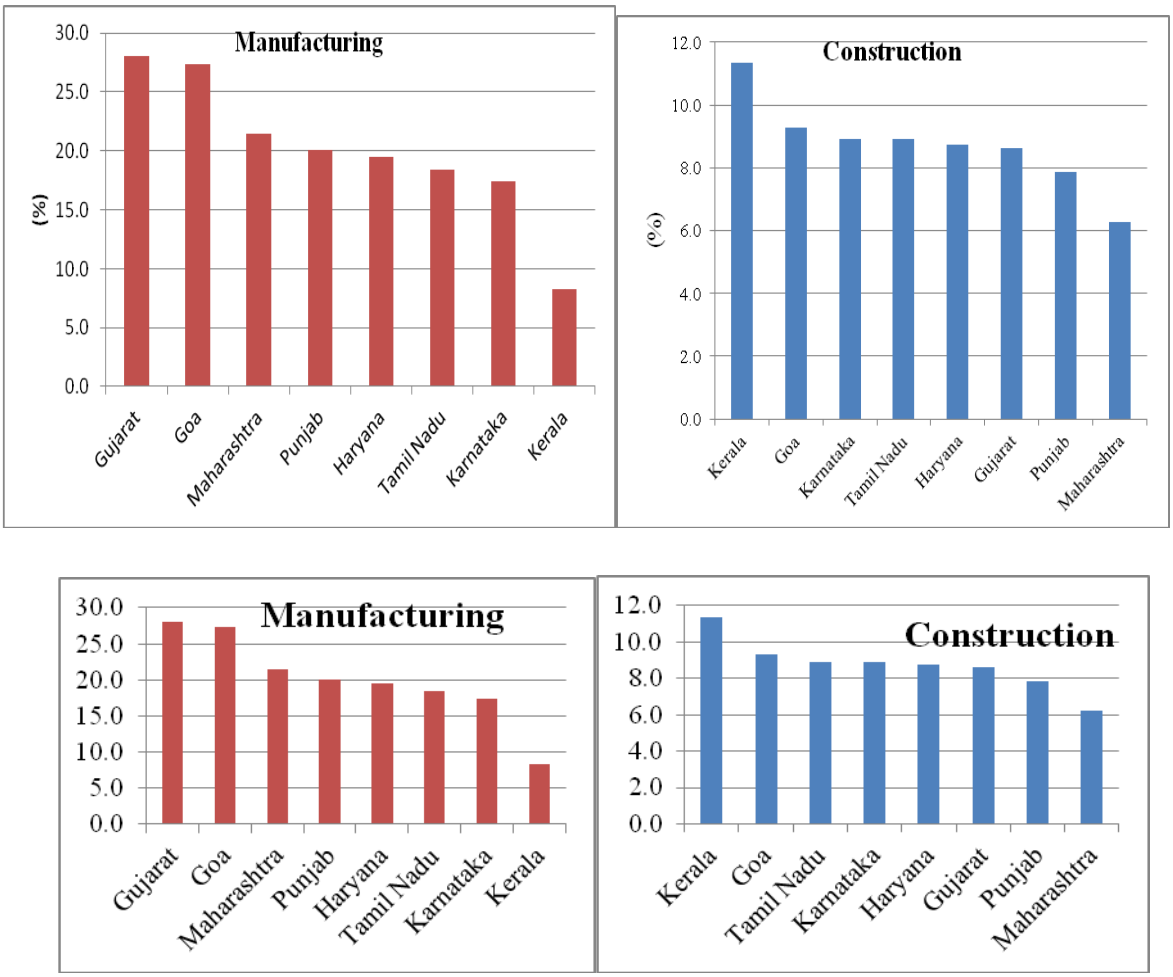


Source: Central Statistical Organisation

9.2.2.3 A comparative analysis of Kerala's industrial sector composition with nine other major industrial states reveals that the former is an outlier. In comparison with other states, its manufacturing sector is very small while the construction sector is disproportionately large (figure 9.5).

[5] Helper, S., Krueger, T. and H. Wial. *Why does Manufacturing Matter? Which Manufacturing Matters?* Advanced Industries Series. 1. February.

Figure 9.5: Inter-state Comparison of the Share of Manufacturing and Construction in GSDP: 2009–10 (%)

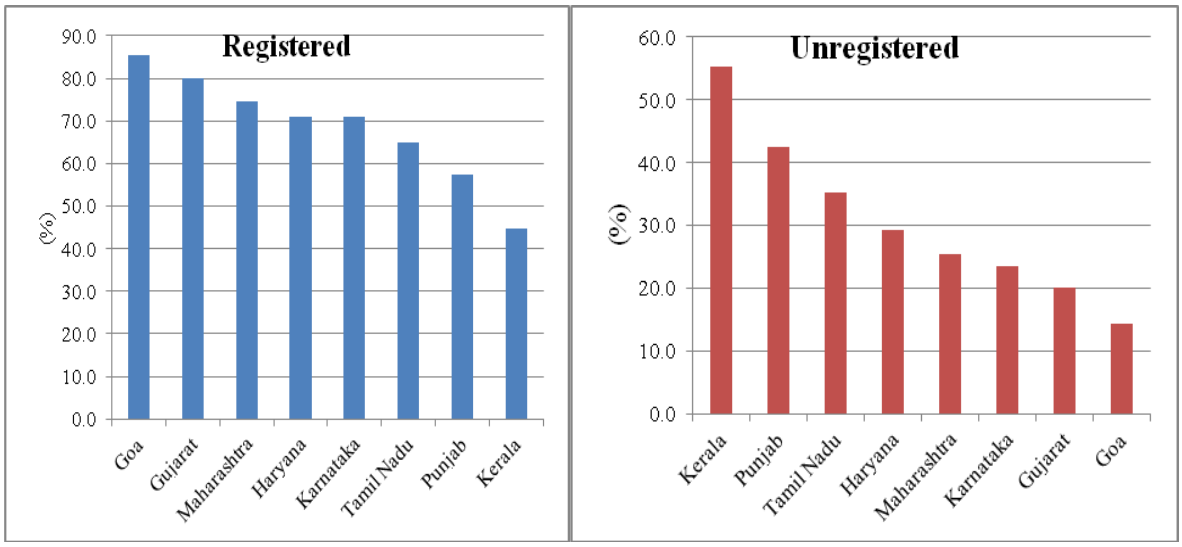


Source: Computations based on Central Statistical Organisation

Share of unregistered manufacturing is disproportionately large

9.2.2.4 Another highlight of industrialisation in Kerala is the disproportionately larger share of unregistered manufacturing in total manufacturing. It is not only larger than registered manufacturing in Kerala but also higher than in any other high-income state in India (Figure 9.6). Since the working conditions and wages are relatively lower in this sector, this is a matter of serious concern for policy makers.

Figure 9.6: Share of Registered and Unregistered Segments in Total Manufacturing across Selected States: 2009–10 (%)



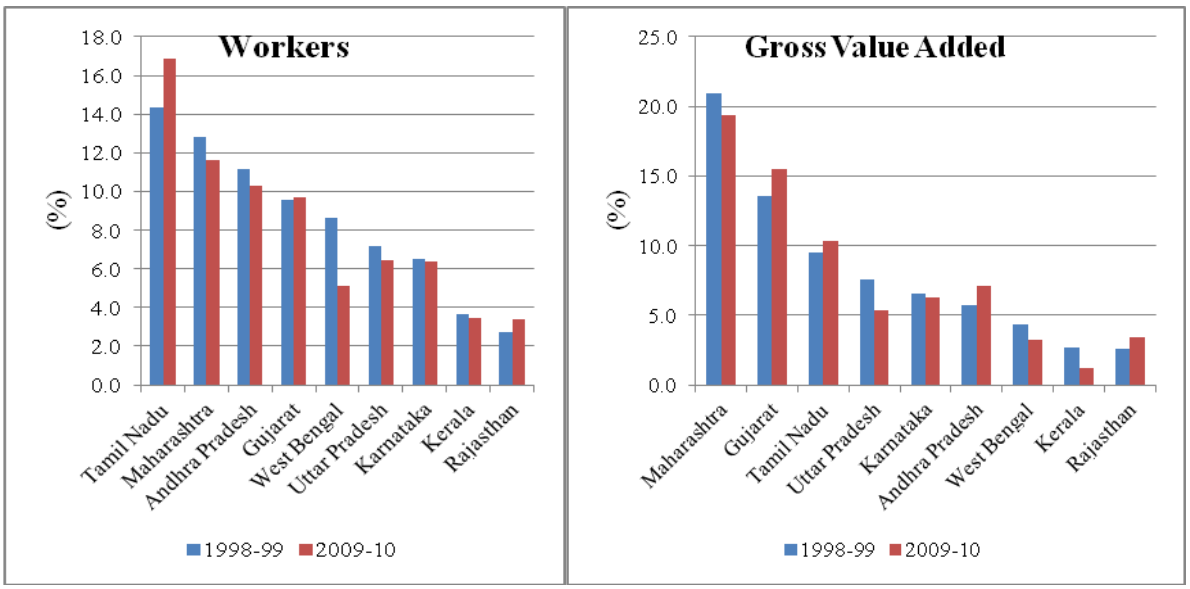
Source: Computations based on Central Statistical Organisation

Small and declining share of the registered sector

9.2.2.5 Kerala's factory sector is not only small but has also been shrinking over time as compared with the all India average. Its share in all India was 2.5 per cent in 1998–99, which declined to 1.2 per cent in 2009–10 (Figure 9.7). In terms of employment, also, there has been a decline in the share of Kerala in the national total.

9.2.2.6 An inter-state comparison of the share of 9 major states in all India factory workers and gross value added shows that, of these states, Kerala had made the smallest contribution to the national total and that its contribution has declined over time between 1998–99 and 2009–10 (Figure 9.7).

Figure 9.7: Share of Top Nine States in National Total Factory Sector GVA and Workers: 1998–99 and 2009–10 (%)



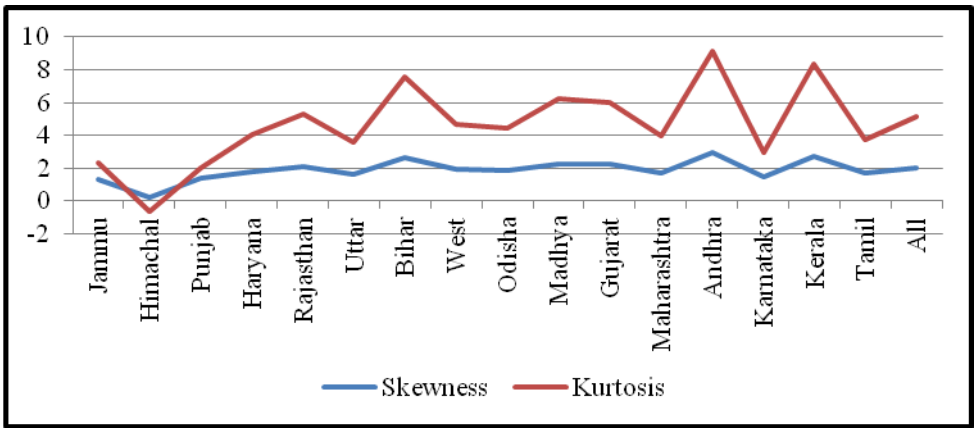
Source: Annual Survey of Industries

A highly skewed industrial structure

9.2.2.7 Enterprise size distribution in registered industry is highly right-skewed in Kerala. Figure 9.8 reveals a high degree of skewness with a positive sign in Kerala's industry as compared with the rest of the Indian states[6]. Interestingly, Kurtosis of the distribution is also high indicating a distinct peak near the mean. This shows that most enterprises are clustering within a short range of small size groups. Over 42 per cent of the total enterprises in the state are in the smallest size group of 0–14 workers.

[6] Skewness is defined as asymmetry in a statistical distribution. Kurtosis is a measure of the "peakedness" of the probability distribution of a real-valued random variable.

Figure 9.8: Skewness and Kurtosis of Size Distribution of Industries across Major Indian states: 2008–09



Source: Annual Survey of Industries

Lop sided composition of industries

9.2.2.8 While the industrial base is quite diversified in the state, the structure is rather narrow with 11 of 61 two-digit industries contributing 75 per cent of the value addition in both years. Three resource-intensive industries, namely, 'coke, refined petroleum products and nuclear fuel', 'food products & beverages' and 'chemical & products' contributed approximately half of the total gross value added in both 1998–99 and 2007–08 and have been the top rung industries. Their aggregate share has remained constant over time (Table 9.2). Within this sub-group, however, the composition has undergone a significant change. The share of the refinery sector, which is publicly owned, has increased from 12 per cent to over 23 per cent. The chemical and food processing sectors, both of which have private sector dominance, have shrunk.

9.2.2.9 In the second rung, textiles, electronics, publishing, and rubber based industries constituted 26 per cent of the GVA in 1998–99. However, their share declined to 23 per cent by 2007–08. While the share of rubber and publishing increased further, the decline was due to a drop in the shares of textiles and electronics. Clearly, there has been degradation in the Kerala industrial structure, with resource-oriented industries increasing their share. Most industries in Table 9.2 that have increased their share are resource-based.

Table 9.2: Share of 2–digit Industries in Manufacturing Sector in Kerala: 1998–99 and 2007–08 (%)

Industries with increasing share			*Industries with declining share*		
Industry	***1998 –99***	***2007 –08***	***Industry***	***1998 –99***	***2007 –08***
Tobacco Products	0.1	1.2	**Food Products and Beverages**	**19.6**	**15**
Wearing Apparel Dressing and Dyeing of Fur	0.2	1.1	Textiles	6	3.2
Publishing, Printing	5.6	8.5	Leather	2.3	0.4
Coke, Refined Petroleum Products and Nuclear Fuel	**12**	**23.3**	Wood and Products of Wood	1.1	0.9
Other Non-Metallic Mineral Products	3.1	3.6	Paper and Paper Products	2.7	1.1
Basic Metals	3.5	4.6	Rubber and Plastic Products	8.2	7.6
Fabricated Metal Products, Except Machinery and Equipments	1.2	2.7	**Chemicals and Products**	**18.4**	**10.4**
Furniture; Manufacturing N.E.C.	0.3	0.5	Machinery and Equipments N.E.C	2.1	1.3
Medical, Precision and Optical Instruments, Watches and Clocks	0.6	0.9	Electrical Machinery and Apparatus N.E.C.	2.3	1.9
Other Transport Equipment	2.4	5	Electronic products	5.9	3.9
Office, Accounting and Computing Machinery	0.1	0.2	Motor Vehicles, Trailers and Semi-Trailers	0	0.03
Others	2.3	3.6			

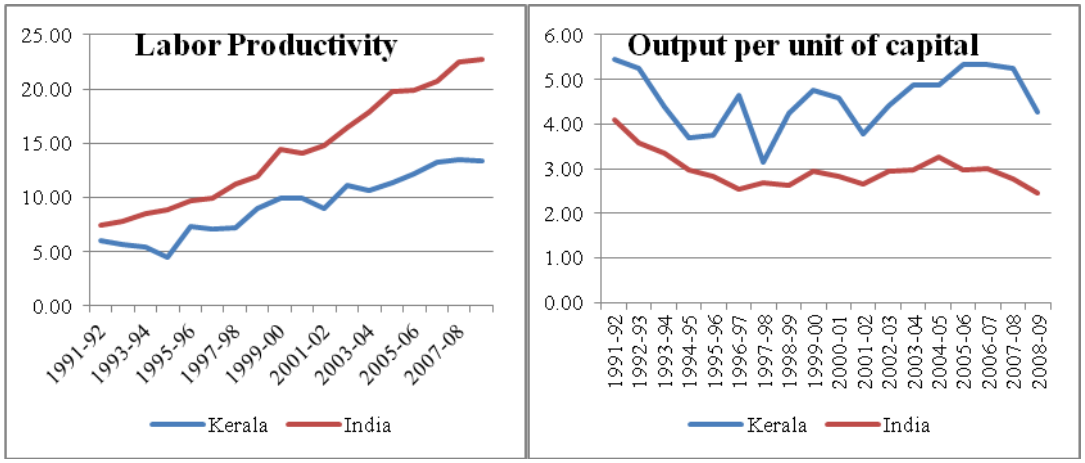
Source: Annual Survey of Industries

Low efficiency

9.2.2.10Labour productivity is an indicator of productive efficiency that measures the relationship between an industry's output and the labour hours used in producing that output. Figure 9.9A plots labour productivity trends from 1991–92 through 2007–08 for the factory sector both in Kerala and at the national level. It shows that labour productivity in Kerala has always been less than the national average. However, the difference had been marginal until 2000. After the year 2000, national average productivity surged while that of Kerala slowed down, increasing the gap between the two. Output per unit of capital for Kerala and all India also diverged over this period (Figure 9.9B). It is also noteworthy that the wage cost per unit of output has declined continuously in Kerala (Figure 9.9C).

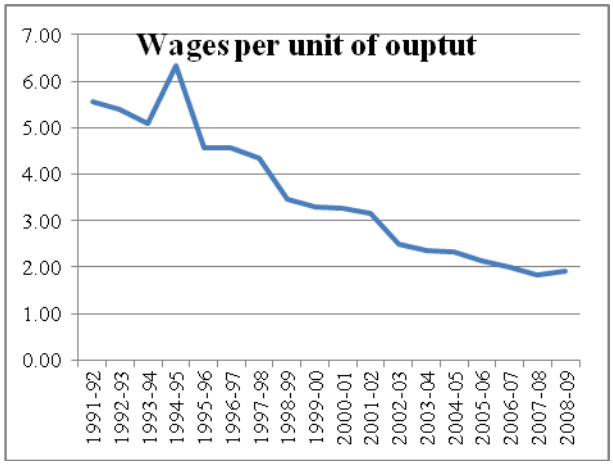
Figure 9.9: Gross value added per unit of labour and capital for Kerala: 1991–92 to 2007–08

A **B**



Notes: A. Rs lakh per worker and B: Units Rs and Base Year: 2004–05

C

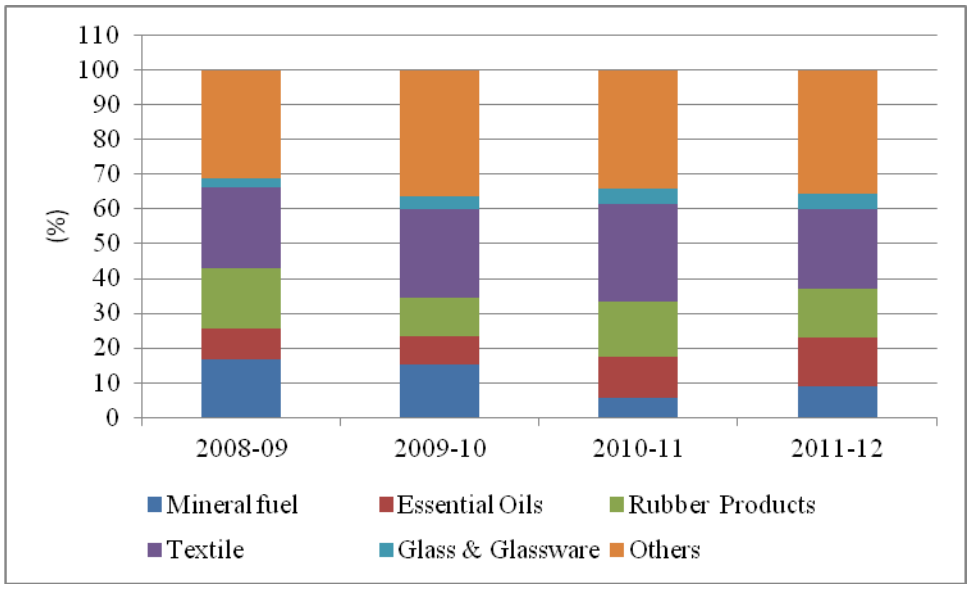


Note: Units: Rs and Base Year is 1998–99
Source: Annual Survey of Industries

International trade in merchandise products

9.2.2.11 The structure of exports reflects competitive advantages of the state. The DGCIS Kerala State data on trade indicates that the share of agriculture in merchandise exports remains more than 50 per cent while that of agro-processing remains at just 6 per cent. This bias needs to be corrected. Figure 9.10 shows that the composition of Kerala's manufacturing exports is dominated by textiles, rubber products and essential oils resinoids; cosmetic and other similar preparations.

Figure 9.10: Composition of Kerala's Manufacturing Exports 2008–09 to 2011–12 (%)



Source: Directorate General of Commercial Intelligence and Statistics (DGCIS)

Mining

9.2.2.12 Kerala is rich in deposits such as heavy mineral sand, china clay, iron ore graphite, bauxite, silica sand lignite lime shell etc. However, mining activities are largely based on mainly on four minerals, such as heavy mineral sand, china clay, silica sand limestone and graphite. About 90 per cent of the total value of mineral products in the state is lying covered by heavy mineral sand and china clay. However, 75 per cent of the mineral revenue comes from the minor minerals. Mining in Kerala faces obstacles like non availability of land for mining, vast expanse of reserve forest and dense population.

9.2.2.13 There are 81 major mineral mines that are in operation in the State. Also there are 3,500 licensed minor mineral quarries in the State. Government gets revenue from minerals mainly by way of royalty. Revenue collected during the year 2011-12 is Rs 44.3 crore (Rs 11.17 crore from major minerals and Rs 33.13 crore from minor minerals) which is 22 per cent higher than the previous year collection of Rs 36.34 crore.

Table 9.3 Revenue collection from the Minerals in 2005−06 to 2009−10 (Rs crore)

Year	*Major Minerals*	*Minor Minerals*	*Total*
2005−06	7.33	16.27	23.6
2006−07	6.54	19.93	26.47
2007−08	7.05	24.03	31.08
2008−09	7.59	27.9	35.49
2009−10	8.74	26.33	35.07

Source: Mining & Geology Department via State Planning Board, Government of Kerala. Economic Review 2010 and 2012, Thiruvananthapuram

9.2.3 What went wrong?

9.2.3.1Kerala has natural, resource based and communication advantages in industry. It has a long coastal line facilitating trade. Further, it is strategically located on the trans-national trade corridor. It has rich deposits of non-metallic minerals. When compared to the neighbouring states of Tamil Nadu, Karnataka, and Andhra Pradesh, Kerala is relatively poor in ferrous and non-ferrous metals and basic industrial raw materials, such as coal, limestone, etc. The state however, possesses rich deposits of beach placer sands consisting of ilmenite, rutile, monazite, zircon, sillimanite, etc. Other minerals of economic importance found in the state are iron ore, bauxite, limestone (both of crystalline and marine origin), graphite, and mica. Finally, it has vast hydel power resources for energy production. Until 1982, the state was enjoying a surplus position in power production. As has been discussed earlier in this report, it also has a large educated and trained labour force, which is looking for decent employment commensurate with skills. Its Human Development Index is on par with many developed countries. The state, as mentioned above, also had an early mover advantage. Before the starting of Five Year Plans, 39 industrial units were already registered[7]. However, the industrial dynamism could not be sustained after independence.

9.2.3.2 The industrial development of Kerala during the first 10 years after independence was not at all satisfactory[8]. Comparatively, very little importance was given to industries in the first two Plans. In the first Plan, the outlay for industries was a mere Rs. 112 lakh, 3.7 per cent of the total Plan outlay. The total outlay for industries in the Second Plan increased to Rs. 6.84 crore, i.e., 7.9 per cent of the total Plan outlay but the share of Kerala in the Central investment remained a mere 0.1 per cent[9]. While at the national level heavy industrialisation was taking place, in Kerala, more attention was given to the promotion of small, cottage and

[7] Sreekala, K. 1995. *Problems and Prospects of Industrialization and Their Impact on Environment with Special Reference to Kerala: A Gandhian Critique*. PhD dissertation submitted to Mahatma Gandhi University, India, 1995.

[8] The reference for this paragraph is Sreekala (1995).

Sreekala, K. 1995. *Problems and Prospects of Industrialization and Their Impact on Environment with Special Reference to Kerala: A Gandhian Critique*. PhD dissertation submitted to Mahatma Gandhi University, India, 1995.

[9] Sreekala (1995) cited the data from this report: Government of Kerala. 1990. *Report of the Steering Committee on Industry and Mining 1990*. pp.11.

traditional industries. This continued in the third plan as well, when the industrial outlay was increased to over 10 per cent. In 1961, the Kerala State Industrial Development Corporation (KSIDC) was established as the nodal agency for the promotion of large and medium scale industries in Kerala. But, industrial activities could not be accelerated.

9.2.3.3 In the late 1960s, there was a resurgence of interest in industrial promotion by the state. Several efforts were made by the successive government to revive industrialisation. The first industrial policy in Kerala was formulated in 1967 with the following objectives: acceleration of industrial activity, raising of industrial finance, and formation of industrial corporations to expand or rehabilitate industries and make subsequent plans to increase industry outlays. Following this, a variety of service agencies were set up in the early 1970s. These included: the State Industrial Development Corporation, Kerala Financial Corporation, Kerala Technical and Consultancy Organisation, State Electronic Development Corporation, and the Kerala State Industrial Enterprises Limited. In subsequent years, the policy evolved through successive Industrial Policy Statements. While there has been no revision in the Industrial Policy Statement at the national level after 1991, Kerala government has revised its Industrial Policy Statement several times over the past decade: 2001, 2003, 2007, 2009 and 2011(draft). Essentially, the objective is to offer a package of policy measures and incentives, which seeks to make Kerala one of the most attractive investment destinations in the country and to accelerate the industrial growth in the state by attracting a steady stream of investment into industry, infrastructure, and core strength sectors. The Industrial Policy Statements cover almost every aspect of industrialisation: promotion of the thrust sectors, small scale industrial units, medium and large scale industries and traditional industries, industrial infrastructure, industrial R&D, industrial relations, industrial entrepreneurship, human resource development, incentives, and marketing.

9.2.3.4 Another important policy is the Biotechnology (BT) Policy, which has been framed to catalyse the development and application of BT, take advantage of the State's resources and emphasise its specific needs while meeting global requirements. The State Government has also formulated an "Information Technology Policy", with the aim to establish Kerala as a global centre for excellence in human resources, through the creation of a large pool of diverse, multi-skilled technically competent manpower in the State. Also, there is an "Energy Policy", which is directed towards placing a greater thrust on overall development and promotion of renewable energy technologies and applications.

9.2.3.5 The promotion of industrial infrastructure in the form of industrial estates/parks has been an integral part of the industrial policy in Kerala since the Third five-year Plan. An elaborate government set up has emerged in the state, which has been entrusted with the responsibility of developing and managing industrial infrastructure, specifically aimed at the economic development of the industrially backward regions of the State, by setting up industrial estates, industrial areas, industrial Parks/Townships/Zones, etc.

9.2.3.6 Notwithstanding all of the above, the state failed to attract private investment. Kerala's industrial backwardness is associated with several socio-political developments in the state that took place in the post- formation period:

- From the historical and social perspective, labour unionisation has frequently been cited as a major cause of industrial backwardness. The argument is that strong labour unions had been successful not only in raising the wages which were not commensurate with the productivity of labour but also in resisting introduction of new technologies, particularly in the sixties and seventies. While the incidence of labour unrest has declined over time, a highly active role of trade union movement and a high incidence of labour unrest in the past gave the state an image of one with an unfriendly investment climate. This image continues to linger.
- Politically, government instability adversely affected the confidence of investors. It is also argued that excessive bureaucratisation and over-politicisation of the society, and public action politics (see, Chapter 1) affected entrepreneurship badly.
- Economic factors that affected industries adversely include: shortage of capital, infrastructural bottlenecks, non-availability of land, and above all, a non-conducive business environment. The project-based approach of creating industrial infrastructure in terms of industrial parks and estates and promoting other services through state- owned agencies with little strategic vision and focus appear to have proved ineffective in propelling industrial growth in the state.

9.2.3.7 Therefore, despite the high degree of human resource development and the early rise of a commercially minded middle class, the private capitalist class could not emerge in the state. In the late 1960s, the state government assumed the role of an industrial entrepreneur and spread its limited resources[10] thinly across a large number of public sector enterprises. A number of large enterprises in the public sector emerged: the first steel complex at Feroke and the expansion of Traco Cable, Cochin Refineries, Hindustan Latex, Hindustan Machine Tools, Modern Bakeries, etc. The government also exhibited enthusiasm for "industrial cooperatives" as a means to achieve economic development with social development. The period of the late 1960s witnessed a massive drive to promote cooperative societies not only for traditional and small industries but also to expand the modern sector. The coalition government formed a number of corporations to rehabilitate or expand industries relating to coir, cashew, handloom, textiles, minerals, and handicrafts. In the late 1970s, a massive new programme was launched to create 100,000 new units, revitalise the old ones over the period of four years, and to reorganise the industrial department. As a result of these and other policy initiatives, Kerala has the distinction of having the largest number of state government owned units. There are 63 Public sector units (PSUs) under the Industries Department, out of which, 17 have remained closed for long periods. Five are welfare corporations and four are developmental agencies. Thirty-seven companies are directly engaged in manufacturing

[10] Only 3.7 per cent of total plan outlay was allotted to industry and mineral in the first plan which increased slowly to 11 per cent by the fifth plan.

activities. These units are spread across several sectors, including the traditional ones. Most units until 2005–06 were making losses, though in 2006–07 there was a considerable leap, both in turnover and profit.

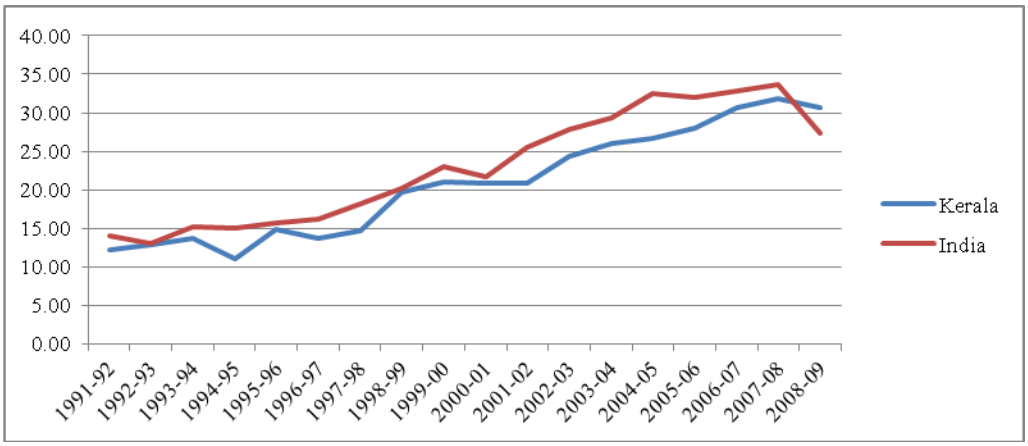
9.2.3.8 Thus, state capitalism could not replace private capitalism. Recognising the importance of private capital and entrepreneurship, the state government has taken several measures, especially since 2001–02, to promote industrial investment within the state. But these measures do not appear to have made a significant dent on investment in the private sector due to the overall investment climate.

9.2.4 Social Implications

Jobless growth and declining wages

9.2.4.1 The predominance of low and medium tech industries in Kerala's manufacturing has social implications. The main pillar of strength for these industries is their cost competitiveness. But in Kerala, high wage rates in the initial phase eliminated their cost competitiveness. This situation was not tenable and resulted in jobless growth. Employment elasticity came down to 0.07, which is much lower than the national average (0.2). Output per worker is higher in India than for Kerala throughout the period starting from 1991−92 to 2008−09. For Kerala the number in 1991−92 was Rs 7.4 lakh per worker and in 2008−09 was Rs 15.4 lakh per worker. The corresponding numbers for India were Rs 9.89 lakh per worker and Rs 29.35 lakh per worker, respectively. Emolument (wages and salaries including employer's contribution) per worker is also higher in India than for Kerala throughout the period starting from 1991−92 to 2008−09. For Kerala the number in 1991−92 was Rs 600.1 per worker and in 2008−09 was Rs 502.1 per worker. The corresponding numbers for India were Rs 693.7 per worker and Rs 1,366.6 per worker, respectively. Combining output per worker and emoluments per worker, Figure 9.11 shows output per emoluments and one can interpret two things from this. One, the industry in Kerala has been more labour intensive than the national average the in organised manufacturing sector. Two, despite that, emoluments per worker remained lower than the national average until recently. This situation could not be sustained for long, and the emolument per unit of labour started increasing in Kerala above the national average towards 2006–07.

Figure 9.11: Output per unit of emoluments (in real terms): 1991–92 to 2008–09 (Rs)

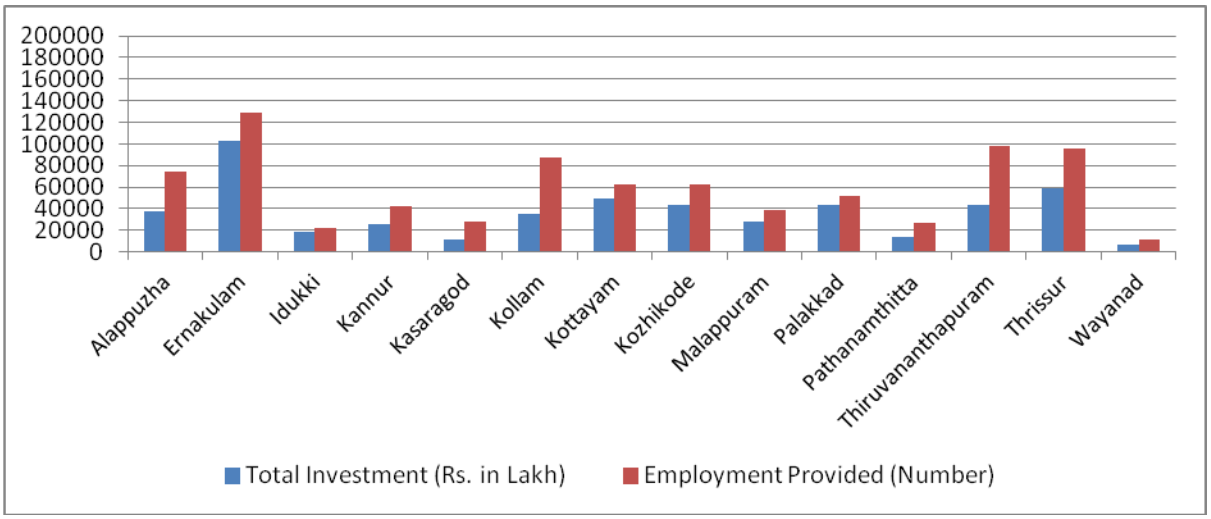


Note: For deflating Emoluments: we have used Consumer price Index for Kerala: base 1998–99 and India: base 2000–01. Correlation between real emoluments with base 1998–99 and base 2000–01 is 91 per cent.
Annual Survey Industries gives the data for formal organised manufacturing sector
Source: Annual Survey of Industries

Regional inequalities

9.2.4.2 Of the 14 districts in the state, only 5 districts attract substantial investment: Ernakulam, Thrissur, Kottayam, Thiruvanthapuram and Kollam. Of them, Ernakulam leads by a big margin (Figure 9.12). Other districts are marginalised.

Figure 9.12: Industrial Investment and Employment across 14 districts of Kerala, 2009–10



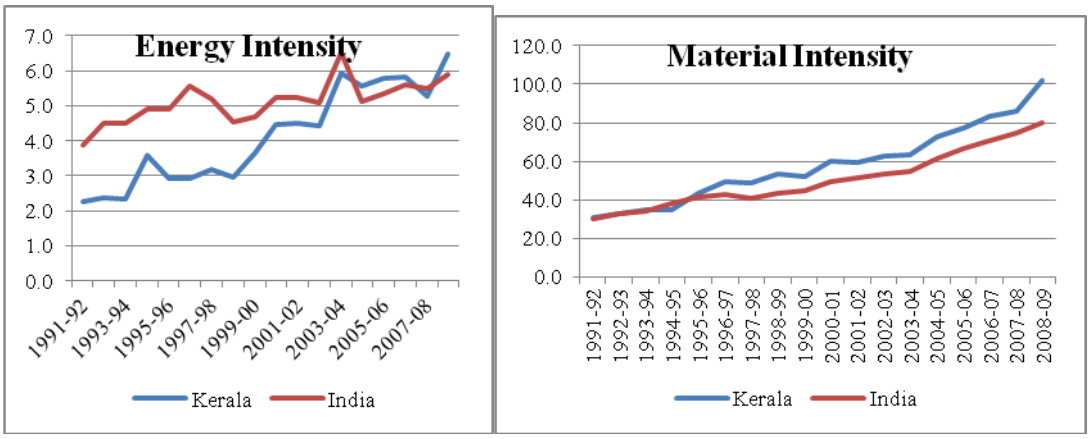
Source: Indiastsat.com

9.2.5 Environment implications

9.2.5.1 Considering the fact that the industrial structure of Kerala has been skewed in favour of the resource intensive industries, the material intensity of Kerala industry has been higher

than the national average (Figure 9.13). This could be due to predominance of resource intensive industries in Kerala's industrial composition. It may also be seen that Kerala's advantage in energy intensity is also reducing(Figure 9.13). High material and energy intensities have environment implications for Kerala. Further, Kerala also has a severe problem of solid waste management. Industrial firms have been one of the major sources of waste generation polluting environment further. The Greater Kochi Area (GKA) ranks 24th (with Comprehensive Environment Pollution Index (CEPI) score of 75.08) amongst the critically polluted areas (CPA) in the country[11]. The main pollution sources of concern are industries, municipal solid waste, biomedical waste, e-waste, and domestic waste.

Figure 9.13: Material and Energy intensities of Manufacturing in the Factory Sector: Kerala and National Average (1991–92 to 2008–09)



Note: Energy Intensity is only available till 2007−08
Source: Annual Survey of Industries

9.3 Opportunities

9.3.1 The state enjoys revealed comparative advantage among Indian states in selected three-digit industries. These are provided in Table 9.4. Most of them are resource based. More important to note, however, is that it also has comparative advantage in some knowledge intensive electronic and electrical components industries, such as Electronic Valves, and Television & Radio. This provides the state with opportunities to expand its base in technology-driven segments of the industry by building on this.

[11] Kerala State Pollution Control Board. 2010. Action Plan for Greater Kochi Area. http://cpcb.nic.in/divisionsofheadoffice/ess/F-Kochi.pdf.

Table 9.4: Revealed Comparative Advantage based Classification of three–digit Industries in Kerala

Industries with Revealed Comparative Advantage (RCA)	*Industries which do not have Revealed Comparative Advantage*
Food Processing, Tobacco, Other Textiles, Wood, Printing & Publishing, Refinery & Petroleum Products, Basic Chemicals, Rubber Products, Fabricated Metals, Electronic Valves, Television & Radio, Instruments & Appliances, Repair of Boats & Ships.	Beverages, Knitted and crocheted fabrics and articles, Spinning, Weaving and finishing of textiles, Wearing apparel, Leather, Paper and paper products, Other chemical products, Plastic products, Glass and glass products, Non-metallic mineral products n.e.c, Basic precious and non-ferrous metals, Structural metal products, Reproduction of recorded media, Coke oven products, Man-made fibres, Basic Iron & Steel, Casting of metals, General purpose machinery, Accumulators, primary cells and primary batteries.

Source: NCAER's calculations based on Annual Survey of Industries

Mega Projects

9.3.2 The state government has initiated several mega projects to kick-start the industry:

- Integrated Petroleum, Chemicals and Petrochemical Investment Regions (PCPIRs) spread over an area of 10,000 acres of land.
- Kochi-Palakkad National Investment and Manufacturing Zone (NIMZ) for Rs 53,825crore. Spanning over a vast area covering Ernakulam, Thrissur, Malappuram, and Palakkad districts, it proposes to establish industrial and commercial establishments across 20 identified nodes.
- Electronic Park with infrastructure development, with a cost of Rs 336 crore and land cost of Rs 750crore over 334 acres of land at Amballur village in Kochi.
- The Rs 2,000crore Supplementary Gas Infrastructure Project by Kerala Gail Gas Limited (KGGL). KGGL will take up initiatives including city gas distribution, CNG stations for KSRTC buses, establishment of a gas training institute, laying of spur lines from GAIL's main pipeline, and setting up of gas-based small power generating plants.

- The Kochi Metro Rail.
- A Rs 320 crore Oceanarium project through Public-Private-Partnership (PPP) in Kochi on 36.5 acres of land.

9.3.3 In addition, the Vizhinjam International Deep Water Multipurpose Seaport, the Monorail Project in Thiruvananthapuram and Kozhikhode, the Indian Institute of Information Technology, Kottayam, Sea Plane Services in Kerala, and Gas Based Power Project at Cheemeni and Suburban Railway Corridor Project are some of the other projects that have been in the pipeline. These projects will offer rich opportunities for industries to grow in the state.

9.3.4 Keeping in view the challenges and opportunities, a strategic framework has been proposed for the sustainable development of manufacturing in the state.

9.4 Vision, Mission and Objectives

9.4.1 Vision

9.4.1.1 To establish Kerala as a one of the most attractive locations for business investments in Asia. Kerala will develop its industrial sector that is:

- dominated by high value added activities,
- innovation driven, and
- socially and environmentally sustainable

9.4.2 Mission

9.4.2.1 “Sustainable industrial prosperity”

9.4.3 Strategic goals

9.4.3.1 Economic:

- Increase the share of manufacturing from 8 per cent to 10 per cent of GSDP by 2030.
- Shift the structure of industry from resource-driven to efficiency-driven over the next 20 years and, further, to innovation-driven by 2040.

9.4.3.2 Social:

- Reduce the share of the informal sector in total manufacturing to 20 per cent from 56 per cent to achieve developed countries standards.
- Promote sustained employment in manufacturing.

9.4.3.3 Environment:

- Save energy per unit of production by 20 per cent.
- Reduce, recycle and reuse 60 percent of industrial waste by 2030.

9.5 The Strategic Framework

9.5.1 The central idea is to achieve sustainable industrialisation. This calls for a strategy that sets out the path for a development model that would balance economic prosperity, environmental stewardship, and social sustainability. Also, there is a growing recognition that social and environmental sustainability are significant components of, and complements to, economic performance. Hence, they need to be properly integrated with the objective of accelerating industrial growth to drive it towards higher levels of sustainable prosperity. The four pillars of the new industrial strategy will be as follows:

9.5.1 Strategic Elements and Action Plan

Pillar 1: Industrial prosperity

Action Plan 1: Focus on restructuring industrial structure towards high knowledge intensity

Prioritise high knowledge activities

9.5.1.1Promotion of industries on the basis of existing comparative advantages is not the first best approach. Comparative advantages is not a static phenomenon, it changes over time. The focus in industrial planning of Kerala will be on continuous upgrading of industry from a low value- added, resource-driven economy to a high value-added, innovation-driven economy. It will not mean focusing on industries producing knowledge-based goods alone. Rather, it means increase in the knowledge intensity of industrial production. This can be achieved by promoting both new technologies for existing products and new knowledge- intensive industries. The industrial policy, instead of prioritising industries, will therefore adopt a more dynamic approach of targeting activities and product/services. Under the new industrial strategy, interventions will be targeted to three sets of activities:

- All new products/technologies in both the non-traditional and traditional/established industries.
- All start-up companies in nascent non-traditional sectors/industries to encourage imitative entry to promote industry growth.
- New industries.

9.5.1.2 The new industrial strategy will be to encourage the diversification of the industrial structure by promoting innovative (not necessarily new) and non-traditional industrial projects, and upgrading the traditional industries.

Diversify the industrial structure

9.5.1.3 The state, by making full use of the current resources, infrastructure and ports, will promote the existing industries, such as petrochemical, agro processing and shipbuilding, and at the same time will speed up the development of the equipment- manufacturing industry. It will make breakthroughs in 5 key areas, namely:

- Nuclear power equipment.
- Environment related equipments and services.
- Wind power equipment.
- Major equipment for power transmission and transformation.
- Ocean engineering equipment.

9.5.1.4 The objective will be to forge a world-class manufacturing base for major sets of equipment. The non-mineral raw materials used by the electrical machinery industry and equipment are available within Kerala (as discussed above), and can be leveraged.

9.5.1.5 In services, it will promote ICT (Chapter 12) and tourism (Chapter 11) and lay the foundation of:

- Logistics industry.
- Environment services.
- Financial services.
- R&D services.

9.5.1.6 Kerala will thus develop into a globally important belt for hi-tech industries by rapidly enhancing its core competitive strengths in hi-tech activities.

Design an appropriate incentive structure

9.5.1.7 A well- designed incentive structure will be a key element of the industrial policy. The incentive structure will be based on the carrot and stick strategy. Under the policy, 'carrot' in the form of subsidy, or protection, or tax incentives, or venture capital will be offered to investors in new industries and to those with new ideas. These economic rents will in turn be subject to performance requirements, which will act as a 'stick'. The idea will not be to choose the winners but to choose the potential winners. Failures will be allowed but not to use up the economy's resources indefinitely[12]. The policy will ensure that the bad projects

[12] Rodrik, D. 2004. *Growth Strategies*. Harvard University, August 2004.

are phased out. East Asian industrial policies have typically had both elements. Latin American industrial policies typically have used too much of the carrot, and too little of the stick, which explains why Latin America has ended up with much inefficiency alongside some world-class industries.

9.5.1.8 An extreme form of incentive is investment guarantees on new ideas and new products. This means that if the project fails, the government will make up the entire amount spent to the investor. The South Korean government used this as a tool to promote new industries. Since this has the potential of being misused, its use may be restricted to certain new industries.

Action Plan 2: Improve economic efficiency

9.5.1.9 Business environment and freedom determine the institutional environment, which has a strong bearing on competitiveness and growth. However, institutional environment is only one set of factors that determines competitiveness. Competitiveness is a much broader term that covers the set of institutions, policies, and factors that determine the level of productivity of an economy that is a fundamental driver of its growth rate. The World Economic Forum has identified 12 pillars of competitiveness[13]. These are grouped into three categories: basic requirements, efficiency enhancers, and innovation and sophistication promoters. Some of them can be addressed directly as part of industrial planning. These can be regrouped into four broad categories:

- Business regulations: legal and administrative framework, labour market efficiency, and good market efficiency.
- Infrastructure.
- R&D.
- Financial development.

Improving legal and administrative framework

9.5.1.10Improving the legal and administrative framework within which individuals, firms, and governments interact to generate wealth is a key element in the new growth strategy. A growing body of research has traced the effects of simpler business regulations on an accelerated pace of new business creation. There is a high correlation (0.83) between the Doing Business rankings and the rankings on the World Economic Forum's Global Competitiveness Index[14].

[13] Schwab, K. 2013. *The Global Competitiveness Report 2013–14: Full Data Edition*. World Economic Forum, Geneva, Switzerland.
[14] World Bank and International Finance Corporation. 2013. *Doing Business 2013:Smarter Regulations for Small and Medium Size Enterprises*. World Bank, Washington D.C, USA.

The IFC/World Bank produces an annual report on Doing Business, comparing countries across the world. These indicators measure the efficiency in achieving a regulatory goal, such as the number of procedures to be followed to obtain a building permit or the time taken to grant legal identity to a business. Typically, the Doing Business series does not compare different states of India. But in 2009, it produced a special study called "Doing Business in India" which compared the business environment in different cities of India. Of the 17 cities it examined, Kochi was the second last,before only Kolkata[15]. Since Kochi is the business centre of Kerala, conditions are not expected to be better in other Kerala cities. It is worrisome that among Indian cities, Kerala lags far behind in terms of business-friendly environments.

9.5.1.11 The ease of doing business does not mean fewer (or no) regulations. Rather it means having rules that facilitate interactions in the marketplace without needlessly hindering the development of the private sector. It is proposed here that the State should adopt SMART (Streamlined, Meaningful, Adaptable, Relevant and Transparent) business regulations. A growing body of research, which revolves around business entry rules, shows that simpler entry regulations encourage the creation of more new firms in the formal sector. These studies have confirmed the positive association between improvements in business registration and registration of new firms in such countries. More specifically, these studies have reported increases of 5–17 per cent in the number of newly registered businesses after reforms of the business registration process[16]. Where regulation is particularly onerous, levels of informality tend to be higher. Informality comes at a cost. Similarly, more flexible employment regulations in India have reduced the informal sector by 25 per cent or more than in the states with less flexible regulations[17]. Compared with their formal sector counterparts, firms in the informal sector typically grow more slowly, have poorer access to credit, and employ fewer workers—and these workers remain outside the protection of labour law. Some of the good practices adopted worldwide for the state to follow up are as below (Table 9.5):

[15] World Bank and International Finance Corporation. 2009. *Doing Business in India 2009*. World Bank, Washington D.C., USA.
[16] World Bank and International Finance Corporation. 2013. *Doing Business 2013:Smarter Regulations for Small and Medium Size Enterprises*. World Bank, Washington D.C, USA.
[17] Ibid.

Table 9.5: Good Practices around the World

Topic	***Practice***
Making it easier to start a business	Putting procedures online Having no minimum capital requirement Having a one-stop shop
Making it easier to deal with construction permits	Having comprehensive building rules Using risk-based building approvals Having a one-stop shop
Making it easy to obtain an electricity connection	Streamlining approval processes Providing transparent connection costs and processes Reducing the financial burden of security deposits for new connections Ensuring the safety of internal wiring by regulating the electrical profession rather than the connection process
Making it easy to enforce contracts	Making all judgments in commercial cases by first-instance Maintaining specialized commercial court, division or judge Allowing electronic filing of complaints
Making it easy to get credit	Legal rights such as allowing out-of-court enforcement*, allowing a general description of collateral, maintaining a unified registry Credit information Distributing data on loans below 1 per cent of income per capita Distributing both positive and negative credit information Distributing credit information from retailers, trade creditors or utilities as well as financial institutions
Making it easy to pay taxes	Allowing self-assessment Allowing electronic filing and payment Having one tax per tax base
Making it easy to trade across borders	Allowing electronic submission and processing of documents Using risk-based inspections[#] Providing a single window

Note: *In Latvia, in 2009 further amendments to the insolvency law introduced a mechanism for settling insolvencies out of court to ease pressure on the judiciary. As a result of these reforms, the recovery rate for creditors rose from 32 cents on the dollar to 56 between 2010 and 2011, leading to the biggest improvement in the ease of resolving insolvency worldwide according to Doing Business 2012.

Risk Based Inspection (RBI) is a system for establishing risk profiles that allow custom officers to apply physical inspections in proportion to the potential risk of consignments.

Source: World Bank and International Finance Corporation. 2013. *Doing Business 2013:Smarter Regulations for Small and Medium Size Enterprises*. World Bank, Washington D.C., USA.

9.5.1.12 Table 9.6 shows business environment in Kochi vis-à-vis top Indian states and Singapore. The new industrial strategy will benchmark the state against Singapore in the long term, which has been at the top of the global ranking in terms of business environment. In the medium term however, the target will be to close the gap with top India states.

Table 9.6: Targets for Achieving Good Business Environment

	Kochi	***Top India n state***	***Singap ore***	***Kochi***	***Top Indian state***	***Singap ore***	***Kochi***	***Top Indian state***	***Singapore***	
	Procedur es (number)	***Proce dures (numb er)***	***Proced ures (numb er)***	***Time (day)***	***Time (day)***	***Time (day)***	***Cost (%)***	***Cost (%)***	***Cost (%)***	***Cost normalisatio n***
Starting a business	13	11	3	41	32	3	47.2	41.1	0.6	% of GNI per capita
Dealing with Construction Permits	22	15	11	224	97	26	233.8	158.7	16.7	% of GNI per capita
Electricity connection			4			36			28.6	
Registering Property	4	4	5	27	26	21	15.5	7.7	2.9	% of GNI per capita
Getting credit			10			4			0(58.4) (?)	
Protecting consumers			10			9			9.3	
Paying taxes	76 (Payment number)	59	5	263	255	82	69.1	67.6	27.6	Total tax % profit
Enforcing contracts	46	46	21	705	770	150	30.2	17.8	25.8	Cost (% of debt)
Trade				28	17	5	432	834	456	
				21	16	4	480	833	439	
Solvency				7.5	8.7	0.8	10	10	1	Cost (% of Estate)
Recovery Rate							13.8	11.9	91.3	Recovery rate (cents on the dollar)

Source: World Bank and International Finance Corporation. 2009 and 2010. *Doing Business*. World Bank, Washington D.C., USA

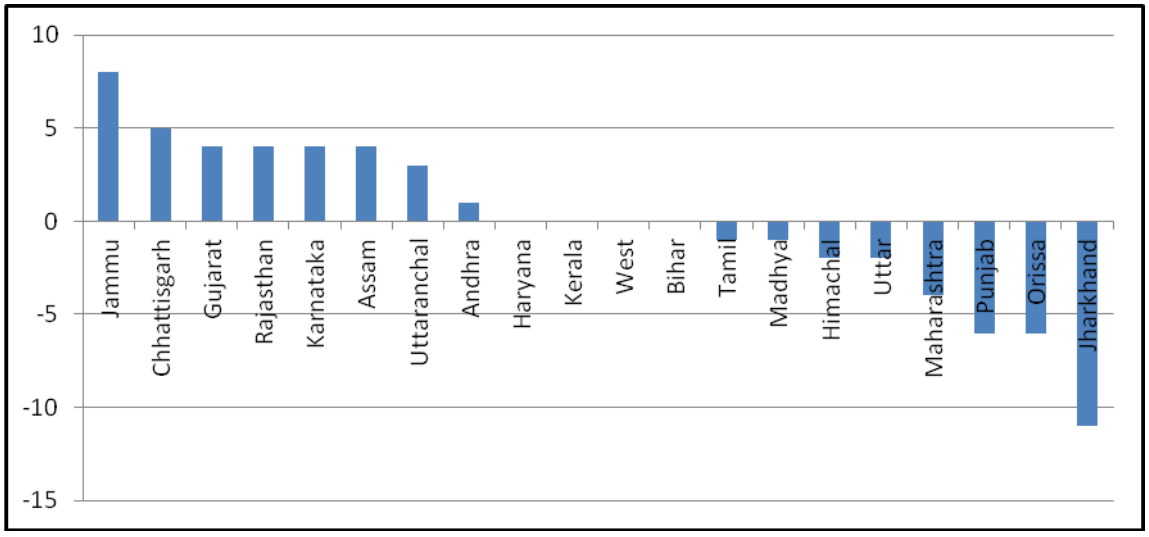
Improving Business Freedom

9.5.1.13 The Economic Freedom Index 2012, as developed by eminent economists of India[18] ranks Kerala 10th among 20 Indian states. In a more disaggregated analysis, Kerala fares rather poorly in terms of regulation of labour and business followed by the size of government. The relative ranking in terms of the former is 15 while it ranks at 12 in terms of the latter. Kerala's improvement has been quite marked in terms of legal structure and

[18] Debroy, B., Bhandari, L., Aiyar, S.S.A. and A. Gulati. 2013. *Economic Freedom of the States of India 2012*. Friedrich-Naumann-Stiftung für die Freiheit, Cato Institute and Indicus Analytics. Academic Foundation, New Delhi, India.

property rights between 2005 (13) and 2011(6). Also there has been a significant decline in the cases under economic offence. Overall, however, Kerala's ranking remains stable over time. The Indian states that have improved their ranking between 2005 and 2011 are Jammu & Kashmir, Chhattisgarh, Gujarat, Rajasthan, Karnataka, Assam, Uttaranchal, and Andhra Pradesh (Figure 9.14).

Figure 9.14: Improvement in rank ladder in Business Freedom Index of Indian States: 2005 and 2011



Source: Debroy, B., Bhandari, L., Aiyar, S.S.A. and A. Gulati. 2013. *Economic Freedom of the States of India 2012*. Friedrich-Naumann-Stiftung für die Freiheit, Cato Institute and Indicus Analytics. Academic Foundation, New Delhi, India

9.5.1.14 International ranking in terms of Economic Freedom Index [19] indicates that Singapore is the 2nd freest country in the world in 2013. The foundations of economic freedom in Singapore are firmly sustained with strong protection of property rights and effective enforcement of anti-corruption laws. The government is very efficient, with competitive tax rates and low government expenditures. The regulatory environment is flexible and transparent, encouraging vibrant commercial activity. The industrial strategy of Kerala will be to benchmark Kerala against the top Indian states in the short term and Singapore in the long term in economic freedom. This requires reforms in the system and continuous monitoring of their implementation (See, Chapter 24 on Governance).

[19] The Index of Economic Freedom is an annual index and ranking created by The Heritage Foundation. It measures economic freedom of 185 countries based on trade freedom, business freedom, investment freedom, and property rights.
Heritage Foundation. 2013. *Index of Economic Freedom 2013*. http://www.heritage.org/index/explore?view=by-variables.

Creation of State Investment Board

9.5.1.15 The Government's responsibility for improving the investment climate in Kerala will be entrusted to the State Investment Board, which may be created by reorganising the existing administrative machinery with the following features:

- This Board will be joined by multiple agencies currently responsible for promoting industrialisation in the state. These agencies will be restructured with clear-cut responsibilities.
- It will be chaired directly by the Chief Minister.
- This institution will also have representation from the private sector and will be responsible for advising the policy makers in policy making, its implementation, granting approvals, and monitoring the policy.
- Under the Board, a "Business Environment Unit" will be established. This unit will be responsible for spearheading the state's reform initiatives. It will comprise of representatives from different ministries.
- This Unit will be made up of working groups focusing on business entry, legislative changes, state taxes and trade logistics, construction permits and property registration. This task force will have representation from the private sector. The working groups will identify the reform opportunities, advise the steering committee, and monitor the progress.

Infrastructure

9.5.1.16 Extensive and efficient infrastructure is critical for ensuring the effective functioning of the economy. It is an important factor in determining not only the location of economic activity but also the kinds of activities or sectors that can develop in a particular instance. India ranks 84 in terms of infrastructure development with a score of 3.6 in a group of 185 countries[20]. Within India, according to a State Competitiveness Report of the Institute of State Competitiveness[21], Kerala ranks 16 of 29 Indian states in physical infrastructure and 15 in terms of communication infrastructure.

9.5.1.17 It is proposed that the new industrial policy benchmarks the quality of infrastructure against Singapore, which has world-class infrastructure, with excellent roads, ports, and air transport facilities. Public-private partnerships (PPPs) will play an important role in infrastructure delivery. The PPP legal framework will be consistent with international best-practices. It will be efficient, stable, and consistent. The leading international example for government institutional regulation in PPP procurement and utilisation is the "Private Finance Initiative (PFI)" in the UK. This system, which has been in place and is constantly evolving since 1992, has been a world pioneer in regulating PPPs, and dozens of countries

[20] Schwab, K. 2013. *The Global Competitiveness Report 2013–14: Full Data Edition*. World Economic Forum, Geneva, Switzerland.
[21] Institute for Competitiveness. http://competitiveness.in/wp-content/uploads/2012/01/SCR-2011.pdf

have since modelled their PPP frameworks from the PFI system. India itself is a leading PPP market, with 758 projects worth Rs 3,833 billion awarded as on 2011. The top five states, namely, Gujarat, Andhra Pradesh, Karnataka, Maharashtra, and Uttar Pradesh (UP) account for over 58 per cent of the total value of PPP. Andhra Pradesh is the leading state in terms of both number and value of PPP. It is also the first state to lay down the Infrastructure Development Enabling Act 2001, which provides guidelines for PPP projects. All the five states have their own elaborate legal framework and administrative machinery in place to implement the PPP (For details see Chapter on infrastructure).

9.5.1.18 It is proposed that Kerala should have its "Infrastructure Development Policy" and an "Infrastructure Development Board" which will have the representatives of the State Investment Board in its management. The Board will also be responsible for land acquisition policies and their implementation.

Agglomerations

9.5.1.19 There has been an explosion of clusters and cluster policies throughout Asia, in particular in East and South East Asia, with China, Korea, Thailand, Malaysia and Japan achieving spectacular success. There has been transformation of the traditional systems of activities or industrial districts to new networks ready for global competition and innovation. Of late, these economies have witnessed the development of new agglomerations or scientific knowledge clusters. The Kerala government has already adopted the cluster development approach for industrialisation to reap the benefits of agglomerations. However, it is yet to show results.

9.5.1.20 Kerala will benchmark its industrial clusters with China and Japan. In both these countries clusters have been instrumental in driving growth. While Japan adopted the One Town One Product (OTOP) programme, which develops local specialty industries with city and township as units[22], China carried that model forward to:

- One village one product
- One town one industry

9.5.1.21 Kerala can draw useful lessons from the Chinese experiments with cluster-based industrialisation. (Box 9.1)

[22] Shakya, G. 2011. *Understanding One Village One Product in Japan, Thailand and Nepal*. Japan International Cooperation (JICA) Nepal Office, Kathmandu, Nepal. September.

Box 9.1: Cluster branding in China

A cluster economy is made up of professional towns and villages, functioning as production hubs focusing on one product/industry,and creating highly specialised large clusters. In China, the cluster policy focuses on branding clusters on the basis of their speciality. These are, for instance, Shengze textiles, Wujiang Hengshan sewing machines, Ningbo costumes, Wenzhou shoes, Shaoxing synthetic textiles, Haining leather coats, Yiwu small commodities, Yongkang hardware and so on and so forth. Small firms in the cluster are those employing up to 300 workers and medium ones have 300 to 2000 workers. Most clusters are developed such that they have entire value chains augmented within the cluster. Each firm is specialised and is connected with other firms through production networks. This increases efficiency and survival rate and reduces cost. These clusters thus have strong forward and backward linkages through value chains.

In addition to product and upstream and support industries, there are banks, insurance firms, transport firms, custom administration, administration departments, research institutions, and labs. Several clusters have their own logistic business centres, loading dock, warehousing, and parking lots. Close to Wenzhou shoe cluster, for example, a large industrial complex has been set up - the "Chinese shoe capital" with integrated facilities. A peculiar feature of cluster development in China is that specialised formal markets are developed close to the cluster to bring suppliers, producers, sellers, and buyers together to help build the forward and backward linkages. These are developed simultaneously with cluster development or have even kick started their development. They offer materials and products, and are constructed and managed by local town, or government departments, or private firms. Regulations for investment types and quality control are strictly enforced. There is a quality control centre in each province that serves several clusters. There are provisions of fines and discontinuation of production in case of substandard production quality. Clusters have their own innovation centres and technology consultancy firms. Support from public innovation and academic institutions are also forthcoming. For instance, Wenzhou shoes cluster is linked with Wenzhou University for testing, technology development, environment management, and pollutant treatment; Dongguan IT cluster is benefitted by its association with Shanghai University, Hong Kong Polytechnic University. There are several incentives to encourage efficiency and punishments for non-performance.

Source: Zeng, D.Z. 2010. *Building Engines for Growth and Competitiveness in China: Experience with Special Economic Zones and Industrial Clusters*. World Bank, Washington D.C.

Mining

9.5.1.22 Agglomerations in the form of zones for mining may be developed. This may be linked to the land and urbanisation chapters of zoning land and spatial strategy.

Promotion of logistics hubs

9.5.1.23 Kerala is proposed to promote hub-type modern logistics parks, including those at ports, and to improve the infrastructure as an accessory to the modern logistics industry such that the role of this region is solidified as a centre for international commerce. Kerala's geographical location is a major advantage, which it has not yet exploited. The logistics hub

is a physical facility which is operated by the Logistics Service Providers (LSPs) and focuses on management of physical logistics operations, including shipment consolidation, warehousing, transportation, packing, collaborative replenishment, and tax-bonded warehousing. The functional goal of the hub is to integrate supply chain resources, provide real-time material supply, ensure information transparency, improve logistics efficiency, and increase customer service quality

9.5.1.24 Antwerp, Rotterdam and Dusseldorf are the best logistics hubs in Europe, according to the latest report, "Logistic Cities" by global property consultants, Colliers International[23]. Singapore, Malaysia, Taiwan, and South Korea have evolved as the economic and transport hub of Asia. These models need to be studied for developing Kerala into a globally integrated logistics hub.

Marketing and Brand building

9.5.1.25 The state will develop a series of specialised conventions and exhibitions with international influences including, Kerala Expo, Kerala Hi-Tech Fair, Kerala Small and Medium Enterprises Fair, and Kerala International Cultural Industries Fair, so as to forge the world's first- class brands of conventions and exhibitions and increase the international popularity of the existing ones.

Regional Innovation systems

9.5.1.26 The use of technology is key towards achieving the goal of knowledge driven industrialisation. In general, the state maintains its role as a facilitator and enabler for promotion of innovation and technology, leaving the industry and the university to decide what to do - instead of performing a strong leading role in directing Research and Development (R & D) development, and facilitating innovations and their diffusion. However, Kerala is dominated by small enterprises, which because of their small size, directly depend on state and university support for R&D. The driving force for innovation and technology development can thus move from a state-led model towards a more integrated approach. Kerala can learn from Taiwan. The Taiwan case has clearly demonstrated a continuum of state-industry-university collaborations, with a growing prominence of the industry / firms in collaborations with the university sector in promoting technology/innovation. The new approach for promoting the innovation system will be to:

- promulgate a "State Innovation Policy";
- develop regional innovation systems by creating supporting R&D institutions and promoting industry-academia linkages in sector- specific industrial parks/estates/SEZs;

[23] Colliers International. 2013. *Logistic Cities, a European Comparison*. http://www.colliers.com/en-pl/poland/insights/news/q2-2013/04-06-13-logistic-hubs. June 4.

- strengthen industry research and development through the industry value chain;
- establish venture capital funds;
- promote a mechanism for incubating and integrating promising research into the commercial realm;
- enforce strict regulations on research processes; and
- set up *hi-tech zones* in industrial nodes (see Box 9.2 for the highlights of Hsinchu Science park).

Box 9.2: Highlights of Hsinchu Science Park (HSP)

The Hsinchu Science Park (nicknamed Taiwan's "Silicon Valley") was created in 1980, to combat brain drain. It has emerged as a "regional innovation system", which emerged as the major base of high-tech development in Taiwan. The government devised a number of policies to attract firms into the Park in the initial stages. These included a five-year tax holiday; a maximum income tax rate of 22 per cent; duty-free imports of machinery, equipment, raw material and semi-finished products; and capitalization of investors' patents and know-how as equity shares. The government also directly entered into industrial production, establishing joint venture companies with private capital. Many prestigious academic institutions are near the park, such as the Industrial Technology Research Institute, National Tsinghua University, and National Chiao Tung University. All provide high-quality human capital for the science park and valuable on-the-job learning opportunities for employees. Incentives structure has changed over the years. It is currently based on business facilitation. Several top firms line up to enter the park. HSP (653 ha) is full, but there are entries and exits every year. Firms with small R&D (< 2.28% of sales) are asked to leave.

Putting in place an internationally competitive environment for Taiwan's high-tech industry has helped induce an across-the-board upgrade of domestic industry and foster expansion of the national economy. In addition to stimulating R&D on the science and technology front, benefits are enjoyed in many other respects – creating clusters of industrial ventures, cultivating talent, bringing prosperity to local communities, and enhancing the nation's overall cultural awareness.

Source: World Economic Forum. 2012. *Talent Mobility Good Practices: Collaboration at the Core of Driving Economic Growth*.
http://www3.weforum.org/docs/WEF_PS_TalentMobility_Report_2012.pdf

Pillar 2: Human Development

Skill developments

9.5.1.27 A healthy and educated workforce is vital to a country's competitiveness and productivity. Kerala has already been at the top among Indian states in terms of health and education indicators, but it will further build on these advantages and improve the quality of

higher education and health care services. Moving up the value chain beyond simple production processes and products in today's globalising economy requires countries to nurture pools of well-educated workers who are able to adapt rapidly to their changing environment and to the evolving needs of the production system. Staff training and vocational and continuous on-the-job training ensure a constant upgrading of workers' skills. In India, it is estimated that more than 87 per cent of the workers never had vocational training. It has been found that there is a vast mismatch between demand for and supply of skills. In 2005, the 15–29 age groups accounted for 27 per cent of the total population, or 289.5 million. Of these, only 11.5 per cent (33.4 million) received any training, formal or informal. But within this 33.4 million, 11.1 million had received (or were receiving) formal training[24].

9.5.1.28 Several proposals have been made to promote skill development in the state in Chapter 3 on Education for reference.

Entrepreneurship for sustainable development

9.5.1.29 In both developed and developing countries, fostering entrepreneurship for sustainable development could improve and create more sustainable consumption and production systems overall. Educating current and potential entrepreneurs enables them to create viable alternatives to existing production and consumption systems that currently fail to adequately address sustainability issues, such as environmental deterioration along the supply chain and overall quality of life. Entrepreneurial education fosters innovation and helps entrepreneurs build better products, processes, and services. It is especially effective when it takes into account the social, economic and ecological complexities of development, the values of sustainability, and a long-term perspective[25]. This subject is dealt with in the Chapter 19 on Entrepreneurship in Volume III.

[24] TeamLease and IIJT. 2009. *INDIA LABOUR REPORT 2009: A Report: The Geographic Mismatch & A Ranking of Indian States by their Labour Ecosystem*. http://www.teamlease.com/index.php?module=research&event=india_Labour_Report.

[25] University of Arizona has started a Centre for Environmentally Sustainable Mining to develop novel technologies in mining: minimise water use and suppress dust generation in mining operations; allow green engineering for environmentally responsible new mine development; create sustainable mine tailings caps; prevent and treat acid rock drainage; allow long-term assessment of environmental impacts; assess short- and long-term health risks from contaminated water and air in urban environments near mining operations. Further, a well-trained workforce is key for sustainable mineral resource development. New workers with specialised professional training are critically needed. Just as important is retraining and post-training for workers to ensure that the skills and knowledge required for all aspects of mining, from permitting to health and safety to geology and engineering, are current and can facilitate optimum performance of the mining operation. University of Arizona website, http://superfund.pharmacy.arizona.edu/content/center-environmentally-sustainable-mining-cesm.

Pillar 3: Social Development

Action Plan 1: Promote socially responsible investment

Enforce Social security system

9.5.1.30 There have been provisions in labour laws for social security systems. In Kerala, social security is offered not only to organised sector workers but also to unorganised labour. This system calls for some reforms to integrate competitiveness aspects. Here, we propose the government to adopt a comprehensive labour policy with skill development, employability, employment, and social security as their components. This has been discussed in detail in Chapter 17.

Strict compliance with decent working conditions

9.5.1.31 The labour laws contain several provisions for decent working conditions. Kerala already has strong labour union institutions, which have been instrumental in high wage rates, abolition of child labour, and decent working conditions. It is however the responsibility of the managers in realising the importance of human capital in business sustainability. Government, therefore, must ensure through regulatory mechanism that the rules on decent working conditions are enforced. It is proposed here to encourage participation of management in labour union and vice-a-versa.

Action Plan 2: Special attention to small and medium enterprises

9.5.1.32 The new knowledge-based economy regime, aided by the application of the Internet, e-commerce and ICT, will provide Small and Medium Enterprises (SMEs) with a new operating model and enhance the speed and efficiency of business operations. To exploit these opportunities the state will have a Micro, Small and Medium Enterprise (MSME) policy. Chapter 10 covers the strategy for the small sector.

Action Plan 3: Design special policies for backward regions

9.5.1.33 The new development strategy proposes to set up "Enterprise Zones" in backward regions. An Enterprise Zone is a specific geographic area targeted for economic revitalisation. Enterprise Zones stimulate economic growth and investment in backward areas by providing communities with an economic development tool, which offers state and local incentives to existing, new, or expanding businesses in these designated areas. The purpose of these zones is to encourage job creation and capital investment in areas of economic distress. They offer strong financial incentives to local authorities and communities to support and encourage local housing and growth. These include,

- Sales Tax Credit - on qualified machinery and machinery parts;

- Other tax benefits at the state level;
- Preference points on state contracts to Enterprise Zone Comapanies.

9.5.1.34 A Regional Growth Fund may be created to give further help to areas where there are particular challenges or opportunities for local growth. These will be of 50–150 acres. Firms need to be given plug-n-play facility at highly subsidised rates. Start-up firms may be given priority in these zones. Government will ensure that Enterprise Zones help to support genuinely additional growth, and create new businesses and new jobs in targeted activities to contribute to building up of competitive strengths. These activities will include:

- Manufacturing;
- Services, including education in specialized areas (for instance, agriculture, traditional branch of knowledge, bio-tech, etc.); and
- Innovation.

9.5.1.35 This model of regional growth was introduced in England in the late 1960s. In view of its success, it has been adopted and implemented by other developed countries in Europe and other countries. The USA also has a large number of enterprise zones.

Pillar 4: Environment

9.5.1.36 The manufacturing sector generates a number of environmental pressures as listed below:

- Contribution to solid waste through non-degradable packaging materials and limited recycling facilities;
- Production of solid and liquid wastes from manufacturing processes;
- Worsening of air pollution, particularly in urban areas.

Table 9.7 shows the strategic policies for green development in the state.

Table 9.7: Strategic Policies for Green Development

Policy	***Impact***
Adopt 4-R Policies	Conserve Resources
	Recycle the waste generated
	Recover the useful material
	Reuse them
Promote sustainable production and consumption patterns	Encourage the use of green products through relevant institutions
	Incentivise the production of environment friendly products
Expand the green sector	Encourage investment in green goods and services
	Encourage the green sector R&D

Source: Conceptualised by NCAER.

Action Plan 1: Adopt 4-R Policy: Reduce, Recover, Reuse and Recycle

9.5.1.37 *Shift from end-of-pipe approach to cleaner production approach for mainstreaming environment*

9.5.1.38 Dealing with pollution resulting from human activities, particularly in industry and agriculture, after it has been generated (the so-called end-of-pipe approach) is costly and quite often ineffective. Cleaner production (CP) is the continuous application of an integrated preventive environmental strategy to processes and products to reduce risks to humans and the environment (Table 9.8). It is a system to increase eco-efficiency and to reduce risks for humans and the environment. The Government of Kerala will therefore minimise behaviours and practices that lead to the exclusive application of end-of-pipe technologies and encourage the use of CP in industrial production.

Table 9.8: The Clean Production System

For Production Processes	*For Products*	*For Services*
• To reduce the consumption of raw materials and energy used in the production of one unit of product • To eliminate as far as possible, the use of toxic and dangerous materials • To reduce at source the quantity and toxicity of all emissions and wastes generated and released	• To reduce the environmental, health and safety impacts of products • Over their entire life cycles • From raw materials extraction through manufacturing and use, to the • Ultimate disposal of the product	• To Incorporate environmental concerns into designing • To Reduce waste through better design and delivering services • To Use waste for new products

Source: Conceptualised by NCAER

9.5.1.39 The training kit for the development of CP policies is designed by the UNIDO under its cleaner production programmes with crucial aspects of CP planning and CP policy development. A training kit is also available that facilitates the organisation of modular interactive seminars on CP policy development, trends, and instruments. Cleaner production requires changing attitudes, responsible environmental management, and evaluating technology options. The strategy to promote sustainable production is now adopted worldwide and is applied in different ways.

9.5.1.40 Companies need also be encouraged to design more environment- friendly products. Further, they are either required or encouraged to conduct CP auditing. For heavily polluting enterprises, CP should be obligatory. Companies can be labelled as green in the public disclosure system by eliminating outdated technologies and equipment, and reducing resource consumption and pollution discharges—showing that they are environmentally friendly enterprises.

Make it compulsory for corporations to declare their green action plans

9.5.1.41 It should be made compulsory for large corporations to declare their green action plans and make them available in the public domain. Currently, many international companies have adopted this strategy as a part of their corporate social responsibility. For instance, Apple's commitment to the environment includes finding the most efficient ways to reuse or recycle electronic equipment at the end of its useful life, including the iPhone, iPad, Mac or PC computers, and displays from any manufacturer. Whether it's an iPhone, iPad, Mac or PC computer, working or not, the company buys it and determines if it qualifies for

reuse and has a monetary value. If it does, the amount will be credited directly into the bank account of the seller. If it doesn't, it is recycled. Ford's 'Reduce, reuse and recycle' commitment is part of the company's broader global sustainability strategy to reduce its environmental footprint while at the same time accelerating the development of advanced, fuel-efficient vehicle technologies around the world. These efforts need to be institutionalised and made compulsory.

Develop recycling and waste management industry

9.5.1.42 There have been abundant opportunities available to take advantage of recycling potential due to more efficient and effective separation techniques, recycling technologies, and technologies to facilitate collection (Box 9.3).

Box 9.3: Recycling and Reusing: The European initiatives

Metals ranging from gold to cobalt and rare earth elements, such as neodymium are used in electronic equipment, including phones, laptops, headphones, rechargeable batteries, and TVs. Most new energy-efficient lighting systems contain rare earths (compact fluorescent lamp, LED, plasma display, LCD display). Substitutions are rare, particularly for compact fluorescent lamps. Recycling e-waste is one way to help alleviate the shortage of rare earth material. It is estimated that between now and 2020; the UK will throw away 12 million tonnes of electronic equipment, a quarter of which will be IT equipment and other goods which contain around 63 tonnes of palladium and 17 tonnes of iridium.

The amount of palladium lost would be worth £1 billion in today's market, while the iridium would be worth £380 million. The European Union recently enacted new e-waste recycling rules requiring member states to recycle 45 percent of all electronic equipment sold, starting in 2016, rising to 65 percent by 2019. The resource security action plan will provide £200,000 for businesses to come up with new ways of reusing or recycling precious metals and develop new products.

The dependency on foreign resources and uncertainty in their supply will be reduced by supplying the European market with secondary rare earth materials.

Source: Department of Environment, Food and Rural Affairs. 2012. Golden business opportunity hidden in consumer goods. https://www.gov.uk/government/news/golden-business-opportunity-hidden-in-consumer-goods. March 16.

Re-using

9.5.1.43 There need to be a policy strategy specifying comprehensive utilisation of:

1. Fly ash, gangue, tailing, lean material, scrap material, exhaust gas and other industrial wastes;
2. Construction wastes;

3. Recycled urban and rural household garbage; and
4. End-of-life motor vehicles, mechanical products and machine tools, and renovated tires.

Mining

9.5.1.44 Mining activities need to be strictly monitored especially sand mining which poses a huge challenge for water management. A green cess should be imposed on users of sand such as to create an awareness of the environmental consequence of sand mining.

Action Plan 2: Develop eco-friendly parks

9.5.1.45 Develop an eco-industrial network that will benefit both regional production systems and environmental protection. Approaches include but are not limited to energy cascading, sharing of local infrastructure, and exchanging by- products and recycling wastes. The development of eco-industrial parks (EIPs), a typical practice at this level, is very popular in China. More than 100 industrial parks claim to be EIPs, of which about three-quarters have been planned by environmental professionals focusing on the recycling principle. The others were planned by local governments with the help of professionals in chemical engineering, management science, engineering, and sociology.

9.5.1.46 At the macro level, the development of the eco-city, eco-municipality, or eco province is one of the most prominent environmental movements in China. Both sustainable production and consumption are key elements at this level. In China, the difference between the notion of an eco-city and that of an EIP is that eco-cities focus on both production and consumption activities, whereas EIP focuses on production activity, especially industrial production. Efforts at all levels include the development of resource recovery enterprises and public facilities to support realization of the recycling principle.

9.5.1.47 Virtual eco-industrial parks may also be created: "… a region, in which industries are not necessarily co-located, but linked through exchange of waste" and collaboration at different levels"[26].

Action Plan 3: Build an institutional set up

9.5.1.48 There will need to be an Act to support the 4–R policy of reduce, recover, recycle and reuse. In China, there are several such laws. The first and most significant is the "Cleaner

[26] Cohen-Rosenthal et al. 1996 cited in Fleig, A. 2000. A Strategy towards Industrial Ecology in Developing and Newly Industrialised Countries. *Working Paper etc 11*. http://www.giz.de/Themen/en/dokumente/en-eco-industrial-parks.pdf. Deutsche Gesellschaft für Technische Zusammenarbeit (GTZ) GmbH. ECO-Industrial Parks.

Production Promotion Law," put into effect in January 2003[27]. The amended Law on Pollution Prevention and Control of Solid Waste, which took effect on 1 April 2005, also supports the development of the 4–R policy; the law is part of the country's growing demand for strict management of solid wastes.

Action Plan 4: Corporate social responsibility

9.5.1.49 It is believed to have a significant influence on corporate sustainability. In the business context, CSR has emerged as a form of sustainability governance, with advantages to the economic, environment, and social progress. In terms of governance through policy implementation, CSR can be practised in a strategic manner with better understanding. Policy framework can be designed using a mixture of regulations, economic instruments, and communication strategies, which significantly affects the environmental and social impacts from corporate activities. New courses need to be introduced in management courses on social and environmentally responsible management practices.

9.5.1.50 In short, industrial development will be viewed in a holistic and systemic way. The constraints, competitive issues, and opportunities are complex and inclusive of different disciplines, and require the participation of various institutions, stakeholders, and sectors.

9.6 Effective Implementation

9.6.1 The possibility of achieving the objectives identified for the industrial strategy for Kerala depends on the effectiveness of the implementation and monitoring processes as well as the right policies being designed and decided upon.

Reorganise the existing administrative machinery

9.6.2 An elaborate administrative machinery is in place to promote industrialisation in the state. The State Department of Industries and Commerce is the apex government body, which is responsible for promoting/sponsoring, registering, financing, and advising industries in the state. It is assisted by three parallel Departments: Directorate of Industries and Commerce, Directorate of Handlooms, and Directorate of Coir. In addition, there are several public sector agencies to assist the industrial units by providing financial assistance, infrastructure, and training/consultancy services. While some aim at infrastructure development, others focus on the soft services such as finance, marketing, and technology development.

9.6.3 This structure may be reorganised to implement the Industrial Strategy proposed here, after consultation with the stakeholders. *S*ome of the best organisational strategies have been

[27] Yuan, Z., Bi, J. and Y. Moriguichi. 2006. The Circular Economy: A New Development Strategy in China. *Journal of Industrial Ecology*. 10(1–2). 4–8.

provided in Figure 9.15. Examples of organisational arrangements for industrial formulation and implementation are shown in table 9.8.

Figure 9.15: Administrative and Supporting Infrastructure for the Industrial Sector

Note: CMD is an autonomous institution
Source: Relevant websites

Table 9.8: Alliance between Leadership and Technocrat Team in East Asia

Country (period)	***Leadership Type***	***Technocrat Teams***	***Development & Industrial Vision Formulation***
Japan (late 50s–70s)	Organisational Leadership	MOF, EPA, MITI (super-ministry for industrial policy)	Economic and physical plans for vision sharing; industry-specific policies
S. Korea (60s–70s)	Strong personal leadership	EPB (super-ministry)	5-year plans and plans for targeted industries
Malaysia (80s–90s)	Strong personal leadership	Prime Minister's Dept. esp. EPU (super-ministry)	Vision 2020, 5-year plans; and Industrial Master Plans (IMP)
Thailand (80s)	Organisational leadership	Core macro-economic agencies (no super-ministry)	5-year plans; no industry-wide plan (except after financial crisis)

Source: Ohno, I. 2009. *Organisational Arrangements for Industrial Policy Formulation & Implementation: Examples from East Asia*. Powerpoint Presentation. GRIPS Development Forum. http://www.grips.ac.jp/forum/af-growth/support_ethiopia/document/Sep09_ET%20organization_5.pdf. September.

Promoting mutual trust between government and business through partnerships

9.6.4 It is important to establish a high-level cooperation between the public and private sector. This requires the following:

- Large volume of high-quality information flow between government and business.
- Government initiatives in operational management of policy networks and monitoring.
- Existence of mutual confidence, making predictions (?), and credible commitments.
- Evolving nature of government.-business coordination, as the private sector grows.
- Moving from government led to private-sector led mechanisms for resolving specific problems.

9.6.5 *Mechanism to frequently review and flexibly adjust policy implementation*

- Inter-ministerial coordination mechanism.
- Devised centralised coordination mechanisms and instruments.
- Deliberation councils, steering committees (national, sectoral), working groups & special task forces.
- Government- business forums, Industry and function-specific "institutes", etc.
- Devised special mechanisms to implement and review high priority programmes.
- Experiential learning from East Asian countries.

9.6.6 *Mechanism for evaluation and monitoring*

For every six months, an evaluation/monitoring report will be prepared in order to assess the situation of the actions in the strategy document; these reports will be presented to a specially constituted Monitoring and Steering Committee. The evaluation and monitoring process of the strategy's actions and targets will cover design, implementation, and outcomes. Apart from assessing the achievement, it will also look into:

- the reasons for failures and success, and
- the sustainability of achievements.

The results will be fed back into policymaking, helping to improve the government's ability to respond to future challenges in the manufacturing sector.

9.7 Conclusion

9.7.1 The new industrial strategy requires institutionalised and sustained cooperation among all key stakeholders in its design and implementation. It is based on an integrated framework, which incorporates economic, social, and environmental dimensions. The underlying principle will be the promotion of sustainable manufacturing driven by knowledge and innovation, and competitiveness. It will focus on expanding and upgrading the existing industries and nurturing new industries. It requires a well-designed incentive structure in place. However, entrepreneurial support in their exploration of new opportunities should not result in the protection of unviable activities. Support should be withdrawn from below average achievers and shifted to more promising dynamic and innovative industrial activities. Support to winners should be limited in time and based on performance. Further, it requires the government to identify the bottlenecks and initiate interventions that will guide the economy to sustainable industrial prosperity. Finally, the strategy requires continuous learning, which in turn calls for coordination mechanisms, capacity building in government, and evaluation mechanisms.

CHAPTER 10

TRADITIONAL INDUSTRIES: UNLEASHING THE GROWTH POTENTIAL

The traditional industries occupy a predominant position in Kerala's economy. The vision is to transform these industries into modern and high value-added ones. Modernisation is essential for the development of the cashew industry sector. The handloom industry is a part of national heritage and hence will be promoted with the primary objective of preserving this ancient craft by protecting its dependents from the threat of power looms/ fully automatic looms / machineries. It will be a niche industry. Coir has many inherent advantages, but the industry is yet to achieve its real potential for want of an integrated approach. Continuous effort must be directed to new sources of income through product diversification and improved product quality, with emphasis on market-oriented technologies. This holds the most potential for Kerala.

10.1 CASHEW NUTS

10.1.1 The Industry

10.1.1.1 The Cashew industry occupies a predominant position in Kerala's economy. It provides an important source of income for low-income groups, particularly women, in the farming and processing sector. Moreover, this is an export oriented industry that is earning valuable foreign exchange. India is the global leader in cashew processing, and Kerala alone accounts for 56 per cent of the total exports of cashew kernel from India. Within Kerala, 90 per cent concentration of industries is in Kollam District, which has been declared as the **"**Cashew Town of Export Excellence**"** by the Ministry of Commerce, Government of India.

10.1.1.2 The cashew crop grows in tropical climates in about thirty countries across the globe within a band of approximately 25−30 degrees north and south latitude of the equator. Countries north of the equator, including India, Vietnam, and producers in West Africa, harvest from early in the calendar year to approximately mid-year. Countries south of the equator, including Brazil and producers in East Africa, harvest from September or October to early in the following calendar year. This ensures the perennial supply of raw material and gives cashew processing the industry status.

10.1.2. Strengths and opportunities

India's competitive advantage in the Cashew industry

10.1.2.1 India is the third largest producers of cashew nuts. In 2011, the total production was 674.6 thousand tonnes, which accounted for 15.8 per cent of the total cashew production of 4,279.7 thousand tonnes. The top ten producers of cashew nuts are Vietnam, Nigeria, India, Côte d'Ivoire, Brazil, Benin, Philippines, Guinea Bissau and Indonesia.

Kerala the first region to export cashew kernels

10.1.2.2 Cashew was first introduced in Goa in the 16th century from where it spread to other parts of the country. In the 1960s and 1970s, Kerala topped in terms of both production of cashew nuts and productivity. It was followed by Tamil Nadu. Kerala was also among the first regions in the country where cashew-processing started as a cottage industry. In the early 20th century, cashew nuts were processed in people's homes or on the streets and commonly sold at markets. In the 1920s, General Foods, an American company discovered its export potential and started importing cashew kernels from Kerala. Kerala thus emerged as the sole exporter of cashew kernels, with the US being the only importer. While cashew is mostly grown in the north of Kerala, the processing industry is concentrated in Quilon (now Kollam), in the former princely state of Travancore due to the encouragement given by local rulers to industrial development since the early 20th century[1].

10.1.2.3 Until the early 1970s, India had a near monopoly in the export of cashew kernels to world markets although it was by no means the only producer of raw cashew nuts. However, since then increasing competition from other cashew kernel producing countries like Brazil, Vietnam, Tanzania, and Mozambique has affected India's exports of cashews. In addition, competition from other surrogate nuts like almonds, pistachios, hazelnuts, Brazil nuts, macadamia nuts and the promotional efforts taken on behalf of these tree nut sectors has affected the consumption of cashew worldwide. Further, non-tariff barriers imposed by major developed countries are also working as a deterrent for its growth.

Institutional support

10.1.2.4 Cashew Export Promotion Council of India (CEPC) was established by the central government in 1955 to promote the export of cashew kernels and cashew nut shell liquid (CNSL), as well as to serve as a liaison between foreign importers and member exporters. CEPC also offers investment to producers for the purchase of innovative technology and equipment.

[1] It could also be due to the lack of labour legislation and regulations in Travancore, unlike parts of India governed by the British.

CEPC also manages the Department of Commerce's Integrated Scheme for Cashew Quality. These schemes consist of consecutive 5-year plans that include various components. The current plan includes a one-time subsidy for the installation of processing equipment that conforms to international standards and quality requirements of importers. Subsidies are also offered for improvements in facilities to make processing units ISO or HACCP compliant. Finally, the plan provides subsidies to exporters who adopt the flexi-pouch vacuum packing system, which is the packing method most commonly demanded by importers in the U.S. and the U.K. (importers in the Middle East require tin packaging, and this method is commonly adopted by processors specifically for that market). Overall, the rate of subsidies offered by CEPC is 25 per cent of the cost incurred by exporters and the total amount for all subsidies granted cannot exceed Rs 8 lakh (approximately $18,000) per exporter during each 5−year period. The scheme's focus on quality is indicative of the challenge processors face in meeting international phytosanitary standards. These standards are usually seen as a greater constraint on business growth than traceability requirements. To address the challenges, a Quality Upgradation Lab and Technical Consultancy Centre have been set up in Kollam, India's processing hub. In addition to certifying quality, the lab also provides training to processors.

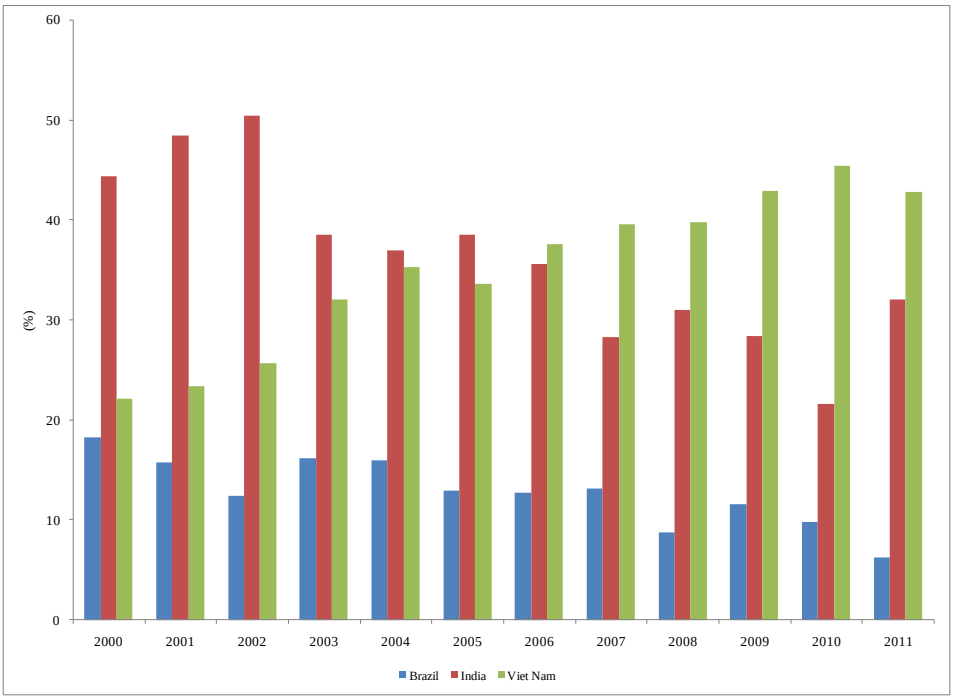
10.1.3. Challenges

Declining exports and increasing imports

10.1.3.1 Figure 10.1 shows the individual share of three countries, namely India, Brazil and Vietnam in the total global exports. India was the top exporter of cashew nuts shelled until 2005. Since then it has not only lost the distinction of being the largest producer but also has continuously lost its share. Vietnam on the other hand has been increasing its share despite the fact that its processors are inexperienced and have been unable to deliver on contracts. African countries are also likely to pose a threat in the export markets, as starting from 2005, the African Cashew Alliance (ACA) has been trying to build African processing capacity, and promote a sustainable global market for African cashews[2].

Figure 10.1: Share of India, Vietnam and Brazil in Global Exports of Shelled Cashews: 2000−2011 (%)

[2] Red River Foods Inc. 2010. Cashews: Highlights of the Cashew Industry. http://www.agoatoolkit.com/agoa/English/Select%20Products/Cashews/Cashew%20Industry%20and%20Export Guide/03-Cashew-Industry%20Highlights.pdf. June.

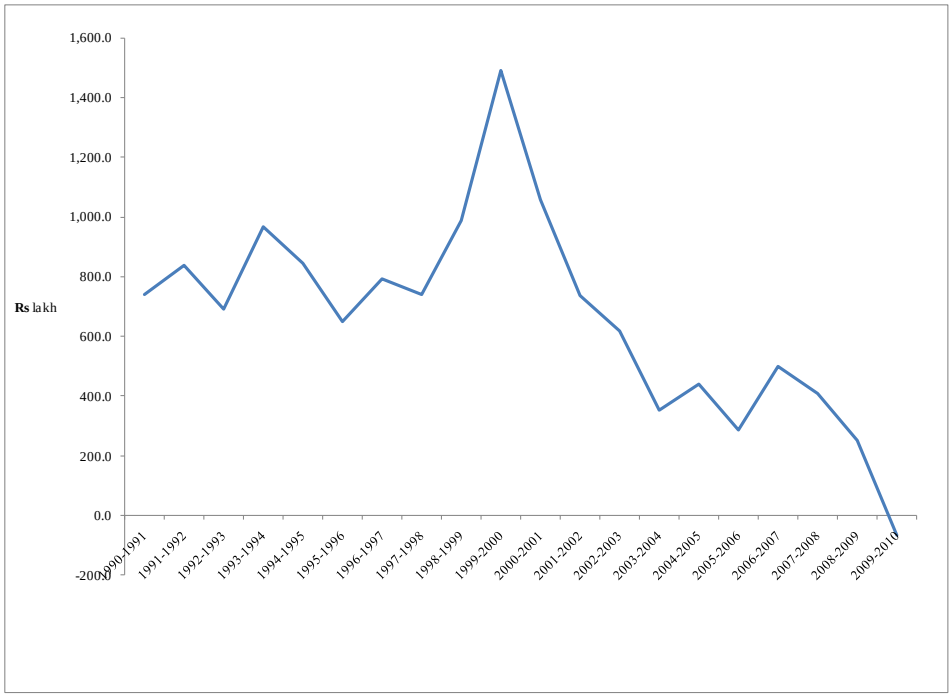


Note: Netherland is the third largest exporter of shelled cashews in quantity terms but fourth in terms of value right behind Brazil.

Source: FAO Statistical database

While exports are declining, imports are continuously rising resulting in decline in foreign exchange earnings (Figure 10.2).

Figure 10.2: India's Net Exports of Cashew Related Products: 1990–91 to 2009–10 (constant prices -1998-99)

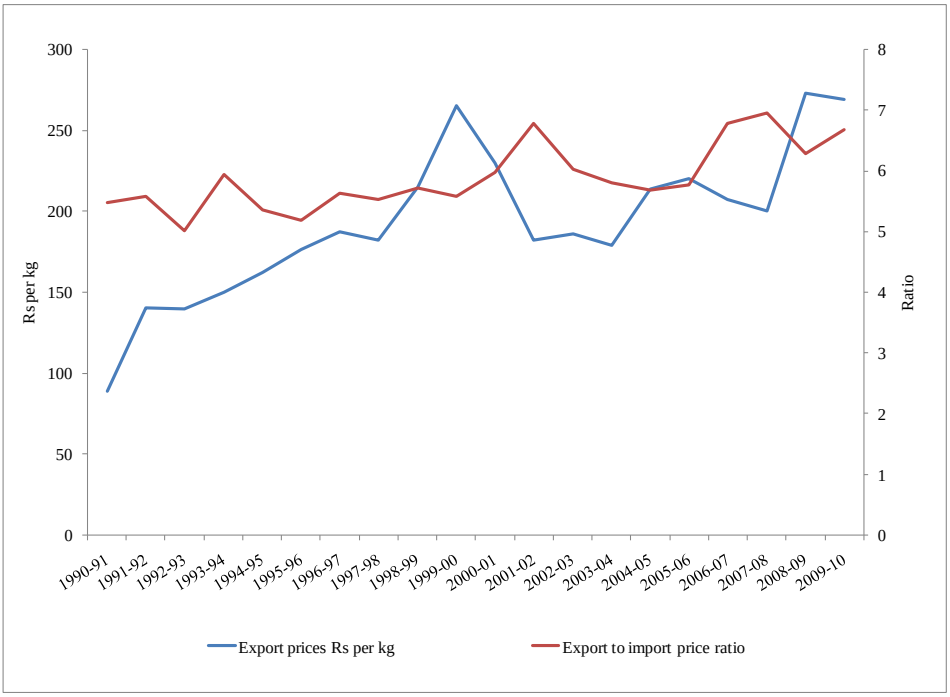


Note: Cashew nut and Cashew nut shell liquid are exported and raw cashew nut is imported

Source: Directorate of Cashew nut & Cocoa Development, Kochi

10.1.3.2 Is the rising gap between exports and imports a manifestation of diversion of cashew nut to domestic markets? Diversion to domestic markets cannot be explained by the export prices. Figure 10.3 shows that export prices have been rising faster than the import prices in international markets. The increasing gap between exports and imports apparently indicates that India is losing competitive advantage in the cashew value chain.

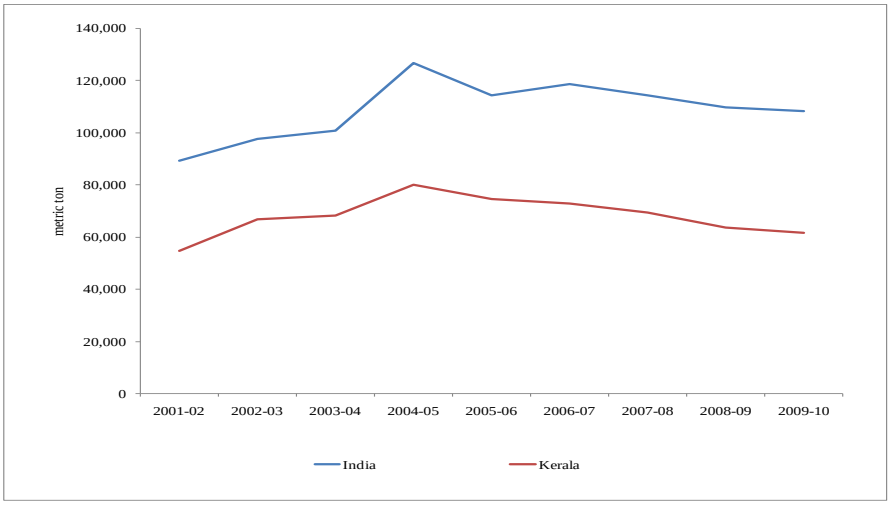
Figure 10.3: Export Prices and Export to Import Price Ratio of Cashew Nuts, 1990−91 to 2009−10



Note: Cashew nut and Cashew nut shell liquid are exported and raw cashew nut is imported
Source: Directorate of Cashew nut & Cocoa Development, Kochi

While exports of cashew kernels from India have been declining, those from Kerala are declining faster both in terms of quantity and value. Kerala is thus losing its share in cashew exports (Figure 10.4).

Figure 10.4: Exports of Cashew Kernels from Kerala and India: 2001−2001 to 2009- 10, (metric ton)



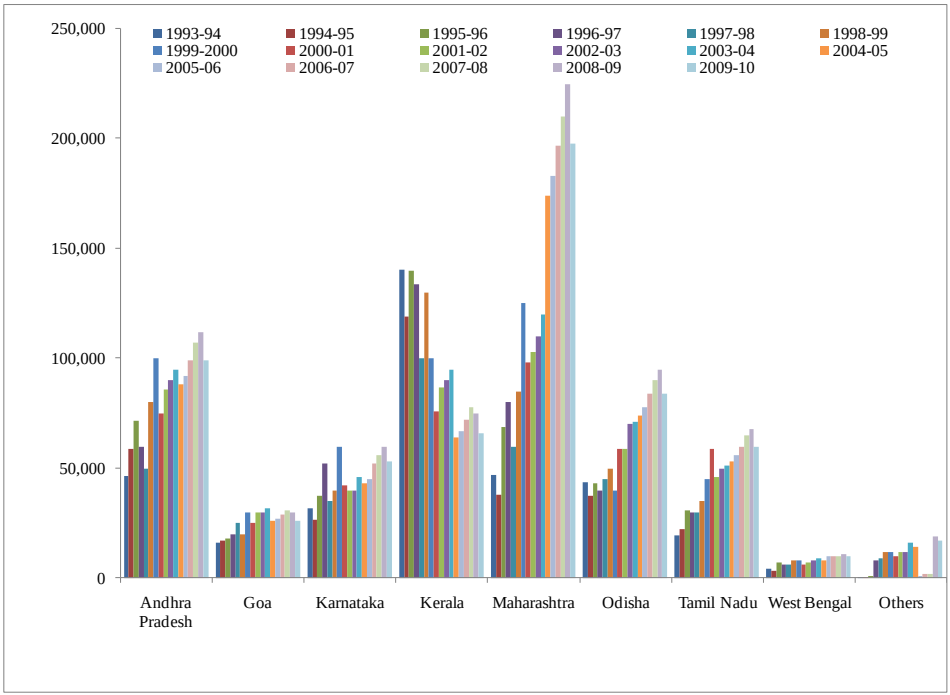
Sources: Directorate of Cashewnut & Cocoa Development, Kochi & Kerala Economic Review, various issues.

10.1.3.3 This is despite the fact that several initiatives have been taken by the Cashew nut Export Promotion Council to promote cashew nut exports. Apparently, these efforts are not enough. This means there are deep-rooted constraints that have been affecting cashew nut production as well as cashew nut processing.

Declining production of cashew nuts in Kerala

10.1.3.4 Figure 10.5 depicts the production of cashew-nut from 1993−94 to 2009−10. Kerala had been at the top in the early 90s, but gradually slipped in terms of relative ranking. Over time, Maharashtra, Karnataka, Andhra Pradesh, and Odisha have overtaken Kerala as the leading producer of raw cashew nuts. It has dropped to the 4th position after Maharashtra, Andhra Pradesh, and Odisha. The two factors responsible for the decline in production are: one, a sharp decline in area, and two, stagnant yield per acre.

Figure 10.5: Production of Cashew 1993−94 to 2009−10 ('000 MT)



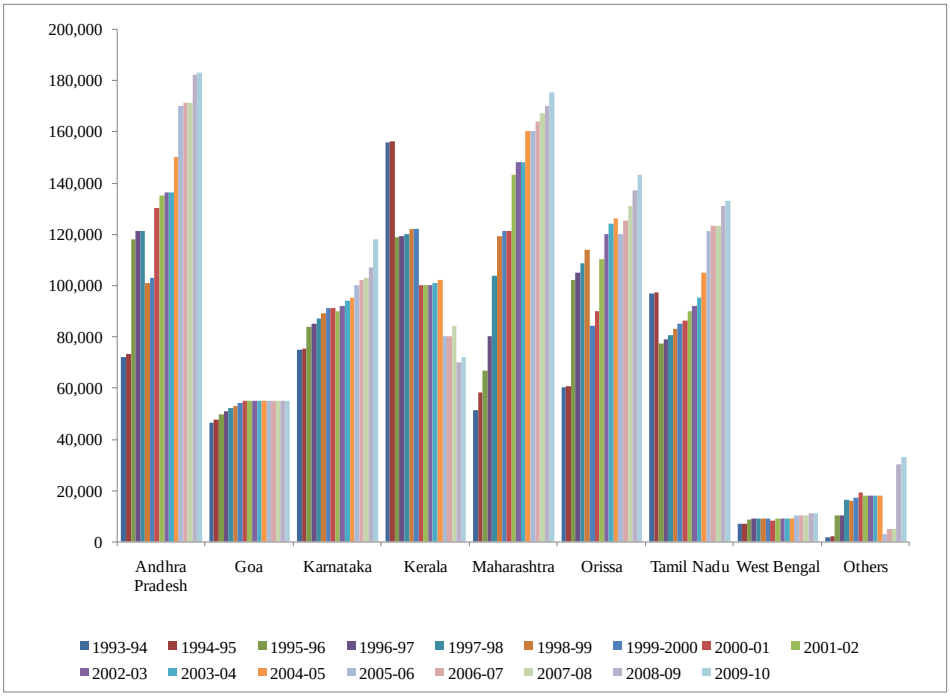
Source: Directorate of Cashew nut & Cocoa Development, Kochi

10.1.3.5 In 1993−94, Kerala had an area of 1,56,000 hectares (ha) under cashew cultivation, which continuously declined to 72,000 ha during 2009−10 (Figure 10.6). This may be attributed mainly to the replacement of cashew with remunerative crops like rubber in Kerala. Unlike certain states such as Maharashtra, where cashew is being promoted with the state government's support, in Kerala few incentives are given to this crop as with other plantation crops. In general, lower yield per hectare can be attributed to small agricultural holdings of less than two acres of land that are of poor quality and/or are multi-cropped. In Kerala, this is partly due to a land ceiling law that limited individual land holdings to five acres for cashew production as well as other designated crops and remained in existence until 2006. Government-run plantations are exempt from this regulation, which has led to the recent development of cashew estates on government-owned lands. State-level plantation corporations are estimated to manage 10 per cent of all land under cashew cultivation. Private production shifted out of Kerala to more land-abundant states including Maharashtra, Tamil Nadu, Karnataka, Odisha and Andhra Pradesh due to land ceiling law. The Act was repealed in 2006. However, the area continues to decline. This could in fact be due to lower value-added taxes in other states (2% − 4%, as compared to 12.5% in Kerala).

10.1.3.6 In 2007, an Agency, "Kerala State Agency for the Expansion of Cashew Cultivation" (KSACC) was formed for implementation of the expansion of cashew cultivation. It has undertaken several measures to incentivise farmers and provide technical assistance to them to improve yield and expand the area under cashew nut cultivation. Assistance has been given for promoting organic cultivation and establishing cashew-apple processing units. The KSACC could bring 12,735 ha under cashew cultivation involving about 80,000 farmers and other institutions. This could be the reason why further decline in

area under cashew stalled in the last two years. Under the mega project, 'Sustainable Production of Cashew Nuts in Kerala', the National Horticulture Mission (NHM) also released Rs 971.8 lakh during 2010−11.

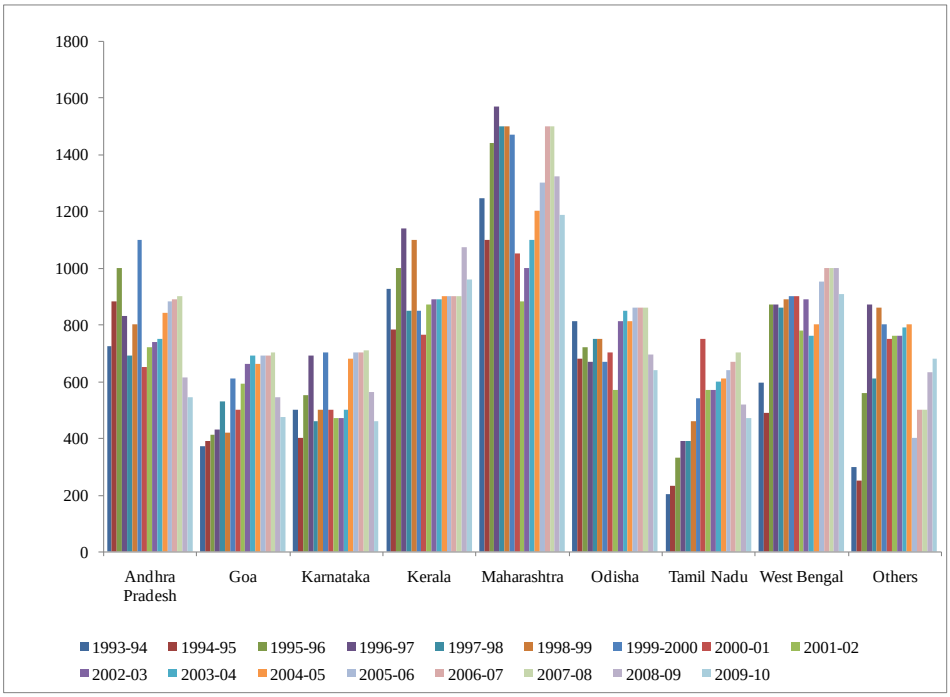
Figure 10.6: Area under Cashew Cultivation: 1993−94 to 2009−10 (hectare)



Source: Directorate of Cashew nut & Cocoa Development, Kochi.

10.1.3.7 Yield per acre has been on the decline in Kerala. In contrast, in states like Maharashtra it has been increasing (Figure 10.7). These states are new to cashew cultivation and hence are adopting high yielding variety seeds for plantation, which gives them high yield per acre in shorter time periods.

Figure 10.7: Yield per acre of Cashew: 1993−94 to 2009−10 (kg per ha)



Source: Directorate of Cashew nut & Cocoa Development, Kochi.

Mixed success of government initiatives in improving productivity in cashew nut production

10.1.3.8 The government is indeed attempting to enhance domestic production through investment in research and development and agricultural extension. Research work on cashew was initiated as early as in the early 1950s resulting in the development of several production techniques. These efforts were further strengthened in the 1960s and 1970s. However, in the initial phase these activities were a part of the All India Coordinated Spices and Cashew Improvement Project. In 1986, a National Research Centre for Cashew was established at Puttur to increase the production and productivity of cashew with the mission-mode approach, and with this the cashew development component was delinked from the combined All India Coordinated Spices and Cashew Improvement Project. Currently, there are 8 research centres and one sub-centre located in 8 cashew-growing states in the country. This network of research centres based at state agricultural universities seeks to increase cashew production and productivity by developing higher yield trees, creating efficient disease and pest management practices, and promoting more efficient planting techniques. These institutions have released between 30 and 40 cultivars with maximum yields of 18−20 kg/tree[3]. Soft-wood grafting is the most widely-supported method of propagation. The Cashew Research Station at Kerala Agricultural University is a leader in research and development and has focused on the development of high yield varieties, bigger nuts, and nuts with a higher shelling percentage. Of the fourteen varieties that have been developed in

[3] Hall, M., Patel, P., Sarmiento, G., Smith, N., Sostowski, N. and S. Waxman. 2007. *Benchmarking the Global Cashew Industry*. Micro and Small Enterprise Trade-Led Growth Program in Brazil. For Development Alternatives Inc. May.

Kerala, eleven were created at the station through hybridisation. These varietals are shared with affiliated institutions in other states. Agricultural extension is primarily conducted by these publicly-funded research centres and universities, although NGOs do provide services in some areas. Farmers can purchase grafts directly from research stations. The Department of Agriculture also buys grafts in bulk and distributes them at the local level at village centres.

10.1.3.9 These efforts have had mixed success, primarily due to the high cost of replacing trees. Farmers who choose to replace their trees risk losing income for 7−8 years while they wait for the grafts to reach their full yield. Some farmers in Kerala expressed dissatisfaction with the fact that the grafts, while producing higher yields, created smaller nuts that fetched a lower price, and also required more intensive fertilizer and chemical use. Utilisation of high yielding varieties has been most successful in Maharashtra, where new plantation development is more common. This may help explain the higher yield per hectare in that state (1,300 kg as compared with the national average of 815 kg per ha).

10.1.3.10 It is apparent that Kerala, which has a long history in the sector, is facing declining competitiveness. It is an ongoing challenge to determine how to provide the right incentives and support that will encourage farmers to invest in replanting higher yield varieties, especially in the face of more lucrative alternatives such as rubber production. Although the government has tried to increase output by establishing new publicly owned plantations with high yield trees, this does not address the needs of the smallholder farmers.

Cashew nut processing: Decline in private investment

10.1.3.11 State intervention has long been very intense in the cashew processing sector in Kerala, which affects private investment adversely. In 1945, the government declared cashew workplaces to be 'factories', even though they did not use power to protect the labour. This declaration gave employers considerable obligations, including adhering to stipulated working hours and paying unemployment compensation, maternity benefit, and employees' state insurance, especially if the factories were categorised as 'perennial' factories. In 1956, the government declared all cashew factories to be 'perennial' and brought the industry under the purview of the Minimum Wages Act.

10.1.3.12 The announcements threatened the cheap labour base of the industry. The factory owners could respond by introducing technological changes, but stiff resistance from labour unions discouraged any such move. The objective of resisting technological change was to protect employment, but it in fact resulted in a sharp rise in unemployment. Several factories closed down; others took a number of steps to avoid implementing the legislation, including seasonalising work and resorting to cottage processing. The government responded by banning cottage processing in 1967. The factory owners countered the move by shifting the base to the neighbouring state of Tamil Nadu. By 1972 there arose 107 factories, primarily located in Kuzhithurai (in the district of Kanyakumari) in Tamil Nadu. In response, the

government resorted to co-operativisation. The Kerala State Cashew Workers Apex Co-operative Society (CAPEX) was formed to engage directly in cashew processing. In 1969, the government set up the Kerala State Cashew Development Corporation (KSCDC). The operations of KSCDC spanned from regulation to distribution to direct processing. It took over the privately-owned cashew factories to run them. By 1975 it had 34 factories with 30,000 employees (accounting for about one-quarter of the estimated work force in this sector). The initial years were successful, when it showed reasonable profits. However, this success story no longer prevails. Currently, the KSCDC has 30 factories. There are about 18,000 workers and a majority of them are women. CAPEX with headquarters in Kollam, is the apex body of cashew workers' primary societies engaged in the procurement of raw cashew nuts and marketing of the processed kernels. It also owns 10 factories. There are about 6,300 workers working in them. Workers of both KSCDC and CAPEX earn benefits including healthcare and pension that are estimated to add value to the minimum wage by 68 per cent. The minimum wage before benefits is comparable for both public and privately-owned processing facilities, and is set annually by a Committee designated by the state government.

10.1.3.13 These measures have had two pronged effects on the cashew processing industry. One, this has caused privately-owned processing companies based in Kerala to shift processing units elsewhere. Two, the level of capacity utilisation has been rather low. In Kerala, there were 432 processing units in 2005−06, with a total installed capacity of 7 lakh tonnes, out of which 3.87 lakh tonnes (55%) was utilised. As compared with this, the utilisation level in Odisha and Tamil Nadu was 100 and 91.8 per cent, respectively.

Resistance to technological changes

10.1.3.14 There has been resistance to technological changes in the industry. The cost of resisting technological changes has been too high. It could neither protect current employment nor lead to a long- term transformation of such industries/activities into higher forms of production and output growth.

Marketing

10.1.3.15 There is no regulated market for raw cashew nuts in Kerala. Due to the absence of regulated markets, the farmers are forced to sell the raw nuts at prices determined by the local traders.

Credit constraint

10.1.3.16 The government of India through the Reserve Bank of India has mandated that all commercial banks advance 40 per cent of their Adjusted Net Bank advance to the "Priority Sector". Out of this total, 13.5 per cent is to be extended directly to farmers for agriculture and allied activities and 4.5 per cent to indirect agribusiness, including lending to processing units and small-scale firms engaged in agriculture activities. NABARD and ICICI dominate

the market for financial services in the agricultural sector. NGOs play a secondary role, and serve more isolated areas. In a study, some farmers in the cashew producing districts of Kerala complained that interest rates for NABARD-funded loans are set too high, and are not well-matched to current cashew prices. Others complained that ICICI is too profit oriented and should charge lower rates or serve poorer clients. Overall, the broadest range of services may not trickle down to the poorest producers. Most government subsidies, including those offered by CEPC, do not reach these farmers. For example, ICICI's RMAG estimates that only roughly 10 per cent of farmers, primarily from tribal groups, receive subsidies. As a result, some farmers have to borrow from moneylenders when credit is needed. Traders may also be sources of informal credit. Many of them run additional businesses in communities, and offer sales to farmers on credit in the off-season.

10.1.3.17 Apparently, the industry is facing a range of challenges regarding international competitiveness. To remain competitive Kerala must make its interventions sustainable and market-oriented.

10.1.4 Strategic planning

VISION

10.1.4.1 The vision is to transform the industry into a modern and high value-added industry; strategic intervention will be directed towards modernisation of the industry. Modernisation is essential for the development of the cashew industry sector. So, certain strategies like

1. restructuring of factories,
2. skill development, mechanisation,
3. market promotion activities,
4. upgradation of existing units,
5. infrastructure development,
6. value additions, etc.,

A four- pronged strategy will be adopted to upgrade the cashew nut industry.

Pillar 1: Improving quality and quantity

Action Plan 1: Encourage private sector participation in production and processing

10.1.4.2 Competitiveness requires a right balance in the involvement of public and private sector, consultancy firms, and NGOs in the sector. Each of these players must have clear-cut responsibilities, proper incentives, and opportunities to support and invest in the cashew industry. Together, these players must create an environment that enhances competitiveness.

10.1.4.3 First of all, the necessary boost in competitiveness requires robust private sector involvement. Cashew being an export-oriented industry is exposed to global competition. In order to compete, Kerala must increase efficiency and quality both at the farm and processor levels by actively engaging private sector players and creating facilitating conditions for the markets to determine and implement necessary interventions.

10.1.4.4 For the private sector, development subsidies and direct technical assistance should be used restrictively, with more emphasis placed on developing capacity within the private sector to provide necessary business and financial services and promote competition in the market. Competition increases quality and efficiency. A focus on technical assistance that develops private sector markets for business services and assists the public sector in improving the business environment is the basis of market-based development. These indirect methods of intervention use markets to guarantee efficiency and sustainability.

10.1.4.5 The state's role should be to regulate the unfair competition and monopolising tendencies. NGOs may help in bringing about this transformation by facilitating and monitoring the process.

Action Plan 2: Promote "Producers' Companies" and other entrepreneurial forms of agriculture

10.1.4.6 As discussed in the Chapter on Agriculture, promotion of Producers' Companies may be a solution even in this sector. Along with the private corporate sector, producers' companies should be promoted. Their emergence will contribute to enhancing competition in this market. An alternative approach is to promote "special integrated cashew zones" along the lines of Special Agri-zones proposed in the chapter on Agriculture (Box 10.1). NGOs can play a major constructive role in promoting these alternative forms of organisation of the industry.

Box 10.1: Panruti "Special Integrated Cashew Zone"

In Panruti, cashew farmers supplement their own incomes by operating small units in which they process their own harvests as well as nuts purchased from export houses that source raw materials from other parts of India or abroad. Recently, they have deviated from this practice. They have discarded the practice of buying the nuts from export houses and selling them independently. Instead, these small processors have formed a cluster in order to increase incomes. The average daily wage for the shelling and peeling stages is Rs 50 (approximately $1) and skilled workers employed in grading earn about Rs 70 (about $1.50) per day. They procure raw nuts from other states and share the expense of transporting truckloads of these nuts. Along with shared transport, they are able to rent machinery and other infrastructure within the cluster. Cluster members have also devised risk sharing schemes that protect them from the daily prices fluctuations. Because it typically takes 10-15 days for a batch of raw nuts to be processed into kernels, processors in Panruti avoid these price changes that would affect their margins by carrying out only one production sub-process and then selling the semi-finished product immediately. Landless people are involved in the Panruti cluster through wage

labour and as collectors of 'free' nuts that become available at the end of the harvest when farm boundaries are no longer enforced. This cluster experience demonstrates how producers with limited resources and even landless people can benefit from primary production and processing when the relationships within the value chain are renegotiated. The involvement of farmers in processing in Panruti is very innovative, and distinct, and is an example of how the small processors and growers can improve their incomes.

Source: Hall, M., Patel, P., Sarmiento, G., Smith, N., Sostowski, N. and S. Waxman. 2007. *Benchmarking the Global Cashew Industry*. Micro and Small Enterprise Trade-Led Growth Program in Brazil. For Development Alternatives Inc. May.

10.1.4.7 To sum up, over the next 20 years, the state- owned agencies may gradually withdraw from direct processing and manufacturing. The process will start by privatising most profitable units and over a period of five years the industry will be fully privatised.

10.1.4.8 The primary objective of state intervention was to act as a model employer. Over time, with demographic transition and change in the labour market realities, there is no rationale for direct intervention of the state in these activities. Box 10.2 gives the experience of Maharashtra in cashew nut production and processing in Sindhudurg district by involving the public and the private sector, and NGOs.

Box 10.2: Maharashtra Success with Cashew Nut Production and Processing

Farm production: The state of Maharashtra is a case study in successful public and private sector support for cashew development, particularly in the Sindhudurg district, which is near the border with Goa. Between 2002−2005, UNIDO helped initiate a strategy to support cashew production in the region following government efforts. The intervention targeted small and marginal farmers, micro-entrepreneurs, and women. Even after the project has ended, government continues to play an important role in addressing technical constraints, quality improvement, access to credit, marketing, and greater coordination between banks, NGOs and public institutions. In 2002, the Department of Agriculture of the Maharashtra government initiated a District Rural Industries Project through NABARD and an NGO, which included technical assistance in marketing and production, as well as financing of local co-operative and commercial banks for extending credit to microenterprises.

Processing: Sindhudurg also has active support centres for processors and other small industries, which help register SMEs, facilitate their access to credit, and provide subsidies for equipment upgrades. Several NGOs, some of which are funded by the Indian Council of Agricultural Research, provide training to farmers and processors, including specialized services to enhance fruit processing and organic production. Technical assistance is intended to help standardize production processes throughout the region in order to improve the marketability of nuts and fruit products. Although public funds have helped initiate many of these projects, interventions also help strengthen linkages between commercial banks, farmers, processors, and NGOs to enhance capacity in the private sector. This includes the effectiveness of research and development and agricultural extension to address tree yields, planting techniques and land use practices.

Source: Patil, R.B. 2010. *A Geographical Analysis Of Cashew nut Processing Industry In The Sindhudurg*

Action Plan 3: Mechanisation of processing

10.1.4.9 The KCDC proposes partial mechanisation to improve the production in the cashew industry. The mechanisation effort will run parallel to the manual system, reducing overall cost of production and thus increasing the viability. The main purpose is to enhance production of output and productivity, thus retaining the labour intensive nature of industry. This mechanisation will be more beneficial in the shelling process, as shelling is heavy work, especially for the present generation who are not willing to enter this area of cashew processing. It is proposed, however, that over time labour shortage in this industry will grow unless it creates demand for skilled labour. Fully mechanised and niche hand- crafted processes may be developed in parallel. They will need to be priced differently, with the latter offered as "premium cashews".

Pillar 2: Differentiation

10.1.4.10 Until recently, the market for value-added products was not considered extensive, although flavouring was common. The future of price-premiums for commodities exists in providing a differentiated product to savvy consumers. For cashews, countries must focus on international market demand for quality, the importing country's standards, and breaking into niche markets.

Action Plan 1: Handcrafted cashew nuts

10.1.4.11 The labour-intensive manufacturing process practiced in India results in a higher percentage of wholes, and avoids blanching that can occur with foot pedal machines (although the latter are also used). However, the product positioning is not differentiated. They compete with the mechanically processed cashew. Over the next 20 years, Kerala will use both labour and machine intensive processing in parallel and differentiate them by positioning handcrafted cashews as a value-added product. Kerala will market handcrafted cashew nuts so that they fetch a higher price.

Action Plan 2: Packaging

10.1.4.12 It is one way of differentiating the product. The significance of packaging has become huge in global markets. At present, KSCDC has only one packing unit. Exports are made as bulk product. Keeping this in view, KSCDC aims to implement 6 more packing units. However, over the next twenty years, the State will not export bulk cashews. With entrepreneurial ventures entering into the market, packaging will also pick up.

Action Plan 3: Organic products

10.1.4.13 Kerala will reposition itself by exploring rising demand for organic products within the country and internationally. The marketing of organic cashews has not been a focus, and a rough estimate is that certified organics are less than 0.5 per cent of total production. This is primarily due to the difficulty of certification, particularly since the majority of cashews are grown on small, fragmented farms together with other crops. Ironically, most cashews in India are naturally grown organically, but cannot adhere to the stringent requirements of international standards. Proving compliance with standards is difficult in regions that have been growing cashews for nearly a century. In Mangalore and Goa, where newer plantations are being developed, standards may be easier to achieve. Despite these obstacles, the Government of Kerala has shown interest in exploring organic production, given the estimated 25 per cent price premium. An action plan will be in place to help farmers to achieve international standards in organic cashews trade.

Action Plan 4: Organise Fair Trade

10.1.4.14 The state will set itself apart to attract buyers through fair trade markets and branding itself in the industry. It is a move towards differentiating the product on the basis of social responsibility. Fairtrade is a group of 25 organisations working across the world to secure a better deal for producers. It is headquartered in Bonn, Germany and sets international Fairtrade standards to support Fairtrade producers. These organisations license companies to use the FAIRTRADE Mark and market Fairtrade (products?).There are 19 labelling initiatives and three marketing organisations covering 27 countries. The cashew Fairtrade market is relatively small in India, but has considerable potential. There is only one agency, Fair Trade Alliance Kerala (FTAK), which was registered in 2006. It works with 3,000 producers. It does away with the system that depends on intermediaries by making farmers directly involved in governance, decision-making, and quality monitoring. FTAK's governance structure includes committees at the village, district, and state levels, and it mandates that one-third of representatives are women. The state committee vets all contracts and decides on the farm gate price. Farmers also operate the 19 collection depots in the state. FTAK hires a truck to transport nuts from these depots to processing units. A strict traceability system is maintained, and each bag can be traced according to date, depot origin, and the machinery in which it was processed. Farmers are paid at the depot. Most of FTAK's buyers are in the U.K. and the E.U., and business is growing. The U.S. market is currently unexplored. These initiatives will be used to promote trade with social development. Kerala will benefit from catalyzing more participation in Fairtrade markets and in inducing a higher quality production from farmers. This can be done by encouraging Fairtrade buyers to partner with small producing and processing units, and to be the interface between co-operatives and Fairtrade organisations in India and abroad.

10.1.4.15 The objective of product differentiation is to move up the value chain and earn price premium for quality. This requires:

- Imparting training to exporters: In Mozambique for instance, TechnoServe has implemented a programme that would train intermediaries to ensure price

premiums. This will act as an incentive that would enable a shift towards better agricultural practices and adoption of the latest R&D technology by the producer.

- Dissemination of price information: Vietnam, the Chamber of Commerce and Industry, and the International Labour Organisation are attempting to broadcast pricing information and best practices suggestions via radio and television to help farmers follow market demands. These activities raise the quality and ergo the competitiveness of the final product.
- Dissemination of information regarding these possibilities: This will require the participation by NGOs and "Cashew Nut Producers Associations", both at the regional and state levels.

Pillar 3: Diversification

Action Plan 1: Diversify the cashew markets

10.1.4.16 Every part of the plant can be converted into high value-added products.

- **Cashew Nut Shell Liquid (CNSL):** This is a renewable material that can be used to make specialty chemicals and polymers including insulating varnishes and resins. CNSL-based polymers are resistant to cold, water, microbes, and termites. There is a high demand for these polymers in coastal areas, where they are used to seal boats. India's largest international buyer of CNSL is the U.S., followed by Korea and Japan. More markets will be explored over the next 20 years to diversify the markets.

- **Cashew Apple:** Marketing of cashew apple by-products is not extensive in India. The alternative uses of the fruit have not been popularised and are primarily used for household consumption. This is partly due to the vulnerability of the apple, which does not have a protective skin, and must be processed within eight hours of harvesting. Despite extensive research at government centres, jams, jellies, and juices are not considered marketable domestically or internationally. Some large private firms, including Beta Foods, attempted to market by-products including jams, but found it difficult. The cashew apple is said to have many medicinal values. Brazil has been successful in promoting markets for the products of cashew apple. In particular, the commercial production of cashew apple syrup has been found to be profitable. Cashew apple is also used for producing organic manure. The action plan will be to initiate major projects in promoting these products successfully.

- **Liquor:** Four grades of cashew liquor have been discovered, but the highest grade, Feni, is only produced in Goa due to government restrictions on commercial sale.

- **Cashew testa:** This can be commercially utilised for manufacturing 'tannin' which is of use in leather processing.

- **The cashew shell:** After oil extraction, cashew shell can be used for making heat-resistant 'particle boards', a substitute for plywood, 'nuwood', etc. The water-resistant wood is used for boats and ferries.

- **Medicinal value of the plant:** The bark, leaves, gum, and shell are all used in medicine. The leaves and bark are commonly used to relieve toothache and sore gums, and the boiled water extract of the leaf or bark is used as a mouthwash. A paste of bark ground in water is applied to the skin to cure ringworm; however, in this form it can irritate the skin and should not be applied to sensitive skin or on children. The root has been used as a purgative. Fibres from the leaves can be used to strengthen fishing lines and nets, and as folk remedies for calcium deficiency and intestinal colic, as well as a vitamin supplement. The Cashew nut shell liquid, in addition to having industrial uses, is also used as an expectorant, cough remedy, and insect repellent.

Action Plan 2: Research and development

10.1.4.17 Cashew apple, cashew nut shell liquid, cashew testa and cashew shell will lead to higher realisation of income for farmers and cashew processor-exporters. This requires extensive research. KSCDC has introduced four value-added products, viz. cashew vita, cashew soup, cashew bits, and cashew powder. However, more will be done to exploit this natural wealth of Kerala to benefit both the present and the future generations.

10.1.4.18 The Kerala State Cashew Development Corporation and CAPEX will be integrated to provide support services, management training, marketing, research and development, and certification. Alongside, NGO participation will also be necessary to incentivise increased research and development and encourage new entrepreneurs and greater competition into the sector. As proposed in the Chapter on Agriculture, private consultancy firms will need to be promoted, equipped with modern technologies, and have links with research organisations. These may be partly/fully funded by the government and employed on the basis of bidding systems.

Action Plan 3: Certification

10.1.4.19 In India, only relatively few processors have attained ISO (International Organisation for Standardisation), GMP (Good Manufacturing Practice), and HACCP (Hazard Analysis Critical Control Point) certifications[4]. U.S. and European markets are

[4] Red River Foods Inc. 2010. Cashews: Highlights of the Cashew Industry. http://www.agoatoolkit.com/agoa/English/Select%20Products/Cashews/Cashew%20Industry%20and%20Export Guide/03-Cashew-Industry%20Highlights.pdf. June.

placing greater importance on receiving standardised quality certification for assured access to their markets. Certification facilities will be improved to sustain these markets.

Pillar 4: Access to Credit

10.1.4.20 Kerala will mitigate the effects of a complex and restrictive financial market by tailoring dynamic approaches. Box 10.3 shows one such practice.

Box 10.3: Commodity Based Financing

The ICICI Bank is a leading commercial lender to the agriculture sector. ICICI minimises costs through its use of technology and by working through intermediaries like MFIs, NGOs, and co-operatives to deliver services. Its goal is to provide touch points (through a branch, kiosk, or affiliate) every 10 km in rural areas. ICICI has developed special low cost ATMs and biometric smart cards with pre-loaded loan limits. Interest is calculated from amounts withdrawn on a given date to avoid the burden of flat interest rates calculated on the entire loan from the initial disbursement. Insurance products for farmers are designed to target specific risks, like rain, to help reduce premiums. ICICI's products for the cashew sector focus on commodity-based financing. ICICI funds accreditation for warehouses whose records are digitized and interlinked. Farmers' access to credit is based on their deposit at the warehouse, which is verified for volume and quality by an independent agency. Cashew prices are monitored daily and distributed to warehouses to advice clients when to buy and sell.

Source: Hall, M., Patel, P., Sarmiento, G., Smith, N., Sostowski, N. and S. Waxman. 2007. *Benchmarking the Global Cashew Industry*. Micro and Small Enterprise Trade-Led Growth Program in Brazil. For Development Alternatives Inc. May

Pillar 5: Development of markets

Diversification of international markets

10.1.4.21It is pertinent to point out that even though India exports to over 60 countries of the world, about 50 per cent of the exports are to USA and about 33 per cent to European countries. Over-dependence on one or two markets is not at all desirable in the international trading of any commodity. The prime marketing strategy to be adopted should, therefore, be to strengthen the non-traditional markets by exploring new ones.

Development of mandi in the cashew centre:

10.1.4.22 It is pertinent to develop a large organised market for raw and processed cashew nuts in Kollam where buyers and suppliers from national and international markets will interact.

Marketing tactics

10.1.4.23 It is observed that the promotion of other nuts, in particular walnuts, has resulted in the shooting up of its demand in national and international markets. Cashew also requires to be promoted based on its health properties. "Cashew is a unique combination of fat, proteins, carbohydrates, minerals, and vitamins. Cashew contains 47 per cent of fat, but 82 per cent of this fat is unsaturated fatty acids. The unsaturated fat content of cashew not only eliminates the possibility of the increase of cholesterol in the blood, but also balances or reduces the cholesterol level. Cashew also contains 21per cent proteins and 22per cent carbohydrates, and a right combination of amino acids, minerals, and vitamins. As such, nutritionally, it stands at par with milk, eggs, and meat. As cashew has a very low soluble sugar content of 1per cent, the consumer of cashew is privileged to get a sweet taste without having to worry about excess calories. Cashew nuts do not lead to obesity and can even help to control diabetes. In short, it is a good appetiser, an excellent nerve tonic, a steady stimulant, and a body builder. Like all plant products, cashews are cholesterol free. Raw cashews are also sodium free, and contain 7 per cent of the recommended daily value for dietary fibre per serving. They contain small amounts of thiamin, riboflavin, niacin, and folic acid. Finally, cashews have an excellent fat composition, and are a good source of iron, phosphorous and magnesium"[5].

Packaging and Marketing

10.1.4.24 Packaging and marketing may be encouraged within Kerala to promote value-added activities. Branding of cashews "Made in Kerala" may be used to fetch a higher premium for the product. Cashew tourism may be encouraged starting from tours of plantations to manufacturing to buying high value-added products.

Market Kollam

10.1.4.25 Kollam, which is already the centre for processing of cashew for India, should be advertised as such. Road, rail, port, and inland water connectivity may help further Kollam's position to establish it as a centre, especially if international ships can land on its port. Inland water connectivity may then help cement its position further.

[5] Peter, K.V. and Z. Abraham. 2007. *Biodiversity in Horticultural Crops*. Volume I. Data Publishing House. Delhi.

10.2 HANDLOOM INDUSTRY

10.2.1 Background

10.2.1.1 The Handloom industry is a pre-market, pre-capitalist industry that produces fabric using hand-operated looms. In an emerging economy like India, where about 70 per cent of the population lives in rural areas, the handloom industry provides an important means to livelihood. As per the latest (3rd) Handloom Census of 2009−10, there are 23.77 lakh handlooms in the country, providing employment to 43.32 lakh handloom weavers and ancillary workers. This includes 38.47 lakh adult handloom weavers and ancillary workers, of which 24.72 lakh are engaged full time and 13.75 lakh on part time basis. As per the Census, nearly 27.83 lakh handloom households are engaged in weaving and allied activities, out of which 87 per cent are located in rural areas and remaining 13 per cent in urban areas. Weavers in the sector are mainly from the vulnerable and weaker sections of the society. Out of the 38.47 lakh adult persons engaged in weaving and allied activities in the country, 77.9 per cent are women. Further, 10.13 per cent belong to the Scheduled Castes (SC), 18.12 per cent belong to the Scheduled Tribes (ST), and 45.18 per cent belong to Other Backward Classes (OBC).

10.2.1.2 However, this sector has witnessed a significant fall in total employment in recent years. As against the total number of weavers at 43.32 lakh as per the Handloom Census of 2009−2010, the number of weavers as per the earlier (2^{nd}) Handloom Census (1995) was 65 lakh**.** It could be partly due to the impact of the global recession in 2008 and partly to the impact of growing competition from the decentralised power loom and mill-made sector.

10.2.1.3 Once a major source of employment, the handloom industry is currently in doldrums in Kerala. It requires a course correction to thrive.

10.2.2 Government support

A slew of schemes to promote the sector

10.2.2.1 A popular belief is that the handloom industry has survived only because of government support. An analysis of government support to the industry reveals that a slew of schemes are being promoted by the Central and the state government, covering almost every aspect of the industry. While the primary responsibility of developing the sector lies with the state government, the Government of India has also introduced various policies along with pragmatic interventions for the handloom sector aimed at promoting the sector and generating sustained, productive, and gainful employment with decent working conditions for the entire weaver, artisanal, and ancillary worker population. The schemes are being implemented by

the respective State Handloom Development Corporations. Table 10.1 provides a list of these schemes.

Table 10.1: List of government sponsored schemes to promote the handloom sector

Scheme	*Main features*
Integrated Handloom Development Scheme (IHDS)	• Integrated four schemes: Deen Dayal Hathkargha Protsahan Yojana (DDHPY), Integrated Handloom Training Project (IHTP), Integrated Handloom Cluster Development Scheme (IHCDS), and Workshed-cum-Housing Scheme, implemented during the 10th Plan, with the aim of • formation of self-sustaining weavers' groups, and • providing a workplace to weavers.
Marketing Export and Promotion Scheme	• Positioning of handcrafted items as niche products and use of innovative measures for their promotion, • branding of products, and • making handloom into a fashion statement.
Diversified Handloom Development Scheme	• Holding design exhibitions and workshops, • conducting the third Handloom Census, and • issuance of photo identity cards.
Mill Gate Price Scheme	• Supplying yarn and dyes to individual weavers through 660 depots throughout the country.
Handloom Weavers Comprehensive Welfare Scheme	• Cover Health insurance (ICICI Lombard), and • Life insurance (Mahatma Gandhi Bunkar Bima Yojana)
NCDC Sponsored Schemes:	• Strengthening the share base of primary co-operative societies for creation of processing facilities to weaver's societies,, • Construction of showrooms or godowns for the primary weavers.
Handloom Export Scheme	• Grant for the development of exportable products, and • Marketing assistance for product development, brand development, participation in international trade events, setting up of units for value addition and setting up of quality testing laboratories
The Handloom based Innovative products development and Marketing schemes (THANIMA)	• Development of micro enterprises involved in innovative products development, and • Marketing in Thiruvananthapuram.
KRITHIKA at KANNUR-3000 weavers (Sponsored by the Ministry of Textile)	• The creation of micro enterprises involved in the delivery of handloom products to exporters and big domestic players, • Augmenting the infrastructure facilities and by adopting appropriate social and technology intervention strategies.

Source: Compiled by NCAER from official documents

An elaborate institutional set up

10.2.2.2 A number of institutions have been set up to support technology, designing, marketing, and exports covered by the above schemes. These are,

- Directorate of Handloom and Textiles, Thiruvananthapuram: for policy initiatives for the development of textile sector
- Indian Institute of Handloom Technology (IIHT), Salem: A government of India Educational Institution devoted for the development of handlooms
- Institute of Handloom Textile Technology (IHTT), Kannur: A state government Institution for the development of handloom technology in the state
- Weavers Service Centre, Kannur: A government of India institution under the Ministry of Textiles for technical support
- Export Promotion Council for Handloom & Handicrafts
- A state-supported Federation for implementing schemes for development of silk (SERIFED), Thiruvananthapuram
- KSHDC (HANVEEV) Kannur: A state government corporation for marketing
- Kerala State Handloom Weavers Welfare Fund Board
- HANTEX, Apex Co-operative Society
- Kerala Handloom Export Organisation, Kannur
- Kerala State Textile Corporation, Thiruvananthapuram
- Hantex Process House, Thiruvananthapuram
- Textiles Committee for quality control, Kannur
- Textile Project Development Centre (TPDC), Balaramapuram
- National Handloom Development Corporation, Kannur.

10.2.3 Performance of the handloom sector

A low share in the national handloom industry:

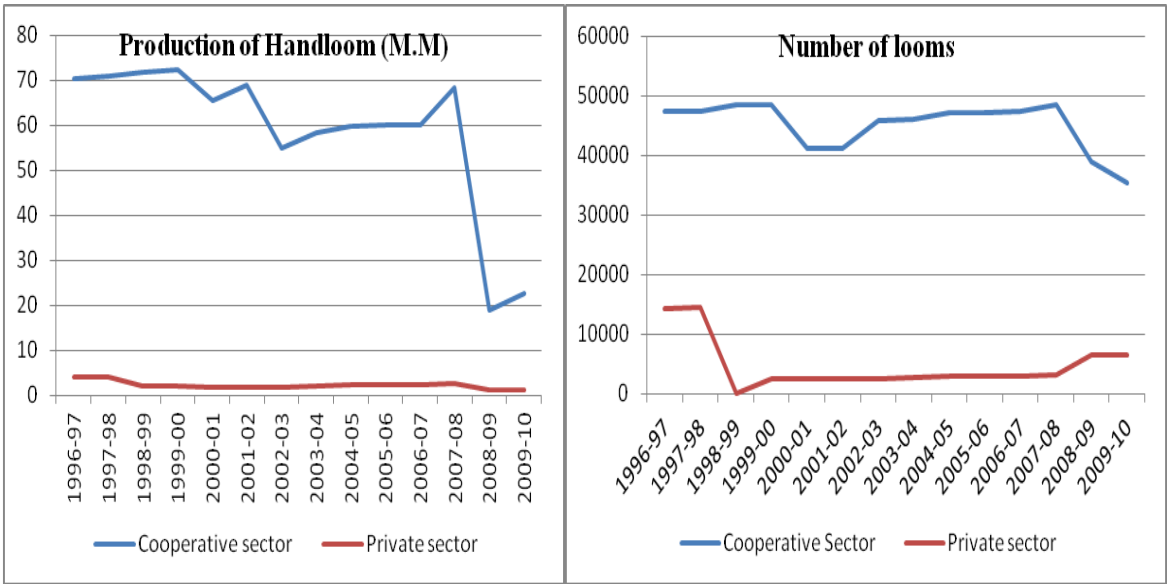
10.2.3.1 Handloom Industry is a major traditional industry of Kerala. According to the latest Handloom Census, grossly, Kerala has 11,690 units employing 14,679 weavers and allied workers, and 13,097 handlooms. The share of Kerala is a mere 0.3 per cent in employment in this sector and 0.6 per cent in terms of looms. Different set of statistics is provided by Directorate of Handloom & Textiles via Economic Review. It shows that the number of looms in 2007− 08 was 52,566 looms with 1.3 lakh weavers working on them. Indeed, the number of weavers declined sharply post 2007 - 08 primarily because of global recession. Yet even in 2009−10, the State Planning Board reports the figure of 57,000 odd weavers against 14,000 odd workers reported in the Handloom census. This discrepancy in data needs

attention. Handloom industry in the State is mainly concentrated in Thiruvananthapuram and Kannur districts and in some parts of Kozhikode, Palakkad, Thrissur, Ernakulam, Kollam, and Kasaragod districts. Kerala is also known for its unbleached cotton handloom crepe, popularly known as 'kora' cloth, which has entered the foreign markets and occupies a place of pride in the garment industry. However, the share of Kerala in the national handloom industry remains relatively small even as compared with those of other Southern states, namely Tamil Nadu, Andhra Pradesh, and Karnataka.

Declining employment and production

10.2.3.2 It is observed that despite the government support, production in handloom sector has been declining with fluctuations over time in Kerala. Figure 10.8 shows that the Great Financial Recession of 2008 affected the sector severely and there has been slow recovery afterwards.

Figure 10.8: Handloom Production and Number of Handlooms in Co-operative and Private Sectors: 1996−97 to 2009−10

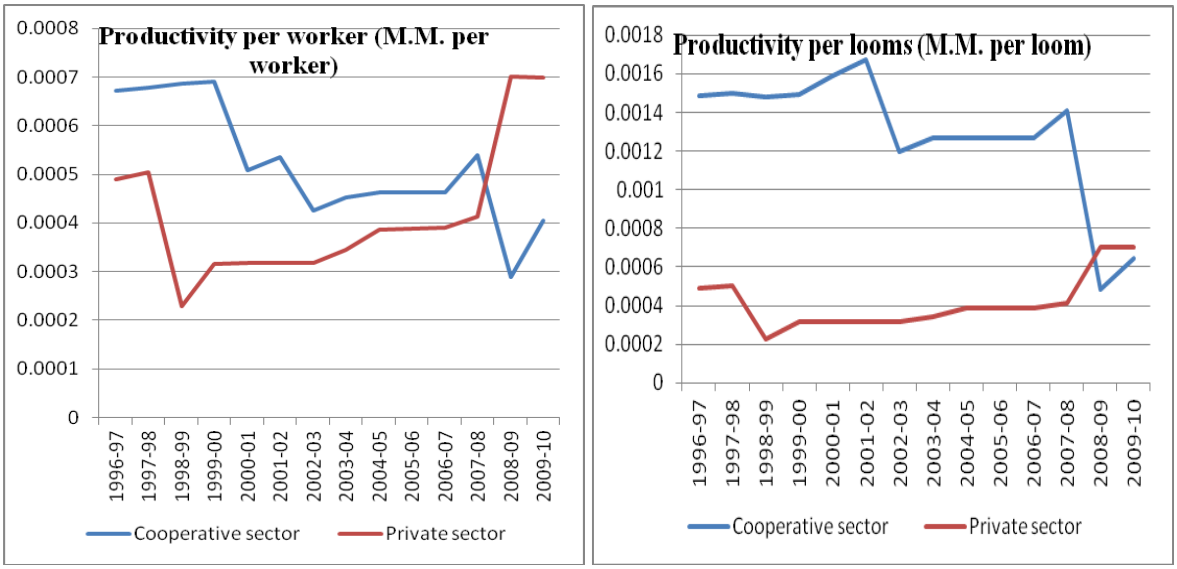


Note: M.M: million metres

Source: Kerala Economic Review, Various Issues

Similarly, productivity both in terms of workers and looms have been declining in the co-operatives sector. The private sector has on the other hand shown a rise in productivity which is encouraging.

Figure 10.9: Productivity per worker and per handloom in co-operative and private sectors: 1996−97 to 2008−09



Note: M.M: million metres

Source: Kerala Economic Review, Various Issues

10.2.3.3 The handloom industry faces a serious crisis, owing to both demand and supply side factors. Table 10.2 lists these factors.

Table 10.2: Demand and Supply factors affecting the Handloom industry in Kerala

Demand side	***Supply side***
• Competition from cheap power loom cloth • The shrinking market for handlooms in Kerala • Non-demand based production and inadequacy of new designs • Lack of branding and quality controls in the face of competition from other countries like China and Pakistan in marketing their products in major importing countries such as USA, EU, Japan	• Rising input costs • Sparse credit coverage and high cost • Dearth of innovation and limited dynamism • Infrastructure gaps • Poor policy dissemination

Source: Conceptualised by NCAER

These bottlenecks need to be addressed in the future strategy.

10.2.4. Strategic Planning for the Handloom Sector

10.2.4.1 The state of Kerala does not enjoy comparative advantage in the handloom sector. Its share in the national handloom sector remains miniscule. Furthermore, over the next 20 years, as Kerala shifts to a new knowledge based paradigm, the contribution of this sector will further erode. There is already labour shortage in the sector. However, the industry is a part of national heritage and hence will be promoted with the primary objective of preserving this ancient craft by protecting its dependents from the threat of power looms/ fully automatic looms / machineries. This vision is in line with the objective of the Kerala State Handloom Development Corporation Ltd (KSHDC) as well.

10.2.5. Vision and mission

VISION

10.2.5.1 The vision will be to promote Kerala as "a centre of excellence in the production of exquisite quality handloom products" to preserve this ancient craft.

MISSION

10.2.5.2 Building on Kerala's capabilities in ICT and other knowledge-based sectors, the mission will be to tap into available knowledge and expertise and transform the business from the inside. This will be achieved by tailoring special policy support schemes that could deal with idiosyncratic barriers for innovation that exists in these areas.

10.2.6. Strategic Action Plan

10.2.6.1 The new strategy will rest on four pillars. In essence, these draw on the strategic element of the Mission as specified by the Directorate of Handloom & Textiles (Box 10.4).

Box 10.4: Mission of the Directorate of Handloom & Textiles

- Strengthen Handloom clusters with financial, technical, and managerial support to sustain the cluster base for result-oriented production and marketing
- Develop regional brands for high quality handloom products to compete in the domestic and international markets
- Create niche markets for handloom products in domestic and international markets
- Develop high quality infrastructure facilities for Handlooms for pre-loom processing and post-loom processing
- Introduce a system of distribution of quality raw material
- Encourage establishment of Handloom Units by Master weavers
- Sustain welfare of handloom weavers in the unorganised sector through welfare measures

Pillar 1: Improving competitiveness of the industry

Action Plan 1: Encourage organisational transformation

10.2.6.2 In India, the government has encouraged the Handlooms sector to adopt a co-operative model. The policy has facilitated the formation and running of Primary Co-operative Societies at the village/taluka level and Apex Societies at the State level. Besides, State Handloom Corporations have also been promoted with a view to supporting individual weavers. It has been envisioned that the Apex Societies/ State Handloom Agencies would, inter-alia, arrange for procurement of yarn from organised mills, supply the same to Primary Societies for producing cloth and, thereafter, also undertake marketing activities. Along similar lines, in Kerala, Kerala State Handloom Weavers Co-operative Society (HANTEX), the apex organisation of the co-operatives and Kerala State Handloom Development Corporation Ltd (with their brand name HANVEEV) providing services (especially marketing) to individual weavers, are the principal development agencies assisting the Department of Handlooms and Textiles.

10.2.6.3 However, alongside the co-operative sector, a small private sector also exists. This sector comprises "Master Weaver firms". There are two routes to set up these firms. The first route is to 'inherit' part of the family firm. The second route is that taken by weavers who after working for an intermediary – co-operative, NGO, or a master weaver – for a while set up their own firms[6]. In most cases, whatever the route may be, it is unlikely that the master weavers have any business experience. They learn the elements of managing a business by observing others and learning from their own mistakes. Yet, it has been observed that they perform better than the co-operative societies. The above analysis also shows that while the

[6] Master weavers almost always belong to the weaving community because it is not easy for persons from any other caste to set up these firms.

productivity of the co-operative sector has been declining, it has been rising in the private sector. Evidence suggests that there are two broad sets of operating factors that seem to help the master weavers. First, they strive extensively to keep their transaction costs low so that the price of the final product remains within the budget of the end customers. Second, they remain close to the demands of the markets by using their social networks of contacts extensively. Their production is generally distributed over a large number of production centres (sometimes up to 10 centres).

10.2.6.4 This clearly depicts the potential of an entrepreneurial approach to business. We propose that the government need to promote:

- Master weaver firms, and
- Producer companies.

Action Plan 2: Develop centres of excellence in handloom industries by establishing handloom villages (HVs) as the major unit for planning

10.2.6.5 Handloom villages will be developed under the "Integrated Environment-friendly Handloom village development programme". Each handloom village will have a governance model in place. A dedicated Village Development Executive (VDE) and a Designer-cum-Marketing Executive should be appointed on full-time contractual basis for each cluster.

10.2.6.6 Over this period 5 HVs may be set up in Thiruvananthapuram and Kannur based on the following principles:

- Identify the best performing nodes of production based on the diagnostic studies in the initial phase
- Identify the locations with best potential
- Assess supply chain management in each location and identify challenges at each level in each of the selected locations
- Brand each HV: Branding at the firm's level requires investments of entrepreneurs' time and money. If it is done at the village level, it will serve to reduce the cost. Perhaps most important, a new quality-inspection centre will be established to randomly check the quality of local products

10.2.6.7 ***Action Plan 3: Adopt comprehensive and focused approach to develop the Handloom villages***

- **Raw Material Availability:** For ensuring adequate availability of yarn, a multi-pronged strategy is required. The Mill Gate Price Scheme (MGPS) in the state should focus on the selected Handicraft villages rather than spread itself thinly across the state. The scope, coverage, and guidelines of the Scheme should be modified so as to improve service delivery. The governing body will be responsible for the improvement in service delivery in terms of minimising delays in yarn supply and providing desired choice of yarn (mill, quality, & type). The

role of National Handloom Development Corporation (NHDC), which is implementing the scheme, should be enhanced. More depots should be allocated to the selected villages. It should also take steps to computerise depot operations to make available information.

- **Tax incentives:** These villages may be offered tax incentives. At the state level for instance, VAT may be waived on domestic procurement of raw materials.

- **Common facilities:** To reap the benefits of economy of scale, upgradation of looms, commissioning of CFCs/ dye houses, etc., will be encouraged by the government.

- **Credit facility:** Each selected handloom village should have banks, MFI and other financial service providers. Each weaver will have an ID and each holder of the Weaver's ID Card will have a bank account and a Weaver Credit Card.

- **Infrastructure:** The local administration will be responsible for the world class infrastructure in the HVs. These include enhanced energy, water, and sanitation management. The common facilities centres may be developed by local authorities. All existing infrastructural aspects (such as interiors, visual merchandising, stock rotation, and professional management) should be reviewed and requisite provisions made in existing structures as well as for new structures such as warehouses.

The underlying principle will be to create agglomeration economies.

10.2.6.8 ***Action Plan 4: Strengthen market support to weavers***

- **Development of market place:** For marketing promotion, the new strategy will focus on the development of the market place within each HV. These markets will attract buyers and sellers from all over the country and world. The economy of scale in production will facilitate the development of these markets. The market place will comprise wholesale markets and distribution centres to enable exporters, manufacturers, and boutique owners to source high- quality handloom fabrics and readymade garments.

- **Niche market development:** Thrust should also be on entering niche markets and on enhancing availability of requisite handloom products, both internationally and within India. Already there are Mega Handloom Expos and exhibitions organised in major metro cities. However, niche market development also requires branding and strict quality control.

- **Handloom village tourism:** The rich tradition of the handloom sector should be leveraged to develop tourism potential, by showcasing the unique skills and products of this sector with live demonstrations of the crafts along with sales counters, at strategic locations within the handloom villages.

10.2.6.9 ***Action Plan 5: Strengthen technical resource support to weavers/artisans.***

- **Use of IT:** A web-portal should be created to provide an e-marketing platform with B2B and B2C facility. Design Studios should also be set up to provide innovative designs/ colour forecasts with appropriate linkages with reputed design institutions.

- **Quality control:** Steps should be taken for strict enforcement of the Handloom Mark Scheme under the Act. This will require setting up of a separate accredited testing laboratory for handloom products. Display-cum-CFC and Quality Testing Units should be set up in HVs by internationally accredited testing agencies.

- **Handloom innovation programme:** This is to be initiated to support innovation in the traditional industries. Under the programme, public funding will be given horizontally to R&D projects that demonstrate high technological potential accompanied by commercialisation prospects. Since the industry requires additional vertical or targeted support through the value chain, these companies will be provided with certain benefits while applying to the R&D fund. The condition is that the firm is classified as low or medium-tech and that its R&D investments are up to 7 per cent of its turnover.

Pillar 2: Human development

10.2.6.10 ***Action Plan 1: Arrange for training and education***

- **Strengthening training programmes and training:** All the Weavers' Service Centres (WSC) and the Indian Institutes of Handloom Technology (IIHT) are to install new and updated machinery and further consolidate them with financial, infrastructural, and faculty support. WSCs and IIHTs should also undergo regular evaluations. Training will be organised for Design Institutes and other organisations which have local and regional experience and relevant expertise. Further, collaboration with the Indian Institute of Fashion Technology (IIFT) at Kannur may prove to be fruitful in terms of adding further value to the product.

- **Modern management skills:** Upgrading the skills and capacity building throughout the handloom chain will be given high priority for bringing about positive transformation in the sector. A crucial requirement is to promote a modern approach in production planning, costing, quality control, and marketing

as well as in design and technology development. This requires mainstreaming of handloom technology and management-related education to turn the sector into a lucrative career option for trained management professionals. Focused training and skill upgradation programmes must be instituted to manage weaving and weaving- related production. Existing training modules and schemes should be more inclusive of women workers and it should be ensured that women get equal access to training and infrastructure under the schemes.

- **Information dissemination**: Major institutions providing inputs-credit, research, technology, management, and market development, etc., are largely centralised and, hence unable to reach the dispersed and largely home-based weavers. There has been limited information flow between buyers and sellers and as such, weavers are often not familiar with the variety in usage of fabrics and thus find themselves unable to respond to dynamic market trends.

Pillar 3: Social Issues

10.2.6.11 ***Action Plan 1: Preserve the craft***

- Establish a Textile Museum/Conservatory/Resource Centre for preserving and revival of the craft, and for archiving and documentation of languishing handloom crafts. Database creation at the state level is one of the requirements and needs to be given priority. This can also become a tourist attraction as a way for passing on the rich cultural heritage both to tourists and future generations.

10.2.6.12 ***Action Plan 2: Transform dramatically the physical environment of work sites***

- HVs will bring about a dramatic transformation in the industry. The old outdated workshops will make way for smart work floors with excellent working conditions for the staff. Professionals will be employed at all levels of the industry, from senior management to technically skilled personnel at all levels of production, as well as a rapidly growing number of trained designers who are products of specialised training schools. Traditional looms may be replaced by improved looms, accessories, and pre- and post-loom processes to reduce drudgery of weavers. New Cycle- wheel charkha and mechanical winding machines (pre-loom activities), and pneumatic jacquards, multiple shuttle box motion on frame/pit looms, washing and calendaring machines, and small jiggers (post-loom activities) should be provided to weavers. Work-sheds will have proper lighting and ventilation along with distribution of low-cost safety equipment kits. Small cost-effective measures like providing suitable masks/gloves/ventilation for workers in dye houses should be provided free of cost.

10.2.6.13 ***Action Plan 3: Promote weaver welfare programmes***

- The **Health Insurance Scheme** will be extended to all workers in the HVs. It could be extended beyond a single insurance provider to include multiple service delivery organisations. This would help to reduce dependency on one entity and create a pool of service providers. The list of empanelled hospitals should be expanded to include public hospitals and made readily available in the public domain.

- A **Pension Scheme** is under consideration which aims at providing social security of pension and also to promote small savings during the productive life of the weavers. The Scheme will be open to all weavers and ancillary workers in the age group of 18 to 60 years. It may initially cover all the weavers in the village. This may be implemented with the support of the National Social Security Fund.

Pillar 4: Environmental Concerns

10.2.6.14 **S**uitable arrangements will be made for controlling the disposal of toxic effluents and mitigating water wastage. Waste management training should be extended to all weavers/ancillary workers. Installation of Effluent Treatment Plants (ETP) should be made mandatory for all units; solar powered systems should be provided at subsidized cost for housing units and/or work sheds of weavers.

10.2.6.15 To improve health and safety of weavers and ancillary workers, steps should be taken to promote vegetable dyeing, and suitable training and awareness-building workshops should be conducted for dyeing based on chemical dyes. NHDC should ensure the availability of azo-free dyes (in small packets of 20 grams each) in all yarn depots and yarn banks.

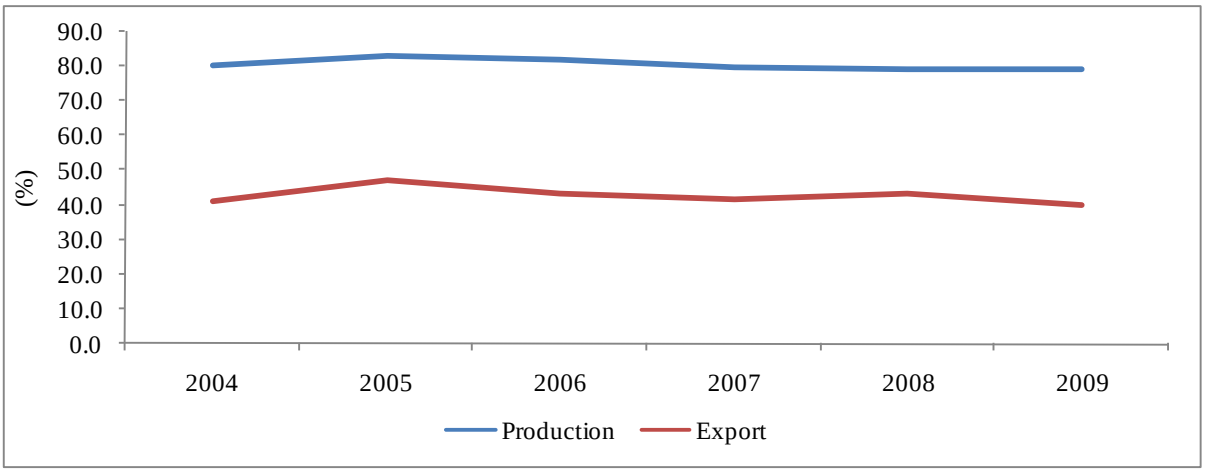
10.2.6.16 Environmental compliance and occupational health and safety issues also need to be built into the training and educational modules. Particular emphasis is required to make yarn and handloom dyeing units aware of the ban on azo dyes as use of these dyes are harmful both to weavers and the customers, and it is not desirable to sell products made using these dyes.

10.3 COIR INDUSTRY

10.3.1 Background

10.3.1.1 Coir Industry is one of the traditional cottage industries concentrated in the coconut producing states and Union Territories of India, with Kerala being the most important of them. It provides employment to 6.97 lakh workers. India accounts for 80 per cent of the world production of coir and coir products. It also accounts for 40 per cent of the total coir exports. According to FAO statistics, between 2004 and 2009, world production of coir and coir yarn has increased from 725 million tonnes to 1011 million tonnes while world exports doubled from 246 million tonnes to 425 million tonnes. India just managed to keep pace with the rise in world exports and production of coir. Its share remained almost constant (Figure 10.10).

Figure 10.10: Share of India in World Production of Coir Fibre and Yarn and Exports of Coir Fibre and Coir Products (%), 2004 to 2009



Note: Sri Lankan Production data does not include Coir Pith

Source: FAO. 2010. *Jute, Kenaf, Sisal, Abaca, Coir and Allied Fibres Statistics*. http://www.fao.org/economic/est/publications/jute-hard-fibres-publications/en/. 30 June

10.3.1.2 However, India is the only country where a diversified coir industry has been in existence. India accounts for 96 per cent of the total exports in coir value-added products such as mats, mattresses, and floorings, etc. Its share in the production of coir yarn also remains as high as 97 per cent.

10.3.1.3 Kerala is the home of the Indian coir industry. Historically, the coir industry started and flourished in Kerala. However, with the expansion of coconut cultivation, the coir industry has picked up in the states of Tamil Nadu, Karnataka, Andhra Pradesh, Odisha, West Bengal, Assam, Tripura, Puducherry and the Union Territories of Lakshadweep and

Andaman & Nicobar Islands through the efforts of the Coir Board[7]. This not withstanding Kerala continues to lead the industry, which contributes significantly to its economy. With 10.05 lakh hectares having coconut cultivation in Kerala, this accounts for 45 per cent of the net cropped area. Coir industry is second to agriculture as a source of employment in Kerala, providing employment to 3.75 lakh persons (in 2011−12); most are women[8]. Furthermore, Kerala is the only state where the coir products (mats, mattresses, and floorings) have been in existence. Tamil Nadu is now emerging as its competitor.

10.3.2. Government support

Central government interventions

10.3.2.1 In as early as 1953, the Government of India set up the Coir Board for the promotion and development of the Coir Industry in India as a whole by regulating production and encouraging scientific, technological, and economic research.

10.3.2.2 Further, on the basis of the recommendations of the special task force constituted by the Kerala government in April 1990, the National Co-operative Development Corporation (NCDC), Central Government, and State Government, initiated a Joint Coir Developmental Plan.

10.3.2.3 The coir industry is also a part of the Scheme of Fund for Regeneration of Traditional Industries (SFURTI) initiated by the Ministry of Micro, Small and Medium Enterprises. The objective of the scheme was to make traditional industries more competitive with more market driven, productive, profitable, and sustained employment for traditional industry artisans and rural entrepreneurs. The scheme envisaged setting up of Common Facility Centres, capacity building measures, product development and design intervention centres, and market promotion assistance including setting up of outlets in the selected coir clusters. The duration of the scheme was for five years starting from 2005−06.

Active involvement of the Kerala government in promoting the industry

10.3.2.4 The Government of Kerala has been extending all help to the stakeholders of the Coir Industry for the overall development of the sector. Production in Kerala is mainly dominated by the co-operative sector. Kerala State Coir Co-operative Marketing Federation (COIRFED) is an apex federation of 833 primary coir co-operative societies. Kerala State Coir Corporation Ltd and Foam Mattings (India) Ltd are the two public sector undertakings in the coir sector in Kerala.

[7] Ministry of Micro, Small and Medium Enterprises, Government of India. 2013. Annual Report 2012−13.
[8] State Planning Board. 2013. *Kerala Economic Review 2012.* Government of Kerala, Thiruvanthapuram.

10.3.2.5 The Kerala State Coir Corporation Ltd (KSCC) is a fully owned government company set up in 1969 for the systematic development of the coir industry in the State. The Corporation has its administrative wings and manufacturing facilities in Alappuzha, Kerala. KSCC and Foam Mattings (India) Ltd (FOMIL) have been implementing pilot projects from time to time. "Kerala Coir – the Golden Yarn of God's Own Country" is the brand logo for Kerala Coir. As part of the popularisation of coir products, the government has organised a campaign, 'Oru Veettil Oru Coir Ulpannam', during the Onam season and has declared 2010 as 'Coir Year'. The Coir Development Department also conducted coir fests/exhibitions.

10.3.2.6 The Alappuzha Coir Cluster Development Project was launched in October 2005 at Central Coir Research Institute, Kalavoor, Alleppey for creating planned infrastructure facilities under the project. The state government has now joined hands in this too. This project was sanctioned by the Department of Industrial Policy and Promotion (DIPP) for cluster-based development of the coir industry in Kerala, with a central grant of 75 per cent of project cost, under the Industrial Infrastructure Upgradation Scheme of the Department. The thrust areas under the Project were: husk collection, fibre extraction, coir yarn production, modern methods of weaving, coir pith processing, and common facility service centres.

10.3.2.7 SIDBI's Alappuzha BDS (Business Development Services) Project was launched on 7th July, 2007 with an objective to build a self- sustained loop of specially trained BDS providers (Consultants) for the Micro, Small and Medium Enterprises (MSME) of Alappuzha coir floor-covering industry and to increase the competitiveness and capacity of the MSMEs of the Alappuzha coir cluster. The project is funded by a cluster of the world's reputed developmental donors, World Bank, DFID-UK, GTZ, & KFW–Germany. Small Industries Development Bank of India (SIDBI) is playing the role of the nodal agency for the Government of India.

Massive research and Technological infrastructure

10.3.2.8 Central Coir Research Institute is the prime research centre of the Coir Board. It implements all the S&T programmes for the development of the coir industry. Recognised by the Department of Science & Technology, Government of India, the Central Institute of Coir Technology is a research institute that is set up under the Ministry of Micro, Small and Medium Enterprises, Government of India. It was established in 1979 for undertaking research in the utilisation of brown coir fibre. The Central Coir Research Institute (CCRI), Kalavoor, Alleppey, and the Central Institute of Coir Technology (CICT), Bangalore, undertake research activities for the different aspects of the coir industry. The Coir Testing Laboratories have been set up at Pollachi, Tamil Nadu and Bhubaneswar, Odisha to cater to the testing requirements of this sector.

10.3.2.9 The National Coir Research and Management Institute (NCRMI) is a state government institution, which was set up to strengthen the R&D activities of the coir sector

with a view to enabling the industry to produce more value-added and new design products at a reasonable cost[9].

10.3.2.10 It has, however, been observed that companies in traditional sectors tend to prefer internal R&D rather than off-the-shelf technologies or R&D done outside of the organisation. Internal R&D may be more appropriate for products developed for the target markets of these companies.

Development of Coir Machinery and development of products for diversification

10.3.2.11 Several technologies have been developed to improve processes; others are in the pipeline. These include, Mobile Fibre Extraction Machine, "Uday" Pneumatic Wooden hand loom for weaving Coir Mats/Matting, Anugraha- a metallic hand loom for weaving coir geo textiles, ANUPAM- a versatile loom for weaving all types of coir mats and matting, semi-automatic loom for weaving coir matting, bio softening and brightening of coir fibre using "COIRRET Manufacture" of two- ply coir yarn on multihead spinning machine, manufacture of coir needled felt, treatment of unsoaked green husk fibre using castor oil emulsion for zero affluent process, softening of fibre, wood logs of coir, and automatic spinning unit for two-ply coir yarn, manufacture of fine yarn/fabric by blending coir fibre with other natural fibres, improved bleaching, dyeing, and bio-conversion of coir pith into organic manure.

Diversification of the industry

10.3.2.12 A number of new products have been launched to expand and diversify the market. For instance, a readymade soilless instant lawn from coir branded as COCOLAWN has been developed. Further, application of coir geotextiles has been made in construction and reinforcement of unpaved village/rural roads, strengthening of the embankment of roads, reinforcement of rain water harvesting pond, and stream embankment, protection of hill slope embankment, protection of canal embankment, and stabilisation of eroded slopes of railway embankment[10]. Finally, Sodium Lignosulphonate extracted from coir pith to be used in lead acid storage in batteries, coir ply boards, garden materials, table tops are some of the products created from coir. The Board has been organising EDPs through engagement of professionally competent and reputed organisations.

[9] State Planning Board. 2011. *Kerala Economic Review 2010.* Government of Kerala, Thiruvanthapuram.

[10] "Under the Prime Minister's Gram Sadak Yojana (Bharat Nirman), it has already been decided to use coir geo textiles for construction of rural roads in nine states. In future, the project is likely to be extended to all 28 States of the country".
Ministry of Micro, Small and Medium Enterprises. 2012. *Report of Working Group on Micro, Small and Medium Enterprises (MSMEs) Growth for 12th Five Year Plan (2012−17).*
http://msme.gov.in/Report_working_group_5yearplan-2012-17.pdf. New Delhi.

10.3.3 Performance of the industry

Patterns of growth

10.3.3.1The above government initiatives notwithstanding, the industry has been struggling for its survival due to the competition with similar products of natural as well as synthetic origin, both in the domestic and international market. Over time Kerala has also been losing competitive advantage in this industry. The following patterns emerge.

Small and stagnant world market

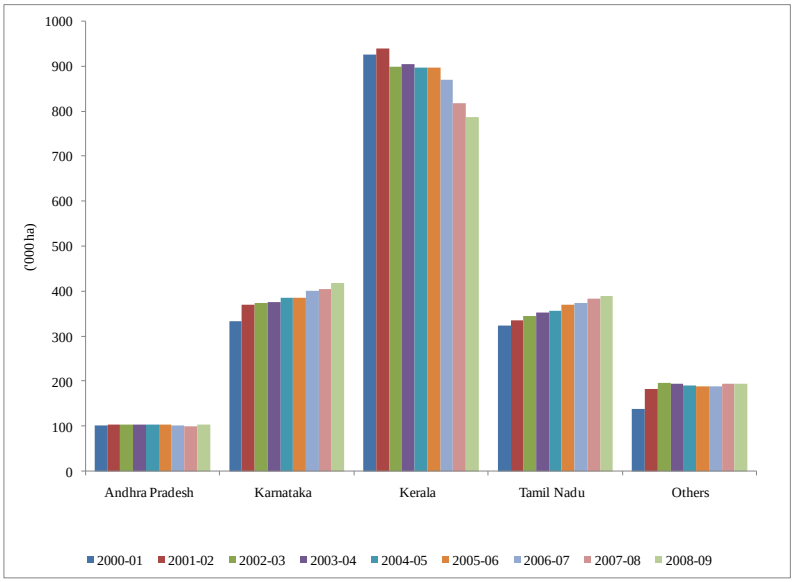
10.3.3.2 The world market of coir and coir products has been growing rather slowly. There are three segments of the market: coir fibre, coir yarn, and coir based products. The only segment that has registered significant growth is coir fibre. This can be attributed to growing demand in China and the U.S. markets. Markets for other products are almost stagnant. Imports of coir yarn have shown a decline in absolute terms from 18.4 MT to 13.6 MT between 2004 and 2009. On the demand side, Coir Products appear to be facing tremendous global competition from other hard fibres. Also, price fluctuations seem to have become a perennial feature of the coir markets.

Kerala is facing stiff competition

10.3.3.3 While India, in particular Kerala, has been leading in production and area under production, it is facing stiff competition from other countries. India accounted for over 81 per cent of total global exports in 1967. It declined to 60 per cent by 1990 and further to 40 per cent in the 2000s. India's exports have increasingly been displaced by Sri Lanka which accounted for a mere 7 per cent in 1973 and increased its share to 25 per cent by 2009−10 (excluding pith).

10.3.3.4 Within India, Kerala is facing competition from Tamil Nadu and Karnataka. In the seventies and eighties there had been a tremendous increase in the coconut production in states other than Kerala, especially in the states of Tamil Nadu and Karnataka. In 1957−58, all states other than Kerala produced only 28 per cent of the total coconut production in India. In 1990−91, it rose to 53.4 per cent. As raw material has become freely available in these states, the coir industry is developing in modern times with sophisticated machines in these states. As a result, the coir industry is no more a monopoly of Kerala. Figure 10.11 shows that the area under coconut has been declining continuously in Kerala while that in Tamil Nadu and Karnataka has been rising slowly but steadily. However, only 36 per cent of available coconut husks in India are used for extraction of coir. Therefore, there is enough scope to enhance its application.

Figure 10.11: Area under Coconut: 2000−01 to 2008−09 ('000 hectare)

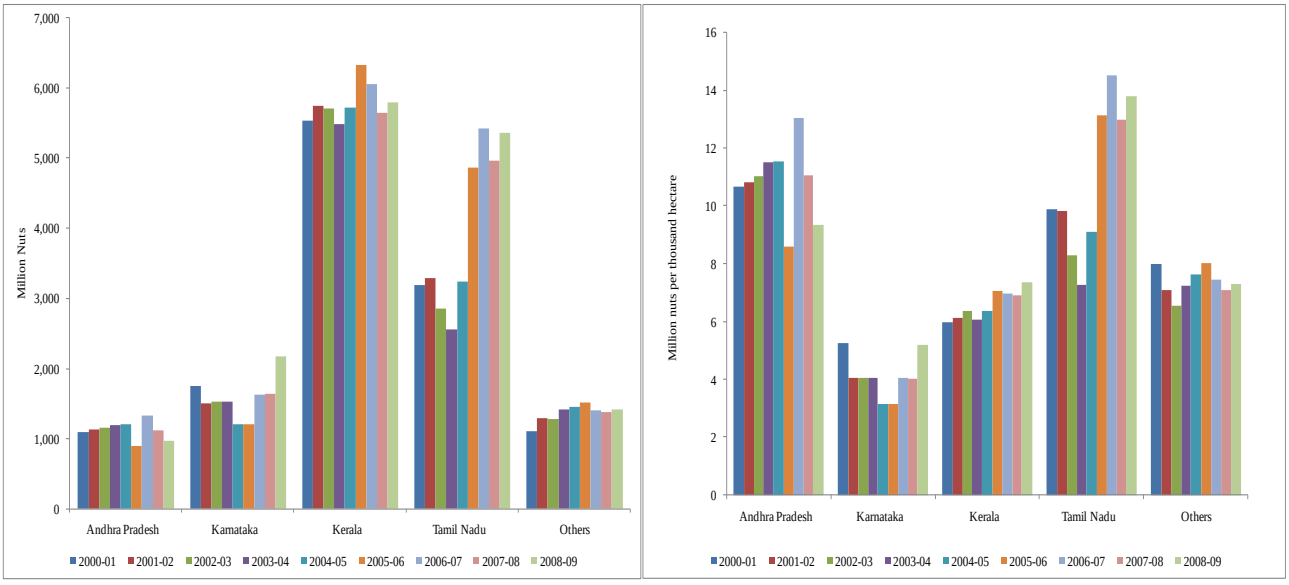


Source: Coconut Development Board

10.3.3.5 While other states lag far behind Kerala in terms of area under production, the gap appears small when production is compared. This means that Kerala's productivity is lower than in other states. Low productivity in turn manifests itself in declining share of Kerala in coconut production (Figure 10.12).

Figure 10.12: Production (million nuts) and Productivity of Coconuts (million nuts per 1000 ha): 2000−01 to 2008−09

A: Production **B: Productivity**



Source: Coconut Development Board

Declining share of Kerala in exports

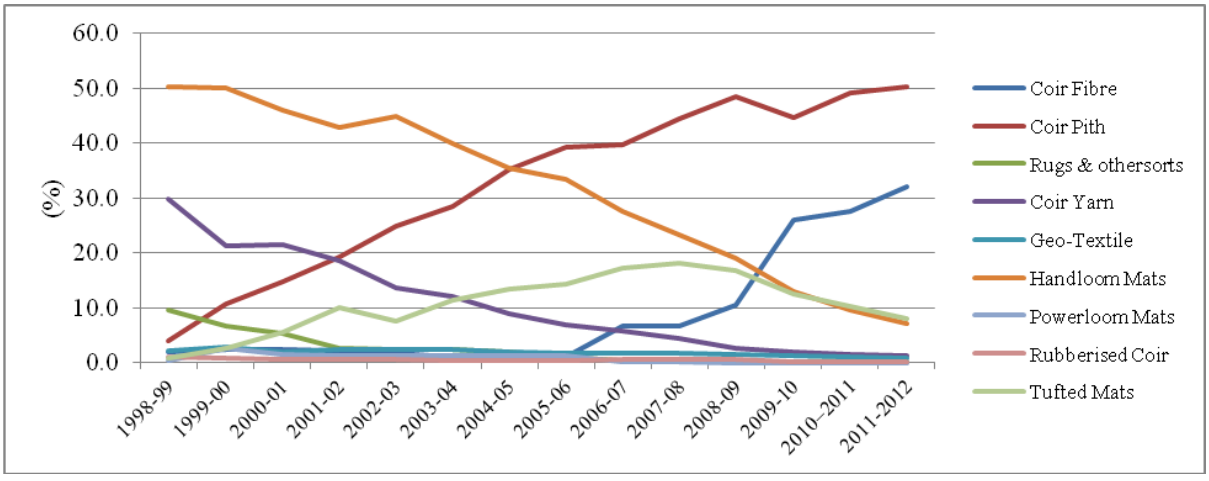
10.3.3.6 Until the late 1970s, Kerala monopolised the coir industry. Strong labour unions fearing displacement stalled the modernisation of coir industry for long in Kerala. The impact of such resistance to modernisation had been severe. The coir industry in Kerala remained insulated. It has been characterised by low productivity and traditional technology. Coir products turned out to be relatively inferior and costly in the world market. Within India, Tamil Nadu has now emerged as a major centre not only in the fibre sector but also in weaving.

10.3.3.7 The State Planning Board of Kerala in 1987 recommended the promotion of mechanisation. Its recommendations emphasised mechanisation on one hand and strengthening of the co-operative organisational structure on the other to infuse new energy into the coir industry. However, little progress could be made in that direction. Low productivity in the sector is manifested in the declining share of Kerala in total exports. Statistics on Kerala's exports of coir is not directly available. However, data has shown that exports from Cochin have been continuously declining since 2001−02.

Small share of value-added products in Coir exports

10.3.3.8 The trade in coir yarn and coir products has been regarded as the thrust area of coir, but the share of foreign trade in this segment is small. It is mostly the high- value products that fetch better returns in the export market. Figure 10.13 shows that the export shares of two products that have been growing are coir fibre and coir pith. The share of all other coir products has moved southwards.

Figure 10.13: Export Shares of Coir Industry by Segment, 1998−99 to 2011−12 (%)



Source: Coir Board \, Govt. of India

In the recent past, the industry has been stagnating owing to various reasons, some of which are enumerated below:

Low raw material availability

10.3.3.9 The traditional coir industry in the state of Kerala is facing an acute crisis of fibre shortage due to labour shortage. The industry feels that there is an untapped stock of husks in the rural areas from where collection is difficult as on−site defibering is not possible. Local coir mills process only a fraction of the available husks, which accrue more or less year round as a waste during coconut processing. Therefore, there is a need to develop a mobile fibre extraction machine, which could be taken to the remote villages so that the vast untapped potential for utilisation of husks from such areas could be tapped. Neither the coconut farmers nor the end product manufacturers are involved in the primary and extensive activities of husk collection, retting husk, fibre extraction, and spinning of yarn.

Technological obsolescence and lack of timely technology upgradation

10.3.3.10 This is manifested in low productivity; low value addition; lack of innovation; and new products. The low degree of mechanisation achieved in the processing sector and the delay in the practical adoption of scientific development has resulted in production of lower quality, lower productivity, and diversification. Recognising the disadvantages, policies are now encouraging towards full mechanisation.

Inadequate marketing system

10.3.3.11 The industry is characterised by insufficient marketing, which has added to its already mounting problems. The manufacturers of the original and the major product sector of the coir-household have very low direct access to the markets. The traders and exporters control the entire marketing business due to their higher financial strength and procure goods only on job-work basis. The actual producers find it beyond their own means to hold the products for a long time before marketing it directly. Due to limited access to the market, the traditional yarn and other product manufacturers are always engaged in price wars and are even found to compromise on quality aspects in order to make their products cheaper. Secondly, anti-pollution awareness has increased and the enforcements from the government are a threat to the industry, especially due to the polluting nature of the Retting process. Another major concern is the amount of drudgery involved in the processes of retting and fibre extraction. Due to insufficient technological upgradation, the manufacturers are unable to make these processes less labour intensive and environment friendly.

A high degree of informality

10.3.3.12 The industry has been given the status of cottage industry. Over 72 per cent of the units in this sector are in the household sector. They are small and cannot reap the benefits of

economies of scale. A major handicap of the Coir Industry in Kerala that results from this type of organisational set up is the continued practice of traditional methods of production and the employment of out-dated and labour- intensive technology resulting in low productivity. This has also led to the under-utilisation of husk potential in the State, shortage of yarn, and stagnation of the industry.

Labour Shortage

10.3.3.13 Acute labour shortage, especially for harvesting coconuts is a big issue plaguing the sectors. The wages in the construction sector attract both the domestic and the migrant labour force away.

10.3.4 Opportunities

Growing ecological applications

10.3.4.1 The emphasis of the buyers is gradually shifting to the new wave of eco-friendliness, biocompatibility, nature sustainable processes, renewable resources, etc., from general considerations relating to the product. A significant prospect for coir is this growing global concern to address ecological problems through the use of natural materials for environmental protection.

10.3.4.2 Coir nets or geotextiles and bio-logs or fascines, two of the most important products of coir, have been proven to be effective materials in controlling steep road slope erosion and are used for riverbank protection in technologically advanced countries.

10.3.4.3 Geotextiles are coir-based matting materials placed in sloping lands and embankments to hold soil and permit vegetative growth. It helps in erosion control and soil productivity conservation. Bio-logs or fascines are tubular structures of coir mats or nets filled with dust, peat, or coir resembling large rolls or gabions.

New products

10.3.4.4 The uses of coir for various industrial applications are being explored (Box 10.5).

- **Automotive uses:** A Consultation on Natural Fibres by the Food and Agriculture Organisation (FAO) indicated that coir has potential as a natural fibre composite for trucks and in automotive parts as roof liners, floor carpets, seat back trims, engine compartment insulation, package trays, luggage compartments, textile exterior, wheel arc liner, rear and side wall covers, and driver cabin liner. Several European firms are testing whether coir can play a role in the growing automotive market as “biocomposites”, or as thermal insulation in home construction.

Box 10.5: The Scotts Miracle-Gro Company of USA

The Scotts Miracle-Gro Company is researching how coconut coir, or husks, might be used as a plastic reinforcement. Ford and The Scotts Miracle-Gro Company of USA are researching the use of coconut fibre reinforcement for moulded plastic parts to reduce the use of petroleum and make the parts lighter and more natural-looking. The coconut coir, or husks, are a waste stream from Scotts' soil and grass seed products. "This is a win-win situation. We're taking a material that is a waste stream from another industry and using it to increase the sustainability in our vehicles", said the technical expert for Plastics Research at Ford, Dr. Ellen Lee. "We continue to search for innovative renewable technologies that can both reduce our dependence on petroleum as well as improve fuel economy." In the interior, the material could be used in storage bins, door trim, seat trim, or centre console substrates. It could also potentially be used on underbody and exterior trim.

Source: The Scotts Miracle Gro Company Website
http://www.scottsmiraclegro.com/corporateresponsibility/infoCenter/crazyForCoconuts.html

10.3.4.5 Experiments show that the advantages of coir over other natural materials are its being low cost and lightweight. Moreover, coir has properties suitable for acoustic insulation, has no abrasive wear, is "non-skin-irritant", and ecologically friendly.

10.3.4.6 Thus, established producers in India and Sri Lanka and newcomers in other Asian countries stand to benefit. The trend in the West towards natural fibres in adapted technical applications, where they provide technical, economic, and environmental advantages also offers market opportunities.

Coir pith

10.3.4.7 Since the early 1990s, coir pith, which used to be an annoying waste, is emerging in horticulture as a durable, highly water absorbent, and environmentally friendly replacement for peat moss. This material can replace the non-renewable resource, peat. Coco peat maintains excellent air porosity even when saturated and brings better crops with faster developing roots. Coco peat has better water retention qualities than peat and other growing media. Coco peat absorbs moisture immediately. Initially, demand for coir pith grew fast and it made inroads into domestic and commercial horticulture. Unfortunately, quality control didn't keep up with demand. While the high salt content in pith had been leached out from the originally "mined" mounds over time, more recent products had high salt content and caused some crop failure. At the same time, low-cost peat from the Baltics and Canada created stiff competition. Through improved quality control and more aggressive marketing, pith exporters are now regaining export volume. Coir dust, meanwhile, has gained more attention from overseas gardeners and plant enthusiasts as they now use this material for organic compost and soil conditioner. The agriculture sector, therefore, is a big potential market for coir dust as an organic fertiliser and as a growing medium. Pots made of coir dust

with other natural materials as binders can be used in growing cuttings of orchids and seedlings of other plants.

10.3.4.8At the same time, pith sales have become crucial to the economic survival of many mills since the slow past growth in fibre price was insufficient to balance growing labour cost. Its high compressibility also helps since it can be shipped overseas at reasonable cost. These trends in existing and emerging markets are indicators that Coir has the potential to achieve sustainable growth.

Chinese demand

10.3.4.9 Another big opportunity for the coir industry is the growing Chinese market for coir and related manufactures. In recent years, China has also discovered coir as a versatile fibre, which serves a less glamorous need of its population: more comfortable bedding. Since 2001, China has significantly increased its imports of mattress fibre. Much of it gets crudely stuffed into mattresses, but China has also set up factories to produce the even softer rubberised coir mattresses. As a result, FOB prices for mattress fibre have increased sharply. Furthermore, China has a number of dams, dumpsites, golf courses, and riverbanks that may need coco geotextiles for desertification abatement, soil rehabilitation, and stabilisation. China may ultimately develop its own coir industry or follow the example set by the West, i.e. switch to synthetic foams. However, Chinese demand for coir creates a medium-term opportunity for the rural small-scale coir industries in several Asian countries.

10.3.4.10 New machines to further enhance production of coir and improve the quality of coco coir products have been developed for various operations along the value chains. The ‘Coco Husk Micro-Decorticator’, the ‘Coco Husk Mini-Decorticator’, the ‘Coco Fibre Twining Machine’, and the ‘Coco Husk Beating Machine’ are some of the new machines.

10.3.4.11 Consumption of coir is expected to continue growing, albeit at a slower rate than that of the past decade, as growth in the demand for coir products in India and China may decelerate.

Export growth

10.3.4.12 Total exports are expected to continue increasing at an annual rate of 1.1 per cent, in line with global demand and consumption trends in the established market destinations, such as the United States and the European Union.

10.3.5. Strategy

VISION

10.3.5.1 Modern and high value-added industry

MISSION

10.3.5.2 A modern innovative rejuvenated coir industry will bring greater growth and equity to the state.

10.3.5.3 It is imperative that the Government of Kerala evolves strategies for research and development in this field and stimulates diversification and growth of the industry through co-ordinated activities among the functional Ministries concerned, namely Agriculture, Industry and Infrastructure Development.

10.3.5.4 Coir has many inherent advantages, but the industry is yet to achieve its real potential for want of an integrated approach. Schemes to promote the industry should include programmes to increase husk availability, increase productivity for product innovation and diversification, bring about improvements in standards and quality, increase value addition through innovation and better packaging, improve scientific and technical inputs, provide better financial support for the industry and workers, etc. Research and development efforts in the diversified utilisation of coconut during the past decades achieved numerous viable processing technologies. In spite of these achievements, the coconut industry in the producing countries is still highly dependent on the production and marketing of traditional products such as copra and coconut oil. This situation contributed to the main problem of the coconut industry, i.e the low returns from coconut farming. Continuous effort must therefore be directed to new sources of income through product diversification and improved product quality, with emphasis on market-oriented technologies.

10.3.5.5 It is timely that Kerala concentrates on product improvement, development and diversification through the introduction of value-added products, and market promotion of these products.

Action Plan 1: Identify the problem areas

10.3.5.6 The areas which need urgent attention are the following:

- Husk collection
- Improved and quicker methods of retting
- Increase in productivity in spinning through mechanisation
- Innovation and mechanisation in weaving

- Bleaching and dyeing
- Introduction of new products
- Packaging

10.3.5.7 Complementary to this is the need to focus attention on sustained efforts for enhancing coconut production coupled with aggressive marketing strategies. If these activities are realised, then positive growth of the coconut-producing areas can be achieved, thus improving the livelihood of the many small farm holders, the main component of the coconut sector.

Action Plan 2: Design a set of action plans

10.3.5.8 An action plan for the development of the industry should include:

- Make Kerala a hub for manufacture of coir and coir products
- Promoting private investment
- Encouraging technological upgradation and product innovation
- Increasing productivity and profitability through mechanisation
- Enabling government procurement: Coir is eco-friendly and is biodegradable, and it promotes vegetation growth as it traps topsoil and keeps its nutrients intact. This could help boost demand for coir. In Philippines, all national and local government agencies, bureaus and other instrumentalities, including agricultural institutions and councils, use coco peat or coir dust and coconut fibre material for soil conditioning and erosion control in government projects nationwide. India should also enforce such practices
- Attracting the younger generation to the industry by making available better working conditions and attractive financial packages
- Encouraging entrepreneurs in this sector
- Introducing vocational courses in coir making
- Developing new uses and areas: For example, the energy sector is examining the use of coconut husk as a bio-gas which can be a win-win situation for all concerned
- Developing new regions to market products
- Issuing of Good Manufacturing Practices (GMP) or Standard Certifications for coconut- related products and branding products as “Made in Kerala”

10.3.5.9 Indeed, Kerala needs to vigorously promote coir and coir-based products in the world market. It is important to showcase the unique properties of coir fibre compared to other fibres.

Action Plan 3: Promote coir zones

10.3.5.10 It is proposed that the government should create three "State Investment and Manufacturing Zones" (SIMZs) for traditional industries: Kollam (for Cashew); Balaramapuram (Handloom); and Alappuzha (for Coir). Physical infrastructure in terms of transport and energy should be well developed in these regions. These should be linked with the innovation systems in the region. Each region will have its own SPV, which will have representatives from the government, co-operative sector, and the private sector. The zones will be equipped with export infrastructure, including the facility of quality marks and labelling facilities. These zones will be linked with the regional innovation systems, in particular universities and research organisations. Appropriate funding mechanisms need to be created. They will have the formal markets for trading and bringing various stakeholders to one place to facilitate knowledge spillover. The objective will be to develop a modern coir sector that can compete in the world market.

10.3.5.11 Coir is the thickest and the most resistant of all commercial natural fibres. The cellular structure of coir makes it more elastic than other natural fibres. The cell walls of coir fibre and pith contain more lignin than any other commercially relevant natural fibre. As a natural polymer, the lignin in coir fibre adds strength and elasticity to the cellulose-based fibre walls. And, since lignin resists bio-degradation, high-lignin material such as coir fibre imparts strength and longevity to outdoor applications. These include geotextiles which have become a very important eco-friendly product, gaining a strong market in the USA, Europe and Asian countries as erosion control blankets, nets for slope protection, mulch blankets, roof greening mats, grow sticks, coco logs as well as skeffed coir for river bank/canal bank support. Coconut pith has also gained wide acceptance in many horticultural applications. The demand for mattress fibre, as in China, remains a big market with tremendous opportunities.

10.4 Conclusion

10.4.1 In all the three major traditional industries, the strategy forward is to increased diversify, increase the value-additivity of products, invent and innovate with other industries. Coir holds major potential for Kerala to propel economic growth. There is potential in cashew too and handloom is a niche product of Kerala. In all products, branding of the products is very important. This will bring growth and equity and environmental sustainability for the state.

CHAPTER 11

TOURISM

Tourism is one of the few sectors where Kerala has clear competitive advantages given its diverse geography in a short space ranging from the Western Ghats covered with dense forests to the backwaters to the Arabian sea. Its ancient rich culture including traditional dance forms and the strong presence of alternative systems of medicine add to its allure. Unfortunately, Kerala is dominated by domestic tourism within the state although foreign tourists arrivals to the state has been growing at a faster rate than national average. The goal in the KPP 2030 is to develop Kerala as an up-market tourism destination with the state being the top destination in terms of number of tourists and revenue among all the Indian states. Sustainable tourism is the mission. This can be achieved by integrating tourism with other parts of the economy like medical and health hubs which will attract more stable tourists over a longer period of time and with higher spending capacity. There will be new elements added to leisure tourism and niche products in tourism will be developed. Infrastructure development is crucial to achieve this goal. The success of Kerala tourism will be based on the synergy between private and public sectors. The government has taken steps to encourage private investment in tourism, while adhering to the principles and practices of sustainability. Industry led sustainable tourism development relies upon the government-imposed and self- imposed regulations. Tourism in Kerala will be benchmarked against international indicators and monitored on a regular basis to achieve quality.

11.1 Economic benefits and costs of tourism

11.1.1 "Travel and Tourism" is the world's largest industry and creator of jobs across national and regional economies. It has great strategic importance for Kerala's economy due to its capacity for wealth-generation and job-creation. According to the World Travel and Tourism Centre (WTTC) statistics[1], an investment of Rs 12 lakh in tourism creates 89 jobs, as against 45 in agriculture, and 13 in manufacturing for the same investment. In 2012[2], the industry generated, directly and indirectly, 9.2 per cent of GDP and nearly 261 million jobs in the world-wide economy. By 2030, it is expected to increase to 12.9 per cent and 389 million respectively. Jobs generated by Travel & Tourism are spread across the economy - in retail, construction, manufacturing and telecommunications, as well as directly in Travel & Tourism companies. It thus, plays an important role in driving growth and bringing about economic prosperity. Tourism's importance to the economy of Kerala also rests in its capacity to help bring about non-economic benefits. For instance, tourism can help in conserving/reviving

[1] WTTC. 2003. *Kerala: the impact of travel and tourism on jobs and the economy*. World Travel and Tourism Council, United Kingdom.
[2] NCAER. 2012. *Second Tourism Satellite Account for India, 2009−10*. Study Commissioned by the Ministry of Tourism, Government of India.

past traditions; and promoting cultural heritage, cultural performances and festivals, etc. It can also reinforce a positive sense of community identity, which in turn will encourage local communities to maintain their traditions and identity. Further, tourism, particularly ecotourism, can place a greater focus on the conservation of natural resources by ensuring financial or in-kind support by the government, in recognition of their importance to visitor experiences.

11.1.2 But, the benefits of tourism are not unequivocal. It is often seasonal and mainly generates part-time and unskilled jobs for local people. Further, if not planned carefully, tourism can be destructive of culture and local traditions. Such criticism can be characterised by the billiard ball model[3]. In this model, the cue constitutes the interests of tourism (big business, investors, government planners, etc.). These are the forces behind the white ball (tourism) which strikes a static (red) ball, culture. The red ball can only move in the direction dictated by the white ball at a pace determined by the white ball: it has no control over its own movement. Finally, tourism can have severe environmental implications. It can be associated with destruction of natural habitat, pressure on natural resources, in particular, land, freshwater and marine resources; damage to ecosystems; excessive energy consumption; and considerable waste and pollution generation.

11.2 Tourism in Kerala

11.2.1 Tourism is one of the few sectors where Kerala has clear competitive advantages. Kerala has natural advantages in this industry, in terms of beautiful hills and valleys, lakes, waterfalls, backwaters, lagoons, and beaches. The state is also well-known for its manmade natural advantages, such as national parks and wild life sanctuaries. Kerala's traditional dance forms, cultural festivals, temples, and traditional medicine are major tourist attractions. Kerala is also India's most advanced society in terms of educational attainment.

11.2.2 These advantages notwithstanding, for the major part of the 20th century, Kerala largely ignored its tourism potential. Kerala was a relatively unknown destination. Great strides forward have been made since 1986 when tourism was declared as an industry in Kerala. Realizing its economic potential, the Government of Kerala declared tourism as an industry in 1986. In 1995, the state government announced a comprehensive tourism policy underpinning public-private partnership for the following:

- Development of infrastructure,
- Tourist product,
- Human resources, and
- Marketing

[3] Wood, R.E. 1993. Tourism, Culture and the Sociology of Development. In: M. Hitchcock, V.T. King & M.J.G. Parnwell (eds.) *Tourism in South- East Asia*, pp. 48-70. London: Routledge.

11.2.3 In 2000, the first Travel Mart was held in the state as a buyer-seller meet in tourism trade. It was attended by 350 buyers and 150 sellers. In this mart, Kerala launched a slogan 'Kerala–God's Own Country' to create a strong international brand. The branding of the tourism industry in Kerala has contributed to its success and placed it in the global tourism map. The brand 'God's own country' has become popular around the world.

11.2.4 In 2001, the government launched the `Tourism Vision 2025' document. It aimed at developing Kerala as an `upmarket high-quality tourist destination' through optimal utilisation of resources. The focus was on conserving and preserving the heritage, enhancing productivity and income, and creating employment opportunities, thereby making tourism the most important sector for the socio-economic development of the State. It called for withdrawal of the government from the direct running of all tourism business activities, and focussed on encouraging the sector to invest in a more open and competitive environment.

11.2.5 In 2007, the Kerala government adopted "Responsible Tourism (RT)" as the bedrock of its tourism policy and chose Kumarakom, Kovalam, Wayanad and Thekkady as pilot destinations for implementing the concept. The objective was to promote community engagement in tourism-planning and programmes. The community engagement came through creation of micro enterprises, undertaking group farming, and setting up of ethnic restaurants run by women from BPL families. The initiative has been supported by strong policy interventions that aligned incentives and subsidies within the RT framework. The tourism policy thus gradually evolved into the more inclusive and integrated concept of sustainable tourism. The recent Tourism Policy 2012 reinforces the need to have a comprehensive sustainable development strategy to promote tourism. It has balanced economic dynamism with environmental, social and cultural considerations.

11.2.6 Today, Kerala is known for its successful tourism model that has turned tourism into a driver of economic growth, without compromising on ecological and inclusiveness concerns. Its Tourism model has been hailed worldwide. Kerala is regarded as one of the destinations with the highest brand recall and named as one of the ten paradises of the world by the National Geographic Traveler. The seventh edition of the Travel Mart in 2012 witnessed participation by 48 countries, with over 2000 buyers and over 400 sellers. In what follows, we examine the achievements and weaknesses of this sector and establish the need for a strategic policy framework.

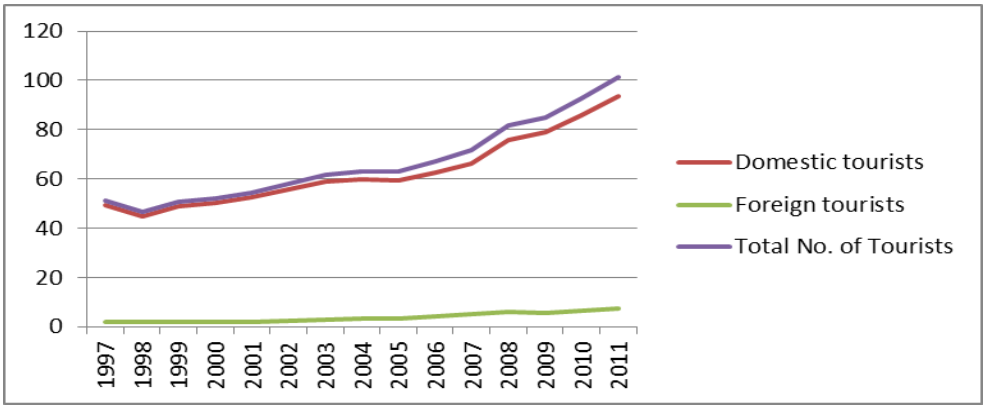
11.3 Achievements

Rapid growth in tourist arrivals

11.3.1Over the past more than one and a half decades, the total number of tourists increased sharply in Kerala. Between 1997 and 2011, it almost doubled from 51 lakh to 121 lakh, registering an annual growth rate of 9.3 per cent (Figure 11.1). While the number of domestic

tourists increased from 49.5 lakh to over 93 lakh, that of foreign tourists increased several times from 1.8 lakh to 7.3 lakh over the same period.

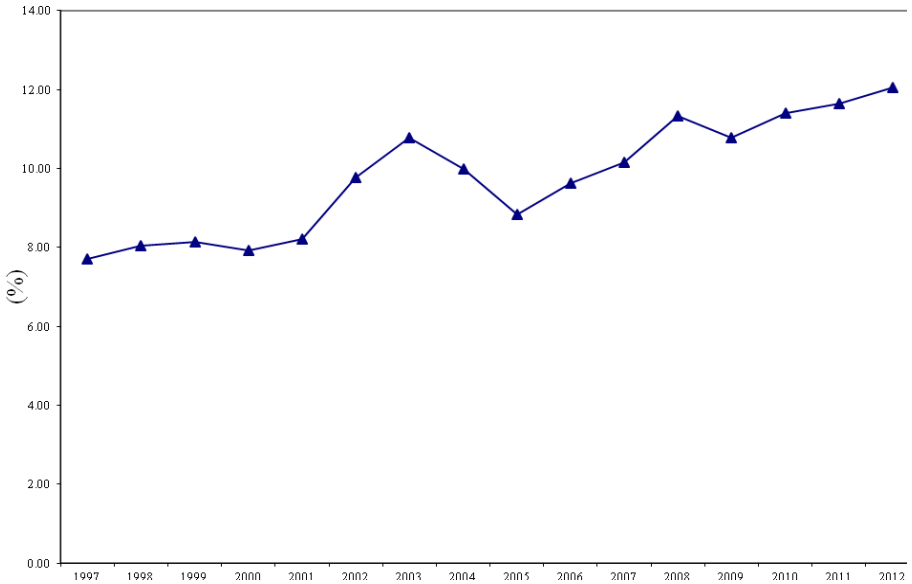
Figure 11.1: Tourist arrival trends in Kerala: 1997−2011, (lakh)



Sources: Department of Economics and Statistics. 2009. *Statistics for Planning 2009*. Government of Kerala and Department of Tourism. 2011 and previous reports. *Tourism Statistics*. Government of Kerala.

11.3.2 It is significant to note that Kerala is able to capture an increasing percentage of the national pie in foreign tourist arrivals (Figure 11.2). Its share in India's foreign tourist arrivals has grown from less than 8 per cent in 1997 to 12.1 per cent in 2012. Clearly, foreign tourist flow has been growing faster in Kerala than at the national level.

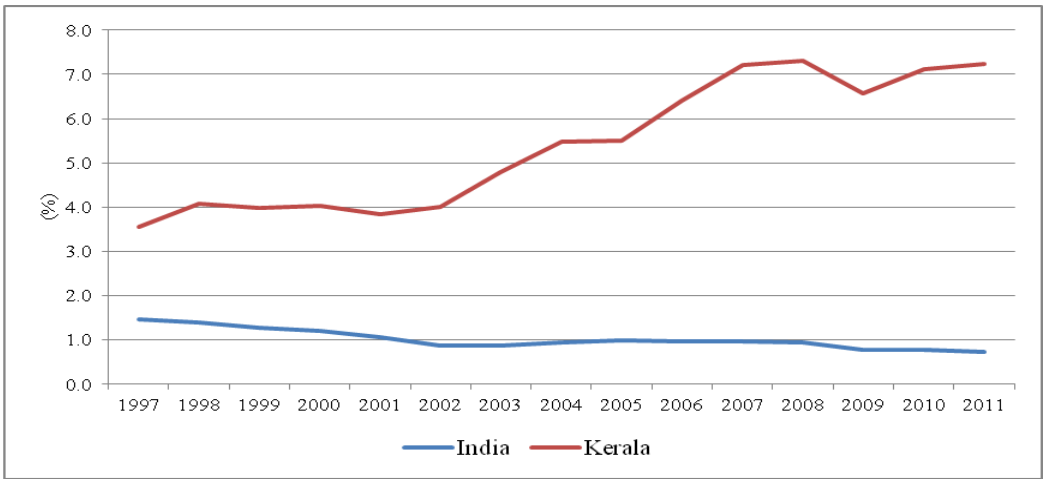
Figure 11.2: Share of Kerala in National Foreign Tourist Arrival (%), 1997–2012



Sources: Department of Tourism. 2011 and previous reports. *Tourism Statistics*. Government of Kerala, State Planning Board. 2000. *Economic Review 1999*. Government of Kerala and Market Research Division, Ministry of Tourism. 2013. *Indian Tourism Statistics at a Glance 2012*. Government of India. July.

11.3.3 This is also manifested in the rising share of foreign tourists in tourist arrivals in Kerala. Notably, at the national level the share of foreign tourists in total tourist arrivals has been declining (Figure 11.3). In 2011, Kerala was ranked 8th in the number of foreign tourist visits in India. The foreign exchange earnings during the year 2011 stood at Rs 4,222 crores while the total revenue generated from tourism was Rs 19, 037 crores.

Figure 11.3: Share of Foreign Tourists in Total Tourist Flow (%), 1997–2011



Sources: Department of Economics and Statistics. 2009. *Statistics for Planning 2009*. Government of Kerala and Department of Tourism. 2011 and previous reports. *Tourism Statistics*. Government of Kerala.

11.3.4 This trend is expected to continue in the future as well. The Kerala Tourism Policy 2012 targets an annual growth rate of 15 per cent in foreign tourist arrivals and expects 3 million tourists by 2021. On the domestic front, the policy is looking forward to achieving an annual growth rate of 7 per cent for the next decade; a target of 18 million domestic tourists by 2021.

Kerala tourism is relatively more stable

11.3.5 The Kerala flow of tourists is relatively more stable than that at the national level. While the coefficient of variation is 54 per cent at the all India level, it is a mere 25 per cent for Kerala. This could entirely be attributed to the stability in the domestic tourist arrivals. This is because most domestic tourism originates within Kerala and is triggered by social and religious motives. Further, as expected, foreign tourism is more volatile in Kerala than the domestic tourist arrivals. Notably, it is even more volatile than the all India foreign tourist arrivals. It could be because most tourist traffic originates from Europe and is vulnerable to economic shocks in European countries.

Awards won

11.3.6 Kerala has won national and international acclaim for its achievements in tourism. These include, among others the following:

- The best tourism state award of the government of India for several years
- The best eco-friendly organisation award
- Acclaim by the National Geographic Traveller as one of the 12 paradises in the world,
- International awards for the "Responsible Tourism" initiative, and
- The best website national award for Kerala Tourism, for deploying the latest advances in Information Technology for marketing

11.4 Economic contribution of tourism in Kerala

11.4.1 Tourism's role in the economy is often perceived as being limited to the hospitality industry (cafés, hotels and restaurants), and outbound and inbound travel agencies and carriers. However, the economic impact of tourism is much greater, since many inputs are needed in order to produce tourism and leisure services, spanning the whole range of farm, agri-food and industrial production, including the production of capital goods as well as construction and public works. Besides, tourism activities also have wider impact on the economy in terms of creating jobs and income for the households through tourists' spending in the local economy. In broad terms, economic impact of tourism has been defined under three categories. They are[4]:

- **Direct impact:** Direct impact refers to changes in the industries associated directly with visitor spending.
- **Indirect impact:** It is a multiplier impact through backward and forward linkages. It is about the intermediate consumption for the production of goods and services in the tourism sector. These are goods and services that tourism companies purchase from their suppliers, forming the tourism supply chain. Indirect effects can be particularly important for the production of local products. The economic impact of tourism revenue in a country or region can be maximized if the tourism sector procures locally produced goods and services.
- **Induced impact**: relates to sales, income or jobs resulting from household spending as a result of income earned from visitor spending (either directly or indirectly). Induced effects also include the consumption of companies that are benefited directly or indirectly from initial expenditure in the tourism sector. An example of such induced effects would be purchases of consumer goods such as food, clothing and electronic goods by people employed in the hotel sector. For companies, this would be purchases of capital goods or expenditure related to the reinvestment of profits.
- **Total impact of tourism** = (direct impact) + (indirect impact) +(induced impact)

11.4.2 A global analysis of the contribution of tourism industry to national value added or GDP shows that the countries where tourism sector contributes more than 50 per cent of GDP

[4] Stynes, D.J. 1997. *Economic Impacts of Tourism*. Illinois Bureau of Tourism, Department of Commerce and Community Affairs.

are Macao, Aruba, Antigua and Barbuda, British Virgin Islands, Anguilla, Seychelles and Vanuatu[5]. In absolute term, United States is ranked number one. The sector contributes US$ 1,348.2 billion (or 8.6 per cent of GDP) in 2012. In the case of India, the tourism industry contributes only 6.6 per cent of GDP in 2012. This is equivalent to a mere US$ 119.4 billion. Table 11.1 shows the estimates for major countries in 2011.

Table 11.1: Tourism's Direct, Indirect, Induced and Total contribution to the GDP by value (US$ billion) (2011 estimate)

Countries	***Direct impact***	***Indirect impact***	***Induced impact***	***Total impact***	***Total contribution % of GDP***
US	404.0	649.2	296.5	1,349.7	8.8
China	166.7	282.2	116.4	565.3	8.6
Japan	120.1	172.5	84.0	376.6	6.9
Australia	44.7	93.3	37.7	175.7	13.0
France	97.1	84.6	46.2	227.9	9.1
Spain	68.4	84.2	39.1	191.7	14.4
Brazil	68.0	76.6	42.7	187.3	9.1
UK	57.0	73.2	32.1	162.3	6.9
Italy	64.3	71.4	34.8	170.5	8.6
Germany	53.9	64.7	27.1	145.7	4.6
Russian Federation	25.2	55.9	22.3	123.4	5.9
Mexico	65.2	43.7	27.6	136.5	13.0
Canada	23.2	43.6	16.8	83.6	5.0
Indonesia	25.3	32.3	15.7	73.3	9.1
India	**34.0**	**29.4**	**16.3**	**79.7**	**4.5**
Turkey	29.2	28.0	14.3	71.5	12.0
Republic of Korea	19.7	26.8	12.0	56.5	5.1
Argentina	15.8	18.4	9.4	43.6	112
South Africa	19.7	16.2	9.1	45.0	11.4
Saudi Arabia	13.5	11.1	5.7	30.3	6.7

Source: World Travel and Tourism Council. 2011. *Travel & Tourism 2011*. http://www.wttc.org/site_media/uploads/downloads/traveltourism2011.pdf. London, United Kingdom.

11.4.3 The direct and indirect contribution of tourism in Gross Value Added (GVA) and employment in Kerala in 2009−12, as calculated by the NCAER (2012) using the Tourism Satellite Accounts (TSA), are given in Tables 11.2 and 11.3. The direct contribution of tourism to Kerala's GVA was Rs 11, 308 crore, which was 4.7 per cent of GVA. The total

[5] The reference for this whole paragraph is from:
World Travel and Tourism Council. 2013. Travel & Tourism Economic Impact 2013. Various tables and countries. http://www.wttc.org/research/economic-impact-research/. London, United Kingdom.

impact of tourism to GVA in Kerala was equivalent to 9.52 per cent of GVA in 2009−12 (Table 11.2).

Table 11.2: Contribution of Tourism in GVA of Kerala 2009−12

Share in GVA (%)			
Country/state	***Direct Impact***	***Indirect + Induced Impact***	***Total Impact***
India	3.8	3.2	7.0
Kerala	4.7	4.8	9.5

Source: NCAER. 2012. *Regional Tourism Satellite Account for Kerala and Madhya Pradesh 2009−10*. Study Commissioned by the Ministry of Tourism, Government of India.

11.4.4 In the case of employment, the study found that the sector generated over 14 million direct jobs in the state. This means that the direct contribution of tourism sector to total number of jobs in Kerala was 9.9 per cent in 2009−12. The total number of jobs created directly and indirectly by the sector turned out to be 23.52 per cent of the total employment in Kerala.

Table 11.3: Contribution of Tourism to Total Employment between 2009 and 2012

Share in Total Employment (%)			
Country/state	***Direct impact***	***Indirect impact + Induced***	***Total impact***
India	4.4	5.8	10.2
Kerala	9.9	13.6	23.5

Source: NCAER. 2012. *Regional Tourism Satellite Account for Kerala and Madhya Pradesh 2009−10*. Study Commissioned by the Ministry of Tourism, Government of India.

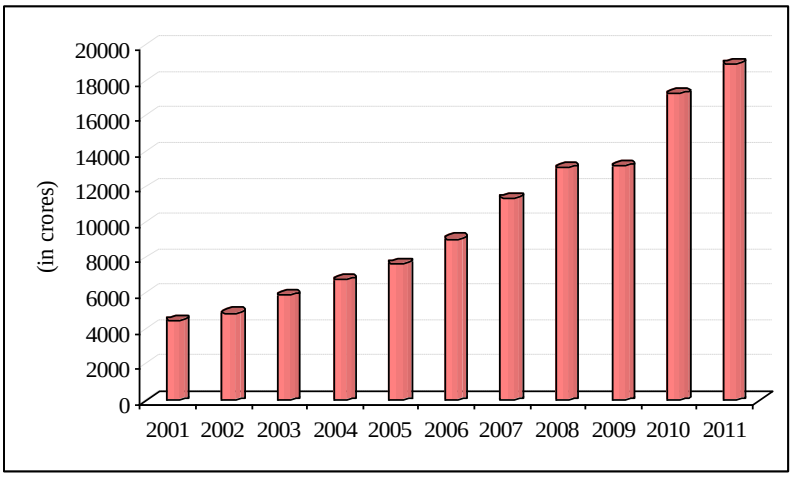
11.4.5 This is the first ever attempt to use the TSA for estimating the size of the tourism sector in Kerala. In 2003, the World Travel and Tourism Council (WTTC) used an expenditure based approach to show that travel and tourism accounted for 7.7 per cent of the total economy and generated employment for 0.1 crore, which formed 6.2 per cent of the total employment (less than its share in GSDP)[6].

Revenue Earnings from Tourism

11.4.6 The total revenue generated from tourism (direct & indirect) increased sharply from Rs 4,500 crores in 2001 to Rs 19,037 crores in 2011 registering a compound annual growth rate (CAGR) of 15.5 per cent in the total tourism receipts in Kerala (Figure 11.4).

[6] WTTC. 2003. *Kerala: the impact of travel and tourism on jobs and the economy*. World Travel and Tourism Council, United Kingdom.

Figure 11.4: Total Revenue Generated from Tourism (Direct & Indirect) (Rs crore), 2001–2011



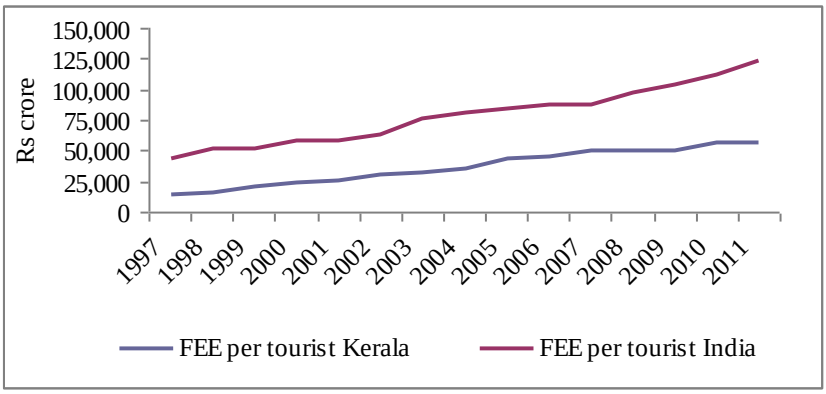
Source: Department of Tourism. 2011 and previous reports. *Tourism Statistics*. Government of Kerala.

Foreign exchange earnings

11.4.7 Kerala earned total foreign exchange earnings (FEE) of Rs 273 crore in 1997 which increased to Rs 4,222 crore in 2011, registering a compound annual growth rate of 21.6 per cent[7]. In 2011, total FEE was 22.2 per cent of the total earnings from tourism. This large increase in FEE has been well supported by a significant increase in foreign tourist visits to Kerala. However, the share of foreign exchange receipts in total receipts is less than the corresponding share in total foreign tourist flow. Figure 11.5 shows the FEE per tourist of Kerala and India which have increased between 1997 and 2011. However, Kerala's FEE per tourist is less than the national average and the differential has been growing. In 2011, it was almost half of the national average.

[7] In real terms this comes to 21.8 per cent.

Figure 11.5: Foreign Exchange Earnings (FEE) per tourist of Kerala and India (Rs crore), 1997–2011



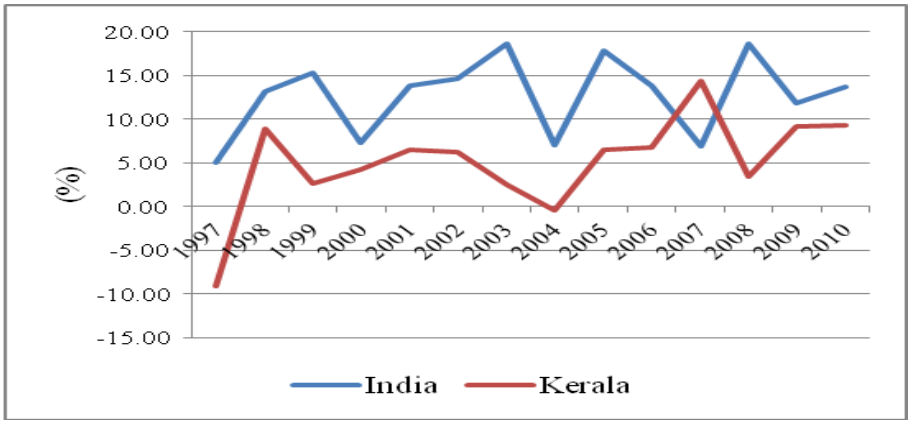
Sources: Department of Economics and Statistics. 2009. *Statistics for Planning 2009*. Government of Kerala and Department of Tourism. 2011 and previous reports. *Tourism Statistics*. Government of Kerala.

11.5 Weaknesses of Kerala Tourism

Sharp rise but less than national average growth in tourism

11.5.1 Growth in Kerala's tourist flow remains consistently lower than the national average growth in tourist flow (Figure 11.6).

Figure 11.6: Growth rate in tourist flow: 1997−2011 (in %)

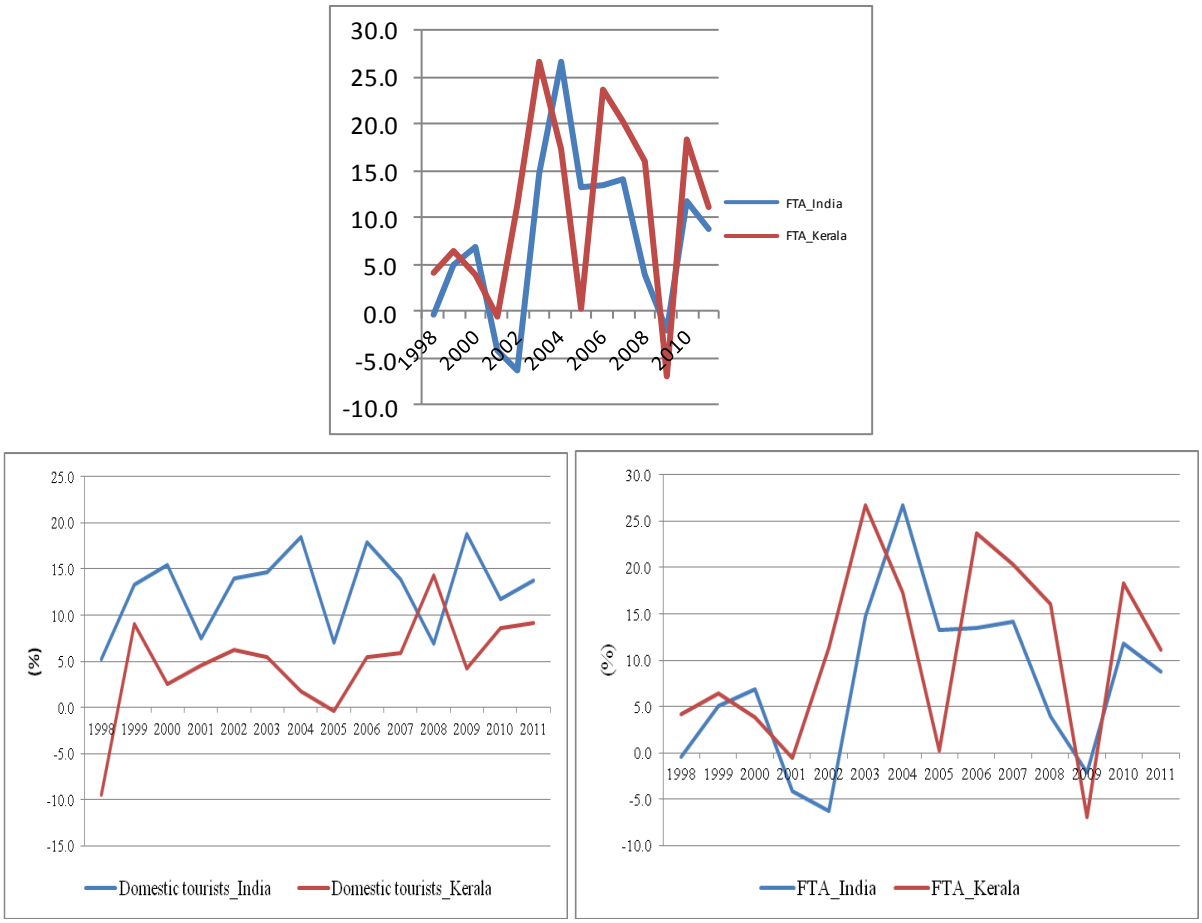


Sources: Department of Economics and Statistics. 2009. *Statistics for Planning 2009*. Government of Kerala and Department of Tourism. 2011 and previous reports. *Tourism Statistics*. Government of Kerala.

11.5.2 This could be attributed to below average growth rate in domestic tourism. Figure 11.7 shows that domestic tourism has been growing more rapidly at the all India level than in Kerala. The latter has been doing exceptionally well in terms of foreign tourist arrivals (FTA). Over the period since 1997, its FTA growth rate has been consistently higher than the

national average barring a few years namely 2004 (Kerala: 17.3% and India: 26.7%), 2005 (Kerala: 0.3% and India: 13.3%) and 2009 (Kerala: −7% and India: −2.1%).

Figure 11.7: Domestic and Foreign tourist arrivals' growth rate: Kerala vs. All India (%)



Sources: Department of Economics and Statistics. 2009. *Statistics for Planning 2009*. Government of Kerala and Department of Tourism. 2011 and previous reports. *Tourism Statistics*. Government of Kerala

Dismal performance in terms of international comparisons

11.5.3 In the top 50 tourist destinations of the world, tourist arrival per 1,000 people was as high as 703 in 2011[8]. In the European Union, it was 755 per thousand people. In comparison, it was just over 22 in Kerala. Indeed the data are not comparable[9]; yet one can conclude that the statistics of foreign tourist arrivals in Kerala is not impressive by the international standards.

[8] World Tourism Organisation (UNWTO). 2013. *UNWTO Tourism Highlights 2013*. http://mkt.unwto.org/en/publication/unwto-tourism-highlights-2013-edition.

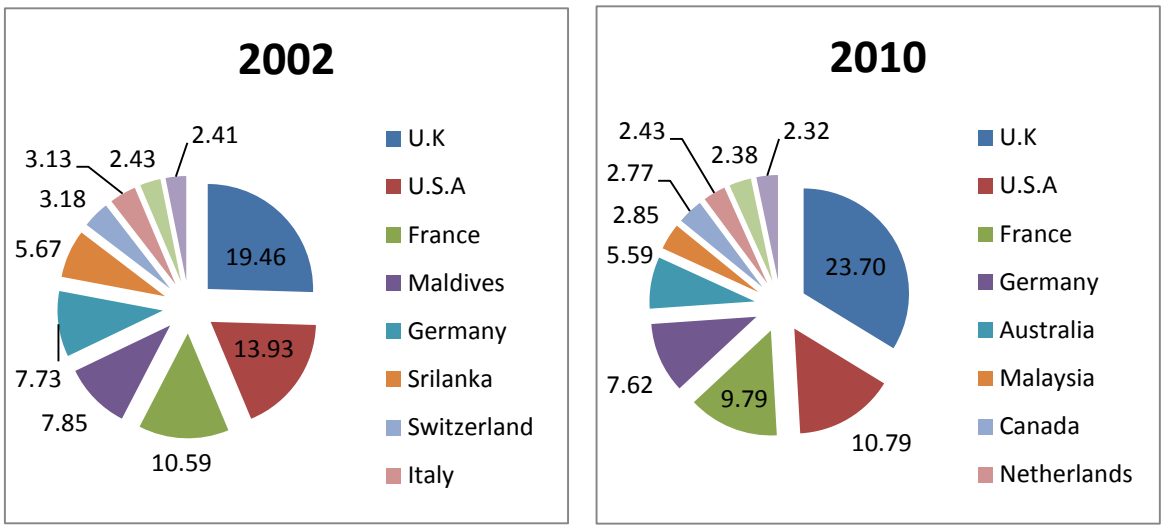
[9] The data on inbound tourists refer to the number of arrivals, not to the number of people traveling. Thus a person who makes several trips to a country during a given period in transit is counted each time as a new arrival. Further, Sources and collection methods for arrivals differ across countries. Kerala data is based on the internationally accepted definition of tourist.

Spatially lopsided

11.5.4 Kerala's tourism is spatially lopsided with the top ten countries accounting for over 70 per cent of the total tourist flow (Figure 11.8). At the national level it is slightly above 62 per cent. The foreign tourists in Kerala mainly come from European countries and the US, Canada and Australia. The share of foreign tourists was 11.4 per cent of total tourist arrivals in Kerala in 2010. It was found that the majority of foreign tourists in Kerala came from the U.K. (23.7%) and the U.S (10.8%), followed by France (9.8%), Germany (7.6%), Australia (5.6%) and Canada (2.8%), accounting for 60.3 per cent share of foreign tourists in Kerala in 2010. Among the top ten countries, five are from Europe. These are, namely UK, France, Germany, Netherlands and Italy. These countries account for 45 per cent of the total inflows. At the national level however, only two European countries figure in the top ten countries and they account for a mere 21 per cent of the total tourist flow. Kerala does not seem to be popular with tourists from Asian countries. Only Malaysia and UAE figure among the top 12, accounting for 5 per cent of the tourist flow.

11.5.5 Over time, there has been diversification in tourist arrival. The share of top 12 countries has declined from over 76 per cent in 2002 to 70 per cent in 2012. However, the share of the European countries in the top ten remained almost constant.

Figure 11.8: Nationality-wise Foreign tourist visits to Kerala in 2002 and 2010 (%)



Source: Department of Tourism. 2011 and previous reports. *Tourism Statistics*. Government of Kerala.

11.5.6 The origin of domestic tourist visits has mainly been regional. 71 per cent of tourist flow originates from within the state; while 25 per cent comes from the region. The rest of India accounts for a mere 4 per cent (Table 11.4).

Table 11.4: Distribution of Domestic Tourist Visits in Kerala by State of Origin, 2010

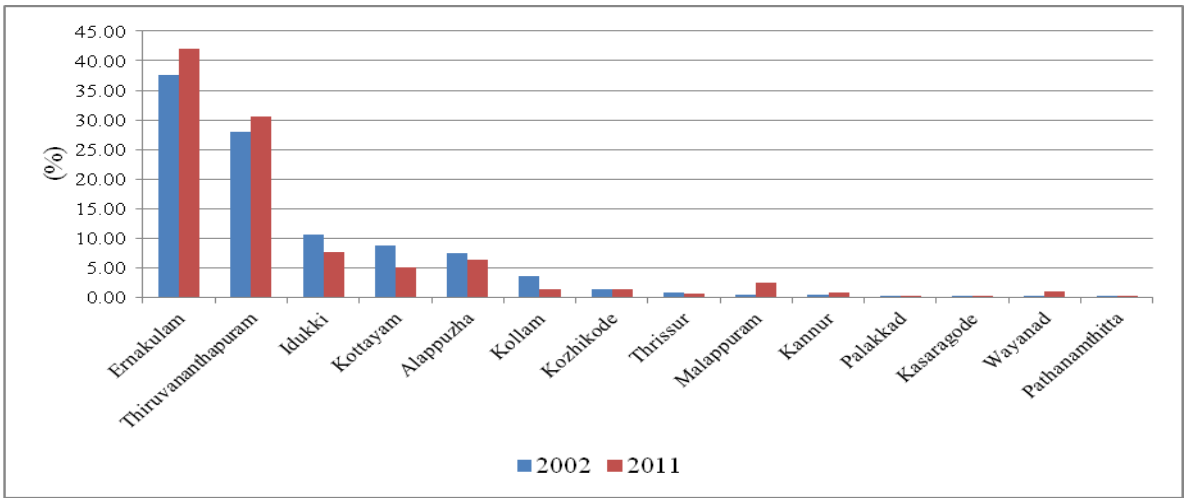
State/UT	*Domestic Tourist Visits (Lakh)*	*Share (%)*
Kerala	61.1	71.03
Tamil Nadu	11.2	13.02
Karnataka	5.5	6.5
Maharashtra	2.9	3.4
Andhra Pradesh	1.7	2
Delhi	1.3	1.5
Total	86	97.3

Source: Department of Tourism. 2011 and previous reports. *Tourism Statistics*. Government of Kerala

Highly skewed inter-regional tourist arrivals

11.5.7 Foreign tourist arrivals vary significantly across the districts. It is found that during 2011, a large number of foreign tourists in Kerala preferred to visit Ernakulam district (42.1%) followed by Thiruvananthapuram (30.6%), Idukki (7.6%), Alappuzha (6.3%) and Kottayam district (5.1%), together accounting for 91.7 per cent of foreign tourist arrivals in Kerala. During the same year, a majority of domestic tourists preferred to visit Ernakulam (23.1%), followed by Thrissur (22.0%), Thiruvananthapuram (13.7%), Kozhikode (6.9%), Idukki (5.4%) and Kannur (5.2%).

Figure 11.9: Distribution of Foreign Tourist Arrivals (FTA) by District, 2002 and 2011



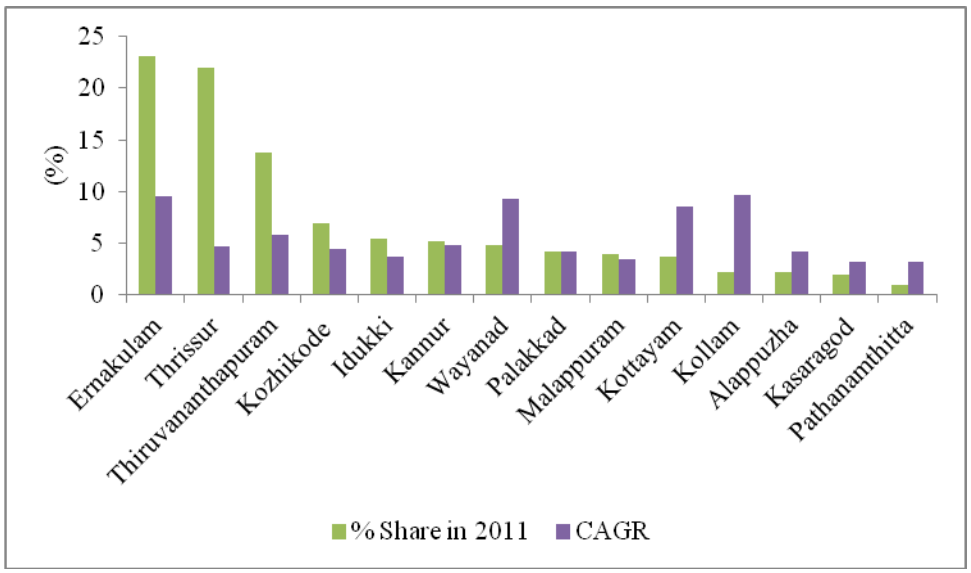
Source: Department of Tourism. 2011 and previous reports. *Tourism Statistics*. Government of Kerala.

11.5.8 While Ernakulam is the commercial capital of Kerala, Thiruvananthapuram is the political capital. Both are among the most developed regions in the state and attract tourists with their beaches. Alappuzha and Kottayam are among the middle income districts. They are mainly famous for their beaches and backwaters. Idukki, which attracts tourists for wildlife sanctuaries and forest walks, is a relatively backward state. However, it has a well developed

tourist infrastructure. Of the total number of 413 homestays in Kerala in 2012, 111 were in Idukki, followed by Ernakulam (71), Alappuzha (70) and Kottayam (62). These homestays are regarded as one of the major sources of attraction for foreign tourists. Majority of foreigners believe in enjoying the natural beauty of the landscape (and getting to know the local culture), so they prefer to stay in these homestays instead of hotels. It has been observed that foreign tourists demand better facilities and connectivity compared to domestic tourists. The flow of domestic tourists is relatively more evenly distributed across the other districts of Kerala, as compared to the foreign tourist flow (Figures 11.9 and 11.10). This is supported by the coefficient of variation statistic[10].

11.5.9 Overall, however, a large number of tourists (both foreign and domestic) prefer to visit three particular districts in Kerala, namely Ernakulam, Thiruvananthapuram and Idukki. Further it is found that most of the tourists prefer to visit the central and southern parts of Kerala rather than other parts of the state, leading to a comparative neglect of the North. The reasons may be, good connectivity in terms of roads, railways and airports and famous tourist places.

Figure 11.10: District-wise Share (%) in 2011 and CAGR of Domestic Tourists during the period 2002 and 2011 (%)



Source: Department of Tourism. 2011 and previous reports. *Tourism Statistics*. Government of Kerala.

Predominance of Seasonal tourism

11.5.10 A survey-based WTTC study (2003) indicates that foreign tourists come essentially for leisure[11]. This type of tourism is seasonal and is concentrated in the winter season. Kerala

[10] A statistical measure of the dispersion of data points in a data series around the mean. The coefficient of variation is 180 for foreign tourists and 120 for domestic tourists, indicating lower variation or more even distribution of domestic tourists across various districts.

[11] WTTC. 2003. *Kerala: the impact of travel and tourism on jobs and the economy*. World Travel and Tourism Council, United Kingdom.

has also not been able to adequately capture its vast potential in medical tourism. A major challenge for the government is to position Kerala in the international market of health care services to exploit the opportunities thrown open by globalisation and match up to the best in the world in terms of health care service providers. According to an estimate for 2013, the market size for medical tourism is US $24−40 billion, based on approximately eight million cross-border patients worldwide spending an average of USD 3,000−5,000 per visit, including all medically-related costs, cross-border and local transport, inpatient stay and accommodations[12]. India is one of the favourite destinations of medical tourism in terms of low cost of medical facilities, high quality and care. In India, Kerala is one of the popular destinations for medical tourism. The Tourism Department does not publish any regular database for medical tourism. Table 11.5 presents an indicative pattern of the arrival of medical tourists. It is found that Kerala is attracting medical tourists from different parts of the world. Ayurveda treatment is popular among tourists from Germany, France, Switzerland and the USA, whereas modern medical treatment is also found to attract tourists mainly from the Middle East, the UK, Germany and the USA. However, so far medical tourism is encouraged by a buyer-driven factor. Collective effort at the government level has not been adopted to draw more tourists for medical purpose until now. A serious effort at the state government's level is expected to nurture the potential.

Table 11.5: Medical tourists from Different Countries to Kerala (%)

Alternative Medicine		**Modern Medicine**	
Germany	22.2	Middle East	26.4
France	13.1	UK	18.41
Switzerland	12.8	Germany	13.4
USA	12.9	USA	12.4
UK	7.2	Maldives	11.4
Italy	7.2	France	7.3
Russia	6.7	Australia	3.5
Middle East	6.3	Spain	2.4
Denmark	5.0	Switzerland	2.4
Japan	4.6	East Africa	1.8
Spain	1.6	Kenya	.24
Kenya	0.42		

Note: The paper does not mention the year the survey was carried out.
Source: Cherukara, J.M. and Manalel, J. 2008. Medical tourism in Kerala: challenges and scope. *Proceedings of the Conference on Tourism in India Challenges Ahead*. 15–17 May 2008.

[12] Patients Beyond Border website. http://www.patientsbeyondborders.com/medical-tourism-statistics-facts.

IIML. 369–379.

11.5.11 In a survey, tourists were asked about their views on the effectiveness of the government in promoting medical tourism in Kerala. The results presented in Table 11.6 show that the there is ample scope for improving the government's role in promoting medical tourism, which can turn into a major revenue generator in Kerala's economy.

Table 11.6: Role of Government in Promoting Medical Tourism (%)

Level of Success	*Alternative Medicine*	*Modern Medicine*
Successful	15.7	0
Satisfactory	26.3	29.4
Failure	57.8	70.5

Source: Cherukara, J.M. and Manalel, J. 2008. Medical tourism in Kerala: challenges and scope. *Proceedings of the Conference on Tourism in India Challenges Ahead*. 15–17 May 2008. IIML. 369–379.

11.6 Business as usual (BAU) projections

11.6.1 Business-as-Usual (BAU) is not as bright as projected by the Department of Tourism. The methodology is provided in Appendix 11.1. Our exercise shows that the income elasticity of foreign tourists' visit to Kerala with respect to per capita GDP of the European Union is 3.3. The elasticity value suggests that 1 per cent increase/decline of Euro area's per capita GDP leads to 3.3 per cent increase/decline in the visit of foreign tourists to Kerala, holding all other factors constant. The BAU projections as presented in Table 11.7 show that the foreign tourist arrival in Kerala is expected to reach 1.86 million by 2020 (and 3.57 million by 2030). The Department of Tourism places the figure at 3 million for 2021 with annual growth rate of 15 per cent per annum, which far exceeds the projections made by us.

11.6.2 Domestic tourist arrival is not as sensitive to income. It is found that the income elasticity of domestic tourism to Kerala with respect to its GSDP per capita is a mere 0.897. Over 71 per cent of domestic tourism originates within the state and is essentially inspired by social and religious motives. This explains the low elasticity of Kerala tourism with respect to domestic income and stability in domestic tourism arrival (DTA). DTA will be between 12.8 and 13.4 million by 2020 depending upon the projections of the GSDP. The policy aims to achieve 18 million domestic tourists by 2021 (more than what is projected in the Table 11.7). Overall, our projections for 2020 are far below the projections made by the Department due to our projections regarding the GSDP in BAU scenario[13].

[13] We have assumed that the GSDP growth rates will decline to 4−5 per cent in BAU scenario.

Table 11.7: Tourist arrival forecast in Kerala (in millions)

Year	*Foreign Tourist*	*Domestic Tourists – Alternative 1*	*Domestic Tourists - Alternative 2*	*Total Tourist Forecast*	*Total Tourist Forecast*
				Alternative 1	*Alternative 2*
2011	0.73	9.4	9.4	12.13	12.21
2015	1.14	1122	12.85	12.16	11.99
2020	1.86	13.37	**12.8**	15.23	14.66
2030	3.57	19.72	17.55	23.29	21.12

Notes: Alternative 1: 4−5 per cent GSDP growth rate
Alternative 2: 3−4 per cent GSDP growth rate
Source: Computations by NCAER

11.6.3 The above analysis suggests that despite excellent work carried out by the Kerala Tourism Department over the last decade, there are fault lines in the performance of the sector. There is a strong dependence on seasonal leisure tourism; innovative products and services are still scarce. The economy is dominated by low knowledge and low technology intensive tourism SMEs. New products and services have appeared in the tourism sector with the emerging global knowledge economy. These are income-inelastic and more stable. But the tourism industry of Kerala is still not a part of this knowledge economy. It is facing serious competition from other countries that offer nature-based tourism. Changing demographics, shifting travel patterns, and volatile global economic conditions are increasingly putting the pressure on industry stakeholders to shift to a new tourism paradigm to stay competitive in a challenging global economy. More importantly, the new knowledge-driven sustainable development strategy proposed for the macroeconomic development of Kerala will call for a longer term strategy for tourism as well to bring it in line with the former. Tourism in the overall Kerala knowledge economy will focus on identifying new products and new markets, and promoting technology-based innovative business solutions enabling tourism sector activities to be more competitive and sustainable in the global marketplace. The next section discusses a knowledge-driven strategic framework for the tourism sector.

11.7 Strategic Plan

11.7.1 Vision and Mission

Vision

"To develop Kerala, into an up-market tourist destination with a high quality, thriving, competitive and sustainable tourism industry, which generates stable wealth, promotes environmental quality, enriches the local communities, and brings enjoyment to visitors

without harming local culture and heritage. Kerala will be a world brand in tourism and a top destination among Indian states in terms of the number of tourists and tourist revenue by 2030."

Mission

Achieve sustained and sustainable tourism. This means,

- Achieving economic prosperity through increasing tourism circulation, innovative products and services, and long term competitive and prosperous tourism businesses;
- Facilitating social equity and cohesion through community involvement in tourism planning and management;
- Promoting safe, satisfying and fulfilling visitor experiences;
- Ensuring environmental and cultural protection through upgradation of the global and local environment, and strengthening of biodiversity in tourism;
- Maintaining the unique and diverse culture by looking after the natural and cultural heritage; and
- Providing quality employment opportunities; and fair pay and conditions for all employees.

11.7.2 Targets

- FTA of 2.33 million by 2020 and 5.88 by 2030 for leisure tourism
- DTA of 16.79 million by 2020 and 32.33 million by 2030 for leisure tourism
- Above 50 per cent share in total medical and knowledge related tourism in India

11.7.3 The Strategy

11.7.3.1 An integrated approach to tourism planning and management is required to achieve sustainable tourism. Some of the most important principles of sustainable tourism development include the following:

- Tourism should be initiated with the help of broad-based inputs that involves all stakeholders, including the community where the development is taking place, and the stakeholders should maintain control of tourism development.
- Tourism should provide quality services and generate demand for high value added services.

11.7.3.2 **Pillar 1: Economic dimension**

The action plan consists of:

- Product differentiation
- Market diversification

- Innovation
- Marketing
- Infrastructure

Product differentiation

11.7.3.3 Research has shown that there has been a shift in travel patterns and demand for products and services (Table 11.8). The advancement of technology has also had a significant impact on the tourism industry. Continuous upgrading and modernising of tourism products will be important in providing visitors with quality, user-friendly and consistent services. The tourism industry should be able to develop unique products, which can provide authentic experiences and value added services. It is necessary to realise the potential of tourism and to extend the products and services at the minimum cost through product differentiation.

Table 11.8: Shift in Travel Patterns

Switch from	***....toward***
Plan well in advance.....	....holiday on short notice
Full packaged/fixed schedule holidays....	....menu of experiences/flexible holidays
Established destinations....	...new destinations
City tourism....	...integration of city and provincial/territorial experiences
Undifferentiated markets...	...special markets
Theme parks and man-made attractions....	...experiential travel/nature based tourism
Mass marketing...	... niche marketing
Destinations taking who arrives....	...destinations chasing specific markets
Non-branded destinations...	...highly branded destinations

Source: Western Australian Tourism Commission. 2000. *Partnership 21: 2001-2005 Tourism Industry Plan: a Working Strategy Reviewed Annually*. Western Australian Tourism Commission, 2000

11.7.3.4 In its efforts to differentiate the tourism experience in Kerala, the Department of Tourism has been introducing newer products. Some of these, for instance, are: Ayurveda, backwaters, rural tourism, plantation tourism, adventure tourism, eco-tourism, convention tourism, and medical tourism. We propose that more innovative elements should be added into the development of theme products, and deep exploitation and utilisation of tourist resources. This will call for two sets of action plan:

- Adding new elements to leisure tourism to change sightseeing tours into leisure vacation tours
- Promoting new tourism products

11.7.3.5 **New elements to leisure tourism:** Leisure tourism is already one of the important components of tourism, accounting for 51 per cent of the global tourism activity. Traditional tourism must be adapted to the changing tastes and travel patterns by adding the following elements:

- **Experience element:** Tourism economy has entered the age of 'experiencing' economy, and with this, the way people consume is also changing. There is a growing segment of tourists who are sophisticated, experienced, well-educated and discriminating. They are more aware of what the competition has to offer. They are less destination-oriented and more experience-oriented. This transformation into an "experience market" is based on personalised services and customised holidays that allow visitors to play a more active role in their travelling experiences and to search continually for new tourism products.
- **Participation element**: The contemporary tourists prefer more active and exciting activities to programmed travel arrangements. Recreational parks, beach sports, *haats*, and fairs may enhance the participation element and are an integral part of tourism worldwide.
- **Automation element:** The mode of travel depends on tourists' wishes, and more and more tourists go in for individuation, diversification and freedom while experiencing the destination. Government policies must be adapted to these emerging needs of tourists. It requires provision of newer transport services and facilities to attract them, for instance, the government may develop biking and cycling facilities in tourism. This will require developing cycling or biking routes through hills and other landscapes. Cycling is considered healthy and a source of enjoyment. In Germany more than 200 long-distance cycle routes have been built to offer opportunity for sightseeing in cities and for romantic rides through unspoilt nature.

11.7.3.6 **New innovative products and services:** The new knowledge economy which will provide a major thrust to medical and education related tourism is expected to change the face of Kerala tourism. The Kerala knowledge economy will shift the paradigm to new varieties of tourism. These are, for instance,

- **50+tourism:** The ageing of society will result in far-reaching changes, particularly on the demand side. There is a continuing rapid increase in the number of outbound travellers aged 50 years and above. This means that travellers will be older. It also means that the aged population, which is more mature, experienced, sophisticated and demanding, will demand high quality, technology-based services, tailored to their requirements. Travel and tourism planners will need to respond creatively to the needs of this market and provide the exact services required to meet and exceed their expectations. This tourism can be marketed to those with functional limits or disabilities. Destinations often employ Universal Design and Universal Destination Development principles.

- **Medical tourism:** This is arguably the fastest growing variety of tourism. While in Europe, National Health Services for the citizens is heavily burdened and the system has almost collapsed, in the U.S. the cost of medical treatment is 3 to 6 times higher than in

its counterpart OECD countries[14]. In the Middle East, huge infrastructure facilities are available, but the expertise is insufficient. Kerala has distinct advantages in terms of medical cost which is 1/12th that of the advanced countries. Its doctors and nurses have been working all over the world. Finally, and most importantly, Kerala will have two medical hubs supplemented by regional spokes over the next 20 years, which will make extensive medical infrastructure available in the state. But this will not automatically guarantee the inflow of medical tourists. There has been serious competition from Thailand, Malaysia, Singapore and South Korea, and it will be important to benchmark the experience against these countries. In addition, Kerala will have to identify niche areas for the promotion of medical tourism.

11.7.3.7 Ayurveda is almost synonymous for Medical Tourism in Kerala. Ayurveda Tourism can contribute to increasing the average length of stay of tourists. The average duration of stay of a tourist coming to Kerala for Ayurveda Tourism is as long as 16.2 days. However, quality control is a major issue. There has been an overcrowding of unqualified people conducting massage parlours in the name of Ayurveda. Further, there is a lack of standardization and scientific research in Ayurveda in India. In order to control quality of Ayurveda, Kerala Tourism has introduced two kinds of classification - Green Leaf and Olive Leaf - for Ayurveda centres. There are strict criteria and guidelines that the centres have to follow to get these classifications. These classifications ensure the credibility of the service providers and the quality. The implementation of this programme must be monitored carefully so that Kerala does not get any negative publicity due to fake centres. Promotion of Ayurveda tourism can be integrated with medical cities to provide tourists a holistic experience. Another component of Ayurveda tourism is its aggressive marketing across the world. It must be noted that Sri Lanka has also taken to promote Ayurveda tourism and will soon emerge as a serious contender in this area.

11.7.3.8 In addition, with several dental clinics operating, Kerala has a distinct advantage in dental tourism. The fact that the treatment requires multiple sittings, with liberal gaps in between sittings, and hence requires around 30−40 days stay, makes the dental patient an ideal candidate for medical tourism. Hence, more effort should be made to market the dental tourism product.

- **Tourism showcasing rich tribal heritage:** There has been a growing trend of promoting tribal tourism in different parts of the world. Tourists are taken to the spots that are associated with the tribal way of life. Of late, however there has been concern that this form of tourism is exploitative and should be stopped. There may be alternative ways of showcasing tribal heritage and attract tourists. In the Yunnan province of China, an Ethnic Village has been created to bring the history, culture, and customs of 26 different Yunnan minorities together into one

[14] Todd, H. 2012. *Why Are U.S. Health Care Costs So High?* Can be accessed on http://www.forbes.com/sites/toddhixon/2012/03/01/why-are-u-s-health-care-costs-so-high/.

exhibit. Each of the 26 ethnic minorities has a village built on the premises. A central square has been built to symbolize unity among the various ethnic groups. In addition, there is a folklore museum, a museum of ethnic waxworks, and a theatre for the performance of ethnic songs and dances. This is a major point of attraction in Kunming, the capital of Yunnan. In this form, the province is able to showcase its heritage without disturbing the habitat of the tribal population. Further, there have been cultural shows on colourful tribal dances which attract tourists from different parts of the world. This also opens a window for the outside world to their life style.

- **Educational tourism**: It involves travelling to an education institution, in order to take personal-interest classes, such as cooking classes with a famous chef or crafts classes. It also involves travelling for short-term assignments for teaching, presentations, lectures, imparting training or organising workshops. South Korea and Singapore are serious contenders in this segment and need to be studied for policy formulation.

  Ancestry tourism (also known as genealogy tourism) is also covered in this category. It is travel with the aim of tracing one's ancestry, and includes visiting the birth places of ancestors.

- **Cultural tourism:** Rooted in the process of globalisation, the so called cultural tourism is expanding and flourishing at all levels of society. It is linked with the curiosity to learn about others to enhance one's own experience. It involves tourists who travel to develop their creative potential, and get closer to local people, through informal participation in hands-on workshops that draw on the culture of their holiday destinations.

  Museum tourism is an important component of cultural tourism. Museums as art markets, as laboratories, and as recreation places can be the promoters of state culture and enhance its prestige. There have been new approaches in promoting experience through museum tourism. These include, specialisation and diversification in museology, entrepreneurial approaches in their organisation, and the use of audio-visual aids to explain exhibits. Considering the fact that the state has rich culture, museum tourism needs a big push.

- International music festivals and youth festivals have also proved to be a major tourism product. The midsummer music festival was originally a French idea, but has now spread worldwide.

- **Wetland tourism**: Wetlands offer significant tourism opportunities. It is not only a key source of income generation but also contributes to wetland conservation. The

best practices of promoting wetland tourist while minimizing its threats and adverse effects include the following:

- integration of wetland tourism planning with wetland management planning to resolve the multiple issues arising from tourism activities in wetlands,
- involving local communities in decision-making as a central element of both wetland-wise use and successful tourism,
- making appropriate legislation and ensuring its effective enforcement to prevent damage to the environment and to tourism assets, and
- connecting the wetlands through the state.

11.7.3.9 Some of the successful case studies of wetland tourism have been provided in Appendix 11.2. Their details can be viewed at the Ramsar website at www.ramsar.org/tourism.

Niche Products

11.7.3.10 Customers of different age, sex, nationality, occupation, culture, hobby and tourist motivation have different needs and perceptions. The strategy will be to subdivide the market and design different products according to the special features of the segment market. In Kerala, for instance, 56 places have been identified for development of ecotourism. The Kerala Tourism has set up a separate ecotourism wing to give policy support for the development of ecotourism destinations in the State. Out of them, some progress has been made in 31 locations. It is important to design specialised products to enhance experience of these locations. Besides these, highly specialised tourist agencies and material need to be promoted to deliver quality services by complying with the standards set by international benchmarks. Destination Management Councils set up in Kerala are a right step in this direction. Their functioning will need to be monitored on a continuous basis.

Diversification of markets

- **New markets:** Kerala has already strengthened the existing international markets along with local markets. The state needs to explore new emerging international markets, like USA, Scandinavia, Russia, China, Malaysia and other South Asian countries having tremendous potential for tourism growth. The product specific promotion of tourism products, like Ayurveda in Germany, and culture in France needs to be replicated in the case of other countries. Foreign exchange earnings could be optimized only if Kerala succeeds in attracting more stable foreign tourist inflow. Advertising campaigns and promotional tourism programmes through electronic media, especially for television, major international tourism events and fairs, etc., need to be further developed to promote awareness among the tourists.

- **New destinations:** The policy also emphasises continuous development of unexplored leisure destinations and enhancing local level experiences to showcase the

cultural heritage of Kerala. Significantly, "Vision 2025" envisaged the development of "one tourist destination every year". While that programme was highly ambitious and unsustainable, under the Tourism Policy, 2012 a comprehensive plan 'Wake up to Malabar' to promote North Kerala is being formulated[15]. Developing micro destinations also can be a part of this policy. For example, Banat-Crişana in Western Romania was developed as a micro-tourist destination. Medical-spa tourism (48.5%) is the dominant form of tourism in this region because of the existence of several springs of thermal water in the region[16].

Promote innovation

11.7.3.11 Most innovations currently happen outside the tourism industry and are only later adopted by organizations within it; this is partly due to the unique structure of the industry and the particular nature of its product. Thus, contacts with customers and suppliers are far more important to the innovation process in tourism enterprises than business-academia linkages. Therefore, innovation policies in tourism should mainly aim at enhancing destination-based or networking innovations rather than single company innovations. Government should encourage innovative firms to achieve economies of scale; innovating on the basis of co-operative alliances and other forms of networking. Public policy is important and directly impacts the diffusion of technology because it is public policy that establishes the climate in which businesses operate.

11.7.3.12 The policy makers will emphasise education and increasing managerial professionalism in the industry. One may further suggest that tourist firms should be encouraged to introduce more technology, particularly IT (e.g. Websites). Social research on customer behaviour and reactions should be supported.

Marketing

11.7.3.13 The policy makers envisage marketing the state as a visible global brand with equal focus on domestic and international markets. There have also been policies to attract new investors in tour operations, homestays, serviced villas and Ayurveda centres by providing marketing assistance. Information centres have been set up at all major destinations, cities and transport nodes with IT-enabled information kiosks and trained staff to cater to the needs of visitors. A website (www.keralatourism.org) has been launched which is interactive and helps travellers to customise their plans. A social media optimization activity is being carried out to use social media tools like Twitter, Facebook, and You Tube etc to reach out to travellers. Kerala Tourism has also entered into a partnership with Google, the number one

[15] Department of Tourism. 2012. *Kerala Tourism Policy 2012*. Government of Kerala, Thiruvanthapuram, Kerala.

[16] Stăncioiu, A., Teodorescu, N., Vlădoi, A., Băltescu, C. and M. Stoian. 2011. Banat-Crişana as Micro-destination – Elements of Tourism Image and Tourism Identity. *Theoretical and Applied Economics*. 18(9). 17−26.

internet property worldwide, for popular search-based campaigns. These efforts need to be carried forward over the next 20 years.

Encourage the use of ICT tools in marketing

11.7.3.14 The industry is information intensive and is benefited tremendously from the implementation of Information and Communications Technology (ICT). The growth of the Internet and new technologies in general, has influenced the overall sector in terms of approaching potential customers (visitors) who seek information and fulfil their purchase through the Web. Tourism seems to be directly related to the use of ICT. For instance, Italy, a leading worldwide European tourist destination also has an enormous number of web pages of itself (767,000 pages). There is evidence that tourist companies that had web sites increased their revenue but the ones that had their own web portals, had even higher revenues. ICT also offers value added services by providing information on accommodation, events, culture and leisure, together with booking and payment facilities.

11.7.3.15 ICT will also have a great impact on virtual tourism, a market-share development strategy that focuses on promoting the unique aspects of a city or region in order to draw tourists interested in those particular subjects to the area. Action in the field of ICT for tourism is targeted at developing new components and distributed architectures for tourism information and communications systems that support users and businesses, by offering value added services and multimedia information on tourist destinations. Eventually, this may also have a positive impact on the physical flow of tourists to the state.

Use Smartphone systems

11.7.3.16 Smartphones come in very handy to an increasingly mobile generation and in particular for travellers. Companies are developing applications that allow travellers to download all the information they need related to their trip, straight onto their BlackBerry smartphone. This mobile shortcutting method will enhance the already interactive, marketing initiatives and make everything more efficient. Just as the Internet completely revolutionised the way consumers book their travel, now the immense, growing reliance on mobile devices is causing a second shift in how travel is purchased. It is imperative for hotels to tap into these growing markets. In the future, the computer as the main means to access the Internet will move to the background, while other mobile devices will provide an interface to the Web. The end user will interact in a more natural and relaxed manner. Hence, there will be more possibilities of service customization and product configuration. In addition, flexibility during the trip will be increased and travellers will have the possibility to book ad hoc services.

11.7.3.17 These visions require new forms of collaboration between service providers and ICT industry for skill development, incentives, and capacity building.

Develop electronic value chain

11.7.3.18 The dominant feature of travel and tourism is supply-chain fragmentation. Hundreds of thousands of enterprises are involved in providing the various elements associated with travel. Providers are dependent on a multiplicity of intermediaries and the distribution chain is long and expensive. These providers are characterised by extreme heterogeneity and diversity in terms of focus, size and sophistication. The vast majority of providers are small, medium or micro-sized (SMEs or SMBs). They are excluded from e-commerce. They are required to connect to multiple channels. But, they have neither the financial resources nor the time to manage multiple systems physically. Of late, electronic intermediaries are emerging dynamically, enabling consumers to interact and to offer advice. The adriatica.net Group offers a unique opportunity for small hotels and businesses to promote their activities and services through a very interactive web site, www.adriatica.net. It was founded in 2000. It expanded over time by acquiring intermediaries across a number of segments.

11.7.3.19 There are instances where governments have taken initiatives to organise the value chains electronically:

- **CoolCapitals.com**: CoolCapitals.com is an initiative of the authorities of five cities that came together to fulfil their aspiration for luring travellers coming to Europe. These are five sought after capitals in Europe - Amsterdam, Antwerp, Zurich, Vienna and the recent entrant, Valencia. They came together to carry out joint promotional campaigns. It is highly interactive and gives an opportunity to the 'visitor' to have online access to significant information about the places to see and visit, which could also be available on their smartphone system, once in the city.

- **www.vastsverige.com**: This is a West Sweden web site, where 49 cities collaborate to form 'The virtual travel agency', which provides information, booking, visualisations, maps and coordinates and weather information.

11.7.3.20 In the case of Kerala, districts may form such collaborations to form electronic value chains covering all aspects of the tourism experience.

Encourage customised packages

11.7.3.21 Travel agencies are dynamically packaging tour products and also support the development of customized packages. This calls for flexible and smart products, which will allow customers to plan their own trip according to their wishes, choosing from the large variety of items on offer. This very often can be frustrating to the consumer. There is, therefore, a great need for meta-data screening of information so that the consumer can find what he wants in the time frame available to him. As an example, a search for Cochin hotels

yields a number of web pages. This makes it difficult for the customer to decipher and screen all this information. Use of some of the websites may reduce the number of pages, but the problem still remains. It is important to have organised efforts to provide information and packaged services to customers to plan their trips.

11.7.3.22 In Kerala, the portal www.keralatourism.org is a move in this direction. It needs to be upgraded technologically and made more interactive by exploring the Web 2.0 based technologies.

Box 11.1: The European Travel Commission (ETC)

ETC, created in 1948, is an association of National Tourism Organisations (NTOs) with 39 members, 27 member countries of the European Union and 12 other countries. It is an independent body, which is financed entirely by annual membership contributions. It also generates significant funding for its marketing activities from commercial partners in relevant marketplaces.

Source: Europe Travel Commission website. http://www.visiteurope.com/home.aspx

11.7.3.23 The huge benefits from technologies like Web 2.0 can be exploited by capacity creation, infrastructure development, need for education, and exposure to global best practices, focusing on innovation and always having a vision for the future.

Infrastructure

11.7.3.24 The government has been attempting to deliver a world-class experience to all visitors in terms of basic amenities by improving the basic tourism infrastructure. The focus has been on improvement in hotels, restaurants and other visitor related services (including wayside amenities, such as public toilets, parking bays and refreshments); upgradation of visitor facilities through proper management of tourism resources; and overall improvement in maintaining the tourist destinations by forming institutional mechanisms at various levels to make them clean and safe as per international standards. Our proposals in this regard are as follows:

Integrated framework for infrastructure development

11.7.3.25 **Transport:** Easy access to tourism destinations in terms of international transport and facilities for easy movement within the destinations is a prerequisite for the development of tourism. Transportation infrastructure is composed of:

- International air services and international airports;
- Domestic air services;
- Land transport systems and routes; and
- Water transport.

11.7.3.26 The state should focus on providing good connectivity in terms of rail, road and air in each and every district. In particular, infrastructure and tourism products in underdeveloped districts, mostly situated in the northern parts of Kerala, need to be promoted. Initiatives are required for better quality infrastructure, in terms of transport facilities based on the principles of affordability, and easy access to tourist destinations, etc.

11.7.3.27 It should be the responsibility of the public sector to develop transport infrastructure due to the public goods nature of this infrastructure. It should be ensured that:

- The network of services is available to both tourists and residents of the area.
- Achievement of consistency in standards is maintained.
- The construction of an integrated system contributes to the economic welfare of the region.

11.7.3.28 The government will adopt the Multimodal planning approach in transport. It refers to planning that considers various modes (walking, cycling, automobile, public transit, etc.) and connections among modes. Further, sustainable tourism development plans should set stringent environmental guidelines for infrastructure development. Finally, planning for infrastructure and services must effectively accommodate the needs of aged and physically challenged travellers.

11.7.3.29 **Hospitality Infrastructure:** Efforts should be made to provide a world class experience to all visitors by giving importance to the provision of basic amenities in destinations, and making constant improvement in services offered by hotels, and restaurants. The less known and unseen places should be identified and developed into tourist destinations with necessary infrastructure. While providing world-class products and services to the tourists, the prices should be made competitive. This can be pursued primarily by inviting private players and ensuring competition. Kerala tourism has put in place certifications for its key tourism products – houseboats, Ayurveda and hotels – to ensure that the tourist receives products that are acceptable, uniform and also adhere to certain basic standards. These may be extended to all other hospitality infrastructure, with adequate information provided through the website.

11.7.3.30 **Tourism infrastructure:** Typically tourism infrastructure is viewed as consisting of museums, cultural institutions, amusement parks, entertainment parks, heritage sites, and parks. In the case of medical tourism, it comprises medical facilities. For education tourism, educational infrastructure is the key. Different layers of government should collaborate together to work for the promotion of tourism infrastructure. This type of infrastructure requires upgradation of visitor facilities in places of interest and the overall improvement in the upkeep and maintenance of local attractions at destinations. Kerala is believed to be the first state in the country to provide accreditation to tour operators. However, the accreditation policy initiated in 2009 is limited to tour operators based in Kerala. It will need to be extended to all.

Pillar 2: Environment

11.7.3.31 The use of cleaner technologies can contribute to the sustainability of the tourism system. These are environment friendly technology, the adoption of which can attract more "green" customers, and reduce production and fixed costs. As discussed in Chapter 10, these technologies comply with the principles of "Reduce, Reuse, and Recycle". Cleaner technologies include treated sewage use for irrigation; metal, glass and plastic recycling; composting organic solid waste; use of renewable energy sources; and smart building design to reduce energy demand for lighting and cooling systems. Cleaner technologies lead to the minimisation of the volumes and hazards of gaseous, liquid and solid waste; the minimisation of the risk of accidents involving chemicals and processes; the minimization of the consumption of raw materials, water and energy; and the use of substitute chemicals and processes less hazardous to human and ecological health**.**

11.7.3.32 **Destination approach in development plans:** Destination Management Councils (DMC) has been formed to cater to 35 tourist destinations in Kerala. These councils, with statutory authority, undertake and maintain tourism projects completed in tourism destinations and evaluate the basic infrastructure, security, protection, encroachment, new schemes, etc., in the respective destinations. The DMCs also implement new projects based on the characteristics of the tourist destinations. Each council has the member of the legislative assembly from that region as its chairman and the DTPC secretary as its chief executive.

11.7.3.33 **Environment protection:** Environment friendly practices have been a part of the Tourism Policy since 2004. Under the policy, the use of disposable plastics at major destinations has been banned reducing the pollution caused by various tourism activities. In this regard, the Department also supports environment friendly initiatives such as production of paper bags and conversion of plastic and other wastes into resources, through viability gap funding. As discussed above, there have been initiatives to encourage the adoption of eco-friendly practices by the hospitality industry**.** Eco-friendly activities, like solar powered and manual coracle ride rafting in the reservoir, up-gradation of musical dancing fountains, creation of jungle camping facilities, enhancement of interpretation facilities, etc., have been successfully completed and are in operation. A new campaign, 'Kerala Waste Free Destination' (KWFD), has been started and a Task Force has been constituted to manage it.

11.7.3.34 Research with hotels and travel industry executives shows that the travel industry is not fully immersed in environmental technology application programmes. A variety of environmental guidelines have been developed by different organisations, such as the International Hotel & Restaurant Association (IH&RA), the American Hotel & Lodging Association (AH&LA), and the International Hotel Environmental Initiative (IHEI). Even hotel corporations now prepare their own action plans and training programs in environmental protection. Tourism businesses are slow in adopting change. Government policy interventions are necessary to promote environment friendly tourism. Some of the proposals are as follows:

- Develop a toolkit and supporting materials to assist SME hotels to plan for and invest in energy efficiency (EE) and renewable energy (RE) technologies.

- Test the toolkit in hotels – and use the lessons learned to improve the tools.

- Disseminate and promote the toolkit to hotels – highlighting the practical solutions for increased use of energy efficiency (EE) and renewable energy (RE) tools, thereby enabling SME hotels to benchmark their energy performance and to prioritise the most cost-effective investments for improving their energy performance.

- Promote policy interventions for use of clean technology- The limitations in using cleaner technologies can be stated as follows: expensive equipment / investment, low consumer interest, no government sanctions, and lack of skilled, professional staff. Some of the policy interventions proposed here are: tax incentives on renewable energy technologies, the use of geothermal energy, the implementation of a solar lighting demonstration project, and permitting purchase of solar water heaters as an allowance against taxable income.

- Focus on beach management practices. The practices adopted by the Gold Coast, Australia are a case in point.

- Initiate a hotel project aiming at radically improving the usability of hotels and the well-being of guests, by assuring the competitiveness of the hotel industry through the development of technologies in the areas of Sensations, Simulation & Training, Sustainability, Safety and Security Services, and Wellness & Health, and by facilitating necessary dialogue and collaboration between education and training institutions and the sector stakeholders.

- Coordinate with the Departments of Urbanisation and Rural Development to mainstream tourism in their planning.

Pillar 3: Social Issues

11.7.3.35 As far as the socio-cultural aspects are concerned, efforts have been made to increase the active involvement of local communities. The policy should ensure that:

- Responsible tourism initiatives are extended to all tourist destinations.

- Cultural activities in the form of traditional art forms are promoted. Kerala celebrates many of its festivals, like Onam, Pongal and local cultural programmes , with people participation. Initiatives have been taken up by the state government

to promote different traditional art forms and tourism-promoting activities in the form of elephant pageants, boat racing, trade fairs, road shows, etc. These should be enhanced or institutionalized. Multi-cultural factors should be emphasized more to bring different cultures together by allowing the travellers to experience the real culture and lifestyles of the local people.

11.7.3.36 More efforts are required by the state government to increase the participation of local communities involved in the tourism activities of the state by creating environmental awareness and educational opportunities among them. This will help restore the environmental balance and create healthy eco-systems in the state. The government should encourage the active participation of the local community in various activities of tourism under its "Responsible Tourism" programme. It generates greater economic benefits to local people and enhances the wellbeing of the local communities. It also makes positive contributions to the conservation of natural and cultural heritage, and maintenance of the world's diversity. At the pilot phase, this programme was implemented at four destinations - Kovalam, Kumarakom, Thekkady and Wayanad. Among these destinations, Kumarakom evolved as the success model for responsible tourism. This needs to be replicated in other destinations.

Pillar 4: Skill development: Capacity building of service providers

11.7.3.37 Tourism is a human-intensive sector. There are a large number of persons who are engaged in the organised and unorganised sectors from highly organized large scale hotels and well integrated tourism companies to small hotels, road-side eating places, ticketing/ travel agencies, etc. A number of human resource development initiatives have been launched for skill development in the tourism and hospitality sector. Government and many other institutes (KITTS, KIHMS and IHMCT) have started offering tourism courses to address the scarcity of qualified faculty in the tourism sector. These institutions are being developed into institutions of excellence. Kerala, with its heavy dependence on water-based attractions, will soon start training programmes for improving the skills of the existing lifeguards and provide them with sufficient modern life saving equipment.

11.7.3.38 While most skill development programmes focus on the human resources engaged in tourism, there is also a segment of service providers who are engaged in other professions but come in contact with the tourist. These persons are the staff at bus/ railway stations, police personnel, the immigration staff at airports, coolies, taxi/ coach drivers, staff employed at monuments, guides, etc. The tourists come into contact with various service providers and it is this experience they have, while interacting, that governs their experience of Kerala as a tourist destination. It is therefore necessary that this large number of service providers be given certain training which can improve their behaviour and service levels. There is a need to:

- **Identify skill gaps:** There is a need to conduct a study on the skill requirement, skill availability, and skill gaps in the tourism sector and design specialized

training for addressing the gaps. There needs to be specialised training for those who have been engaged in the tourism sector. These courses need to be evaluated on a constant basis to upgrade their content and usefulness. The National Skill Development Corporation has prepared a report assessing the human resource and skill requirements for the tourism sector[17].

- **Strengthen tourism pedagogy:** Tourism education has a strong vocational focus with relatively little emphasis on sociological or philosophical issues. There is a need to link specific sociological and philosophical issues to tourism pedagogy. Tourists' and hosts' activities, behavioural patterns, and motivations are to be seen in socially-specific contexts. Tourism influences, and is influenced by societal ideology, that is, "culturally determined expectations and attitudes". Students should be exposed to these issues and the ways to address them.
- **Include tourism in school education:** Tourism education, in particular sociological and philosophical issues, should be a part of the school curricula to shape the perception of the host community towards tourists.

11.8 Implementation

Institutional set up

11.8.1 A strong institutional set up is required within the tourism ministry to monitor and implement various tourism programmes where private players can also participate actively. Development planning for tourism should include the use of multidisciplinary teams for the following:

- Preparation of the Tourism Centre Development Plan.
- Assessment of environmental elements to identify development alternatives.
- Guidance to Reduce Pressure on Coastal Resources.
- Increasing Visitor Carrying Capacity.
- Developing Conservation Strategy for Public & Common Areas & Resources.
- Locating Infrastructure Components in environmentally appropriate Sites.
- Modification of Subdivision Plans to Expand Tourism Potential.
- Employment of better environmental practices to meet development planning objectives.

11.8.2 There is a multiplicity of organisations supporting tourism initiatives:

- Kerala Tourism Development Corporation (KTDC), for instance, is a commercial agency, which is actively participating in building up the basic infrastructure needed for the development of tourism in the State.

[17] National Skills Development Corporation. *Human Resource and Skill Requirement in Tourism, Travel, Hospitality and Trade Sector (2022)-A Report*. http://www.nsdcindia.org/pdf/tourism.pdf.

- The District Tourism Promotion Councils have undertaken the responsibility of creating and marketing local tourism products and opportunities.
- Tourist Resort (Kerala) Ltd. is the agency meant for joint venture projects. Presently there are 4 hotels at Varkala, Kumarakom, Thekkady and Ernakulam that are shared with the TAJ group.
- Bekal Resorts Development Corporation Ltd. is a company formed for the development of Bekal and surrounding tourist attractions.

11.8.3 The, organisation set up may be strengthened based on the principles of development planning for tourism. Fast track clearance should be given to tourism projects with an investment of more than Rs 12 crore.

Financial Assistance

11.8.4 In Kerala adequate plan support is made available to the sector in every successive Five Year Plan. Private investments are being promoted through incentives and infrastructure support. Financial incentives are given by the state government in the form of investment subsidy, limited to 12 per cent subject to a ceiling of Rs 12 lakh; concession in electricity charges; support to avail loans from state financial corporations (KSIDC & KFC), and guidance and publicity support from the state government under the "Responsible Tourism" initiatives. The existing investment subsidy schemes will be withdrawn by 2013. In its place, a new subsidy will be introduced whereby 15 per cent of the total investment, subject to a maximum ceiling limit of Rs 20 lakh, will be provided for investors classified under Responsible Tourism (RT). In addition to the proverbial carrot, there need to be provisions for 'sticks' as well. Punitive actions need to be taken against those who do not adhere to prescribed standards.

Stakeholder participation

11.8.5 Emphasis should be made to enhance the role of major stakeholders, i.e., government, industry, and host communities in the development of sustainable tourism. The government has powerful tools at its disposal to influence tourism development, namely, legislation, regulation (revenue collection and distribution), control, coordination of policies and programmes, infrastructure and incentives, and planning and promotion between state and local level sustainable tourism ventures.

11.8.6 The success of Kerala tourism will be based on the synergy between private and public sectors. The government has taken steps to encourage private investment in tourism, while adhering to the principles and practices of sustainability. Industry led sustainable tourism development relies upon the government- imposed and self- imposed regulations.

11.8.7 The interactions of the volunteer sector, host communities, and NGOs with tourism are generally in the form of pressure groups. Pressure groups can help to move tourism towards sustainability, particularly in cases where they represent the voice of local population. They

need to be involved in the training of members of host communities, introducing appropriate technology transfer, and providing management support such that host communities are better able to participate in tourism developments.

Monitoring and evaluation

11.8.8 The implementation of a sustainable tourism strategy depends upon three key principles:

- establishing a set of performance indicators reflecting the expected objectives of tourism development;
- monitoring the performance of tourism development with respect to these indicators;
- evaluating the effectiveness of the management strategies in influencing the performance of tourism with respect to these indicators; and
- developing refined and/or new tactics for managing tourism based on the effectiveness of these techniques.

11.8.9 It is proposed here that the state department should develop the "Tourism Competitiveness cum Sustainability index" for comparison by destination, to monitor and evaluate the performance of the tourist destination over time. This will be a composite index of the indicators presented in Table 11.9.

Table 11.9: Indicators and Specific Measures of Tourism Competitiveness and Sustainability

INDICATOR	SPECIFIC MEASURES
1. Infrastructure	• Transport infrastructure • Tourism infrastructure • ICT infrastructure
2. Rules and regulation	• Environment • Health and hygiene • Safety
3. Human resources	• Educational and training facilities • Availability of skilled workers
4. Stress	Tourist numbers visiting site (annum/peak month)
5. Use Intensity	Intensity of use – peak period (persons/hectare)
6. Social Impact	Ratio of tourists to locals (peak period and over time)
7. Waste Management	Percentage of sewage from site receiving treatment (additional indicators may include structural limits of other infrastructural capacity on site such as water supply)
8. Critical ecosystems	Number of rare/endangered species

INDICATOR	SPECIFIC MEASURES
9. Consumer satisfaction	Level of satisfaction by visitors (questionnaire based)
10. Local Satisfaction	Level of satisfaction by locals (questionnaire based)
11. Tourism Contribution to Local Economy	Proportion of total economic activity generated by tourism only
COMPOSITE INDICES	
A. Carrying Capacity	A weighted sum of : accessible beach area; number of official beds; parking and road capacity; change in index of local attitudes
B. Site Stress	A weighted sum of : number of tourists; number of tourists per square metre; local response; damage measures
C. Attractiveness	A weighted sum of : water quality; water access; variety of attractions; visitor response

Source: Conceptualised by NCAER

11.9 Conclusion

11.9.1 In order to achieve the vision targets for sustaining and accelerating the growth of the sector and making sustainable tourism a reality, a number of "best practices" need to be followed. The need of the hour is to promote quality on all fronts so as to provide world-class experiences to tourists without deterioration in the society and in the environment, while at the same time strengthening the economy. Awareness of the issues appears to be relatively high in Kerala, and a number of good practices have been widely adopted, but more still needs to be done in this direction since these practices are not well promoted by the state. The strategy should be to engage all stakeholders by marketing and social media, identifying sustainability goals/targets, and creating more sustainable products and services. Marketing assistance for service providers should be increased. Finally, technical assistance and the use of ICT are needed to help tourism organisations market Kerala as a sustainable destination.

APPENDIX A11.1

PROJECTIONS

This study estimates tourism demand model of foreign tourist arrivals in Kerala using an econometric model. The demand equation has been estimated by Ordinary Least Square (OLS). Wherever the autocorrelation problem existed, as per the Durbin-Watson (D-W) statistic, the equation was estimated after adjusting for autocorrelation. We have also done diagnostic checking such as White's heterocedasticity test, Godfrey's autocorrelation test, and Jarque-Bera's normality tests before carrying out the projections. The projection period covers the period, 2012 to 2030. Data used for estimation of demand equation covers the period from 1995 to 2011. The required data is taken from Kerala Tourism Statistics, India Tourism Statistics, and Economic Review of Kerala. The equation is estimated using the software package, Eviews.

As discussed earlier, Kerala's foreign tourist comes mostly from European countries. This region contributes more than 50 per cent of Kerala's total foreign tourist visits. In theory, personal income is one of the key determinants of consumer spending. Travel and tourism is a part of consumer spending and is highly influenced by personal income. Therefore, to calculate the income elasticity, we have considered per capital GDP of Euro area as a key explanatory variable of foreign tourists visit to Kerala. We have estimated a log-log linear model to calculate the elasticity. The data period covers the period from 1995 to 2011.

The equation for foreign tourists visit is specified below:

Log (Foreign tourist) = − 17.956 + 3.269 * Log (Euro area GDP per capital) + 0.939*AR (1)
(t-value) (2.63) (12.6)

$R^2 = 0.97$ D-W = 2.3

The results show that the income elasticity of foreign tourists' visit to Kerala with respect to per capita GDP of Euro area is 3.3 and the t-value is 2.63, statistically significant at 5 per cent significance level. The elasticity value suggests that 1 per cent increase of the Euro area's per capita GDP leads to a 3.3 per cent increase in foreign tourists visit to Kerala and vice-a-versa. The first order auto regressive term (AR(1)) is used to correct the auto correlation problem in the equation. We have used the income elasticity for the projections of foreign tourist flow to Kerala.

In case of domestic tourists, we make a similar attempt to find out the influence of Kerala's economic growth (GDP growth) on domestic tourists visit. The reason is that more than 75 per cent of domestic tourists belong to Kerala. The estimated equation to calculate the income elasticity is specified below:

Log (Domestic tourist) = 7.22 + 0.890 * Log (Kerala GSDP per capita) + 0.446*MA (1)
t-value (12.79) (1.88)

R^2 = 0.96 D-W = 2.01

A11.1.1 Projections of Foreign tourists visit

The projections are based on certain assumptions of growth rate of Euro area per capita GDP for two scenarios: first, business as usual scenario (called preferred scenario) and an alternative scenario. The assumptions are given in Table A11.1.1.

Table A11.1.1: Assumptions on Euro area GDP per capita (%YoY)

Year	***2012−13 to 2016−17***	***2017−18 to 2021−22***	***2022−23 to 2026−27***	***2027−28 to 2029−30***
BAU scenario (preferred)	2.0	2.5	2.0	1.6
Alternative scenario	1.4	1.5	1.0	1.0

Based on the above assumptions, we have made a baseline or BAU and an alternative scenario projection of foreign tourist arrival in Kerala. The results are reported in Table A11.1.2. The actual foreign tourist arrival in Kerala was 7.3 lakh in 2011. Our projection period covers from 2012 and onwards. The results show that foreign tourist arrival in Kerala is expected to reach 2.33 million by 2020−21 under BAU (preferred) scenario and 1.86 million under pessimistic scenario. This is in contrast to 3 million, as being projected by the Department of Tourism, Kerala in its Tourism Policy 2012 report.

Table A11.1.2: Projections of Foreign Tourist Arrival in Kerala (million)

Scenarios	***2000−01***	***2011−12***	***2012−13***	***2015−16***	***2020−21***	***2030−31***
Foreign tourist− **Actual**	0.21	0.73	-	-	-	-
Foreign tourists- **BAU**	-	-	0.81	1.22	2.33	5.88
Foreign tourist- **Alternative**	-	-	0.81	1.14	1.86	3.57

A11.1.2 Projections of Domestic tourists visit

Domestic tourist projections are based on certain assumptions of growth rate of Kerala's GSDP per capita from 2012−13 to 2030−31. The growth rate numbers have been taken from the macroeconomic modelling analysis for Kerala. There are three growth scenarios. They are BAU (preferred) scenario and two pessimistic scenarios (alternative 1 and 2). The assumptions are given in Table A11.1.3.

Table A11.1.3: Assumptions on Kerala's GSDP per capita growth (%YoY)

Scenarios	***2012−13 to 2016−17***	***2017−18 to 2021−22***	***2022−23 to 2026−27***	***2027−28 to 2029−30***
BAU scenario (preferred)	7.1	8.0	7.8	7.3
Alternative scenario −1	4.7	4.4	4.4	4.5
Alternative scenario −2	4.2	3.6	3.6	3.7

Based on the above assumptions, we have made projections of domestic tourist visits in Kerala for three scenarios: baseline (preferred scenario), alternative scenario−1 (low GDP growth), and alternative scenario−2 (lowest GDP growth). The results are given in **Table** A11.1.4**.** The results indicate that domestic tourist visit in Kerala is expected to reach 16.79 million by 2020−21 under BAU (preferred) scenario, 13.37 million under alternative scenario −1, and 12.80 million under alternative scenario−2. These numbers are lower than the projections made by the Department of Tourism, Kerala. In its Tourism Policy 2012, the department had said that domestic tourists' visit will touch 18 million by 2020−21.

Table A11.1.4: Projections of Domestic Tourist Arrival in Kerala (million)

Scenarios	***2000−01***	***2011−12***	***2012−13***	***2015−16***	***2020−21***	***2030−31***
Domestic tourist-**Actual**	5.0	9.40	-	-	-	-
Domestic tourists-**BAU**	-	-	9.97	11.98	16.79	32.33
Domestic tourist-Alternative −1	-	-	9.76	11.02	13.37	19.72
Domestic tourist-Alternative −2	-	-	9.72	10.85	12.80	17.55

APPENDIX A11.2

WETLANDS TOURISM

1. Ibera Marshes: ARGENTIN: 24,550 ha

   - ~ 17,100 visitors/year (in the Ramsar Site only)
   - Boating, kayaking, hiking, nature trails, wildlife watching, horse riding

2. Kakadu National Park AUSTRALIA (1,979,766 ha)

   - Forest wetlands, salt marsh, mudflats, springs, seasonal freshwater marshes, mangroves
   - 175,000 – 225,000 visitors/year
   - Interpretive walks, indigenous art tours, boat cruises, guided bushwalks

3. Abrohlos Marine National Park BRAZIL: 91,300 ha

   - Coral reefs, seagrass beds, mangroves, beaches, sandbanks
   - ~ 5,000 visitors/year
   - Scuba diving, snorkelling, wildlife watching, short nature trail on one of the islands

4. Humedal la Conejera COLOMBIA: 59 ha

   - River, marshland and forest enclave within urban area
   - ~ 16,000 visitors/year
   - Nature trails, guided walks, relaxation, participation in ecological restoration

5. SoomaaESTONIA: 39,639 ha

   - Raised bogs, rivers, swamp forests, floodplain meadows
   - ~ 45,000 visitors/year
   - Boardwalks, canoeing, guided walks, wildlife watching, cultural experience
   -

6. Tsomoriri INDIA: 12,000 ha

   - High altitude freshwater lake and marshes
   - ~ 20,000- visitors/year
   - Wildlife watching, trekking, jeep safaris, home stays, cultural experience, remote experience

7. Lake Nakuru KENYA: 18,800 ha

- Shallow alkaline lake in an enclosed basin, surrounded by marshes, grassland and forest
- ~ 250,000 visitors/year
- Wildlife watching, sightseeing tours, self-guided vehicle tours, trail walks

8. Tubbataha Reefs natural Park: PHILIPPINES: 96,828 ha

- Coral reefs
- ~ 1,400 visitors/year
- Scuba diving

9. Danube Delta, ROMANIA: 580,000 ha

- River, delta, river and marine levees, floodplains, brackish lake and lagoon complex, beaches, dunes and coastal waters
- ~ 50,000-73,000 visitors/year
- Floating hotels, boat trips, canoeing, wildlife watching, rural tourism and home stays, fishing, photo safaris, beach tourism, local cultural experience, rest and relaxation, camping

10. Port Launay Coastal Wetlands SEYCHELLES: 121 ha

- Mangroves, mud flats and streams
- ~ 4,000 visitors/year
- Beach tourism, canoeing, guided walks, sightseeing and beautiful sunsets

11. Skocjan Caves, SLOVENIA: 41,300 ha

- Ramsar Site no. 991 (650 ha)
- UNESCO World Heritage Site
- River catchment with meadows, forests, floodplains, karsts underground water cave system
- ~ 95,000 – 100,000 visitors/year
- Cycling tours, educational trails, guided cave tours, walking

12. Ichkeu, TUNISIA: 12,600 ha

- Ramsar Site no. 213
- UNESCO World Heritage Site
- Lake surrounded by Mediterranean scrub and forest

- ~ 50,000 visitors/year
- Nature trails, guided excursions, bird watching, sightseeing, caving, hiking, horse and camel trekking
-

13. Ba-Be Lake, VIETNAM: 10,480 ha

- Ramsar Site no. 1938
- Freshwater lake surrounded by forests and limestone karst landscape
- ~24,000 visitors/year
- Boat tours, homestays, guided tours, cultural experience, sightseeing, bird watching
-

14. Everglades, UNITED STATESOF AMERICA: 621,000 ha

- Freshwater and wet prairies, sub-tropical forests, salt marshes, mangrove, forests, beach, dunes, brackish water estuaries
- ~ 1,000,000 visitors/year
- Canoeing, boat tours, elevated boardwalks, hiking trails, camping, wildlife watching, fishing, bicycle tours, houseboats

CHAPTER 12

ICT: A STRATEGIC LEVER FOR BUILDING A KNOWLEDGE ECONOMY

The state of Kerala despite being a leader in infrastructure environment, its ability for people to read and use phones and computers has not been able to transform into an ICT powerhouse like its more famous Southern neighbours. The Kerala Perspective Plan 2030 is proposing that the state is to become a knowledge economy where ICT is the lynchpin. Digital technologies will be used to drive productivity and create new growth opportunities across the whole economy. It will catapult Kerala into a league of major knowledge economies by enabling digitalisation of information. ICT will converge with other sectors in an innovative fashion in the economy. Delivery of citizen-centric e-Governance, health and education hubs, smart cities and villages, intelligent transport systems, applications of ICT in agriculture, land zoning are all but just few mention of applications of ICT in the new knowledge economy. E-waste management policy and privacy policies will need to be implemented. Standards need to be defined and continuous monitoring of quantity and quality is required for to build an inclusive society facilitated by ICT.

12.1 Background

12.1.1 Information and communications technology (ICT) is a major driving force of a knowledge economy. The world has witnessed an explosion in the application of computing and communications technologies in all areas of business and community life. The revolution in information technology transforms not only information and its uses but also, more importantly, knowledge and the way it is generated and managed. The IT revolution has intensified the move towards knowledge codification, and increased the share of codified knowledge in the knowledge stock. Knowledge is now seen as input, output, and capital. The ICT strategy aims at stimulating a knowledge-based and innovative economy. It will play a major role in catapulting Kerala to the league of advanced knowledge economies as it will enable digitisation of knowledge. This in turn will take Kerala closer to a sustainable inclusive information society.

12.2 Achievements and challenges

12.2.1 The ICT ecosystem is an integration of five components[1]:

[1] National Council of Applied Economic Research (NCAER) and Department of Electronics and Information Technology, Ministry of Communications and Information Technology, Government of India (DeitY). 2012. "e-Development Index". March 23.

- e-Readiness which comprises of networks (infrastructure, policy, e-literacy, and e-innovations)
- e-Governance
- e-Industry, i.e. information technology (ICT) services and industry
- e-Innovation
- e-Inclusion

12.2.2 Innovation, whether in technology, or applications, or business process, drives the adoption and adaptation of digitalisation in the Indian economy. The extent of digitalisation would be affected by the ability of the three main users – firms, government, and consumers—to use technology for value creation opportunities, i.e. e-readiness. The extent of digitalisation by the government to deliver services is measured in e-governance. Finally, the extent of digitalisation in industry and services for value creation opportunities is measured in e-industry. These three together measure the extent of digitalisation. The outcome of the digitalisation process on users is captured in e-inclusion, i.e. whether the digitalisation has diffused across various groups—region, gender, etc.
A review of achievements and challenges requires a careful analysis of each of these components of the ICT eco system.

12.2.1 E-readiness

Policy approach

12.2.1.1 The government of Kerala is cognizant of the critical role ICTs can play in creating and maintaining economic and social progress. Reflecting the emphasis placed on technology, knowledge, and scientific education by the international development community, the government of Kerala was one of the first in India to develop a policy designed to promote and accelerate the diffusion and use of ICTs within the region. First written in 1998 and followed by numerous revisions (one in 2001, another in 2007, and a third in 2012), Kerala's policy agenda lays out the goals of establishing "Kerala as a leading IT destination...[and] significantly enhance direct and indirect employment creation in the IT sector". The goals of the IT policy include, but are not limited to, building the necessary technological infrastructure to create an environment favourable to ICT development; enhancing the necessary human capital required to both produce and use new technologies through education and skill building; and establishing Kerala as an IT industry destination by attracting investments from within and outside the region.

12.2.1.2 Kerala is also ahead of many states in implementing fully or partially several IT related acts such as the IT Amendment Act 2008. It also has state level cyber law to supplement the IT Act 2008. Kerala also has implemented legislation for the Electronic Service Delivery Act. The state has also implemented a Cyber Security Policy i.e. a computer emergency response team has been set up in the state. A back-up policy was initiated in 2010 to ensure that electronic records (application and databases) are not lost due to equipment failure or physical or cyber disaster. All critical information infrastructures were mandated to

be Protected Systems in 2010. As part of the security measure, only certain people were authorized to access the protected system.

12.2.1.3 Last but not the least, support for the local Malayalam language is provided for in the policy. This is important for inclusiveness of e/m governance.

e-Infrastructure

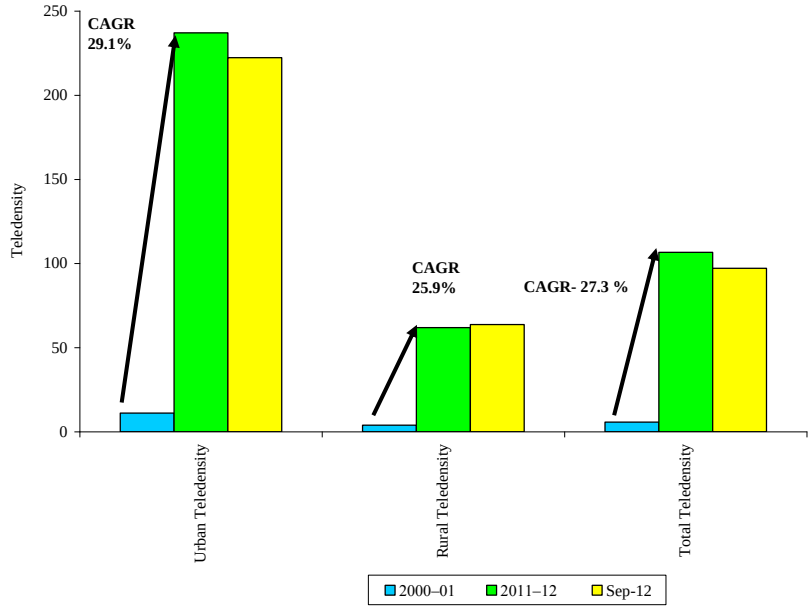
Teledensity:

12.2.1.4 Teledensity is the number of telephone connections for every hundred individuals living within an area. Teledensity, led by mobile teledensity in the last decade, has had significant implications for economic growth. Empirical analysis shows that a 10 per cent increase in mobile penetration delivers, on average, a 1.2 per cent point annual increase in per capita GSDP[2]. Further, a one per cent increase in income will result in a 2.45 per cent increase in mobile teledensity. The correlation between real per-capita GSDP and teledensity of Kerala is 0.97 for the period 2000−01 and 2011−12.

12.2.1.5 Teledensity in Kerala has grown at a compounded annual growth rate (CAGR) of 27.3 per cent between 2000–01 and 2011–12 (Figure 12.1)[3]. The latest available data till January, 2013 shows that Kerala is ranked fifth in terms of overall teledensity (behind Delhi, Tamil Nadu, Himachal Pradesh, and Punjab) at 97.1. This is much higher than the all India level (73.1).

[2] Kathuria, R., Mamta and M. Uppal. 2009. *An Econometric Analysis of the Impact of Mobile*. Vodafone Policy Paper Series no. 9 titled India: The Impact of Mobile Phones.
[3] The data in this paragraph is from the Telecom Regulatory Authority of India.

Figure 12.1: High Growth in Teledensity − 2000−01, 2011−12 and September, 2012*



Note: *The Total teledensity data is for January 2013 and not September 2012.
Sources: Keralastat.com and Telecom Regulatory Authority of India.

Rural-urban divide

12.2.1.6 Within overall teledensity, there are regional variations with urban teledensity and rural teledensity since 2000−01. Urban teledensity in September 2012 was at 222.32 and rural teledensity at 63.75. After Himachal Pradesh (360.06), Kerala is ranked second in terms of urban teledensity. It is ranked below Himachal Pradesh (73.7) and Punjab (66.86) in terms of rural teledensity. The ratio of urban to rural teledensity has increased from 2.8 in 2000−01 to 3.8 in 2011−12, signalling a rising digital divide in Kerala. However, between 2011−12 and September, 2012, rural teledensity increased while urban teledensity declined. Intuitively, the growth in teledensity will slow down as urban teledensity has already peaked and rural teledensity gets close to 100. The rural urban divide is relatively not very sharp in Kerala as it is in many other cases.

Wireless vs. wireline teledensity

12.2.1.7 Wireless teledensity dominates wireline teledensity. This trend is very similar to other developing countries. Table 12.1 shows the de-composition of teledensity across technology and states. Within the Southern region, Kerala has the highest wireline teledensity. Country-wide comparison shows that it is lower than only Delhi, thereby signalling very good telecommunications infrastructure in the state. Nonetheless, wireless teledensity in Kerala is lower than in Delhi, Tamil Nadu, Punjab, and Himachal Pradesh.

Table 12.1: Wire line and wireless Tele-density in Rural and Urban areas as of September, 2012

Service Area	*Rural wireline tele-density*	*Urban wireline tele-density*	*Total wireline tele-density*	*Rural wireless tele-density*	*Urban wireless tele-density*	*Total wireless tele-density*	*Rural tele-density*	*Urban tele-density*	*Total tele-density*
Andhra Pradesh	1.05	6.87	2.66	47.76	177.16	78.67	41.82	184.03	81.33
Delhi	N.A.	N.A.	15.21	N.A.	N.A.	217.45	N.A.	N.A.	232.66
Himachal Pradesh	3.77	8.66	4.32	271.22	351.40	101.58	73.68	360.06	105.9
Kerala	**7.96**	**11.88**	**8.96**	**120.95**	**210.44**	**95.19**	**63.75**	**222.32**	**104.15**
Karnataka	1.07	9.04	4.08	57.29	172.99	92.71	45.18	182.04	96.79
Punjab	2.49	7.83	4.73	94.56	153.00	101.58	66.86	160.84	106.32
Tamil Nadu	1.85	6.63	4.54	66.67	156.91	111.83	55.49	163.54	116.37
All India	0.84	6.49	2.55	39.52	154.64	74.49	40.36	161.13	77.04

Source: Telecom Regulatory Authority of India.

12.2.1.8 International comparisons show that Kerala (95.19) is out-performing China (73) in wireless teledensity (Table 12.2). But it is still below other BRICS and advanced countries.

Table 12.2: International Comparisons of Teledensity in 2011

Service Area	*Wireline Teledensity*	*Wireless Teledensity*
Brazil	21.88	123.18
Belgium	43.06	116.61
China	21.16	73.19
Denmark	45.13	126.46
France	55.92	105.03
Finland	20.06	166.02
Germany	63.05	132.3
India*	2.55	74.49
Japan	51.06	102.67
Kerala*	**8.96**	**95.19**
Netherlands	43.53	115.45
Norway	42.71	116.75
Russia	30.93	179.31
South Korea	60.9	108.5
Sri Lanka	17.15	87.05
Sweden	48.72	118.57
United Kingdom	53.24	130.75
United States	47.91	105.91

Note: * this is as of September 2012.
Source: International Telecommunications Union (ITU)

Improvement in ICT Market Environment

12.2.1.9 The Herfindahl-Hirschman Index (HHI) measures market competition. Lower the number, higher is the competition. The HHI calculated for the wireless telephone market in terms of subscribers, including both the technologies GSM and CDMA, shows that market competition has increased between (0.19) March, 2008 and (0.14) March, 2012. However, the market concentration is marginally higher than the all-India HHI index of 0.12 in March, 2012. Wireline HHI is very high at 0.92 (March, 2012). This also has come down from March 2008 (0.95) and is significantly higher than the all-India index (0.51). In conclusion, the market environment for ICT has improved in Kerala over time but there is space for improvement when compared to the all-India position.

Quality of services: a matter of concern

12.2.1.10 Table 12.3 presents the quality of wireless services for Kerala as of September 2012. It shows that the wireless services do not meet the standards as mandated by TRAI.

Table 12.3: Parameter- wise Analysis of Non-compliance of Quality of Service Benchmarks for Wireless Service Providers for Kerala, September 2012

Parameter	***Service Provider***	***Benchmark***	***Performance***
Metering and billing credibility- post paid	Aircel	≤ 0.1%	0.15
Percentage of calls answered by the operators (voice to voice) within 60 seconds	Aircel	≥ 90%	50.08
	Airtel	≥ 90%	89.76
	Reliance CDMA	≥ 90%	83.07
	Reliance GSM	≥ 90%	72.06
	TATA GSM	≥ 90%	88.09
	Vodafone	≥ 90%	82.14
Time taken for refund of deposits after closures	TATA CDMA	100% within 60 days	98.2

Source: Telecom Regulatory Authority of India

Table 12.4 presents the quality of the wireline service providers. Kerala has both fault incidences and fault repairs higher than the benchmarks mandated by TRAI.

Table 12.4: Parameter- wise Analysis of Non-compliance of Quality of Service Benchmarks for Wireline Service Providers for Kerala, September 2012

Parameter	*Service Provider*	*Benchmark*	*Performance*
Fault incidences per 100 subs/month	BSNL	≤ 5	7.32
% Fault repaired by next working day	BSNL	≥ 90%	71.56%
% Fault repaired within 3 days	BSNL	≥ 100%	98.2%
% Fault repaired within 5 days	BSNL	≥ 100%	87.49%
MTTR (Mean Time to Repair)	BSNL	<8 Hours	16.12
%age requests for Termination/Closure of service complied within 7 days	BSNL	≥ 100% within 7 days	96.15%

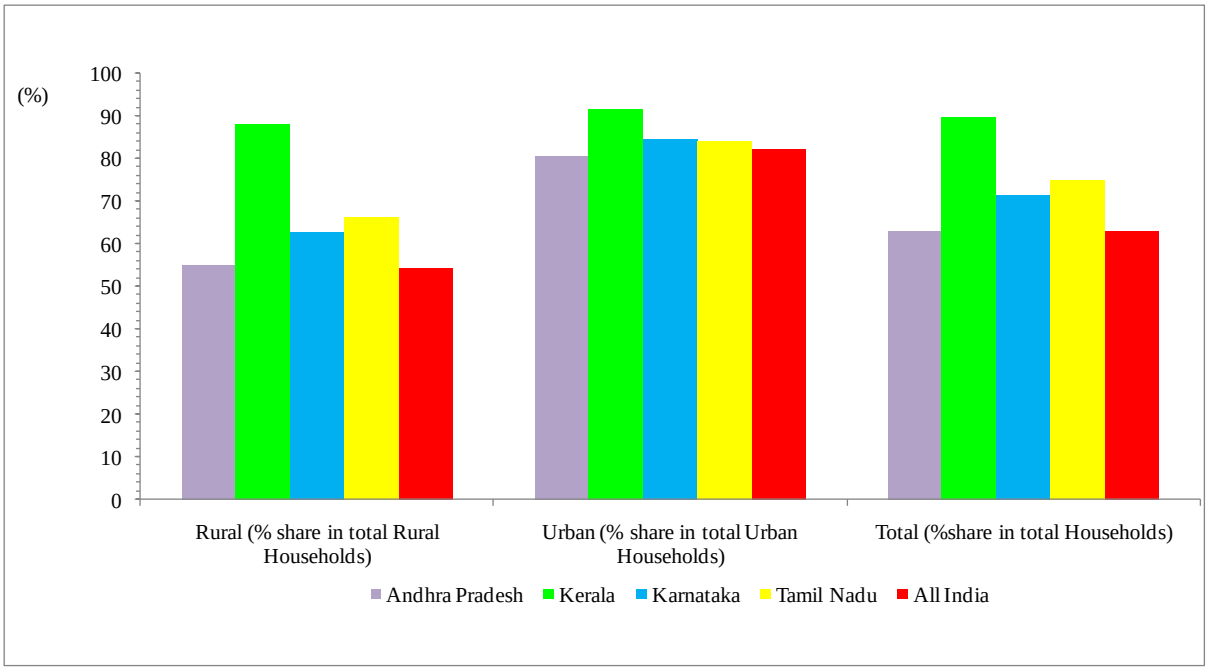
Source: Telecom Regulatory Authority of India

Percentage of households having access to telephone/mobile phones: Blurring rural-urban digital divide

12.2.1.11 The Census 2011 shows that the total number of households (both rural and urban) in Kerala with telephone/mobile phones is significantly higher than states like Andhra Pradesh, Karnataka and Tamil Nadu (Figure 12.2)[4]. 89.7 per cent of households in Kerala own telephones/mobile phones, followed by Tamil Nadu (74.9 per cent) and Karnataka (71.6 per cent). Further, the percentage of rural households having access to telephones/ mobiles (88.0 per cent) is close to urban households (91.5 per cent) in the state revealing the successful reach of ICT Infrastructure to all the rural areas as well. The Annual Status of Education Report (ASER) confirms this finding[5]. In a survey of 349 villages and 8,471 households in 14 districts in Kerala in 2012, the findings show that 91 per cent of the rural households have a mobile phone. The corresponding numbers in 2012 for Andhra Pradesh, Gujarat, Karnataka, Tamil Nadu, and all India are 78, 62.1, 65.4, 74.3 and 66.6 per cent, respectively.

Figure 12.2: Percentage of Households with Fixed Line Telephones and/or Mobile phones, 2011

[4] Census of India website: Office of the Registrar General and Census Commissioner of India. 2011. www.census.gov.in.
[5] ASER. 2013. *Annual Status of Education Report (Rural) 2012*. ASER Centre, New Delhi.



Source: Census of India website: Office of the Registrar General and Census Commissioner of India. 2011. www.census.gov.in

District-wise variations

12.2.1.12 Table 12.5 shows district-wise percentage of households with telephones, either mobile, or wireline, or both in rural and urban areas of Kerala. Even the rural areas of Wayanad, the lowest ranked district, performed better than the national urban average. Clearly, telecommunications has reached all over the state on a relatively equal basis.

Table 12.5: District-wise Percentage of Households with Telephones, 2011

District	***Rural***	***Urban***	***Total***
Kasaragod	88.3	91.2	89.4
Kannur	91.5	93.3	92.6
Wayanad	83.6	87.2	83.7
Kozhikode	91.2	93.1	92.5
Malappuram	91.9	94.4	93.0
Palakkad	83.3	89.9	84.9
Thrissur	88.1	91.3	90.2
Ernakulam	92.4	94.2	93.6
Idukki	88.9	95.6	89.2
Kottayam	93.6	94.7	93.9
Alappuzha	87.5	89.1	88.4
Pathanamthitta	90.7	93.1	91.0
Kollam	84.5	87.7	85.9

District	*Rural*	*Urban*	*Total*
Thiruvananthapuram	81.0	87.0	84.2
Kerala	88.0	91.5	89.7
India	54.3	81.9	63.2

Source: Census of India website: Office of the Registrar General and Census Commissioner of India. 2011. www.census.gov.in

Internet

12.2.1.13 Kerala has the advantage of submarine cables, which link India to the rest of the world via its coast. Submarine cable systems generally use optical fibre cables to carry international traffic. The optical fibre network of Power Grid covers the main urban areas of Kerala. However, there are no such plans for the midland and the uplands of Kerala due to technical reasons. Thiruvananthapuram and Kochi along with Mumbai and Tuticorin are few of the landing stations of these submarine cables. The TRAI has lowered access facilitation charges for submarine cable landing stations in December, 2012[6]. This is good news for the IT industry in Kerala as communication costs of BPOs and small enterprises have reduced. Kerala has provided 997 out of 999 village panchayats with Broadband, as per the latest Bharat Nirman Report available till June, 2011[7]. It is only behind Puducherry in this regard. The other Southern states are further behind in terms of percentage of achievement of targets.

12.2.1.14 In terms of internet subscribers, Kerala is among the top ten states of India. The numbers of broadband subscribers are double that of narrowband subscribers in Kerala (Table 12.6). While it remains far below Maharashtra, Tamil Nadu, Andhra Pradesh and Karnataka in terms of total number of subscribers, Kerala is marginally better at 4.98 than Maharashtra (4.22)[8], when we calculate Internet subscribers per 100 population. The all India number (1.98) is lower than either of the two states. A note of caution is that the number of Internet subscribers reported by TRAI excludes subscribers who are capable of accessing Internet over phones through data packages. This number (4,470 lakh) is substantially higher than Internet and broadband subscribers for all India as of September 2012. Therefore, one may reasonably conclude that the number of people accessing the Internet over the phone in Kerala would be higher than the Internet subscribers reported by TRAI. Even after inflating the number by including the mobile Internet users, these numbers are fairly low compared to international standards. The latest available number for China is in 2009 and is 8.35 per 100 inhabitants, only for fixed line[9].

Table 12.6: Speed Category- wise data on Internet/Broadband subscribers for Top 10 States, September 2012

[6] Telecom Regulatory Authority of India. 2012. The International Telecommunication Cable Landing Stations Access Facilitation Charges And Co-Location Charges Regulations, 2012. TRAI Notification. December 21.
[7] Department of Telecommunications website. www.dot.gov.in.
[8] The Internet subscriber numbers are from Telecom Regulatory Authority of India for September 2012. However the population numbers are for 2011 from the Census 2011.
[9] International Telecommunications Union.

States	*No. of Subscribers (in lakh)*		
	Narrowband, < 256 Kbps	***Broadband, ≥256 Kbps***	***Total***
Maharashtra	22.59	24.82	47.41
Tamil Nadu	9.58	18.31	27.89
Andhra Pradesh	7.19	15.33	22.52
Karnataka	6.02	14.82	20.84
Kerala	**5.89**	**10.73**	**16.62**
Delhi	4.40	10.64	15.04
Uttar Pradesh	6.50	7.72	14.22
Madhya Pradesh	5.56	5.70	11.26
Punjab	3.50	7.34	10.84
All India	93.3	146.8	240.1

Source: Telecom Regulatory Authority of India.

12.2.1.15 Notably, internet users are typically more than the number of subscribers. The literature uses a 1 subscriber: 5 user ratio. By that ratio, Internet users per 100 persons in Kerala works out to be 25. Table 12.7 shows the Internet users per 100 inhabitants and percentage of Internet users in the other countries. Kerala is substantially above the Indian average but far below the developed countries.

Table 12.7: Fixed Internet Subscriptions and Internet Users per 100 Inhabitants- International Comparisons

Countries	***Fixed (wired) Internet subscriptions per hundred inhabitants, 2011***	***Internet users (per 100 people), 2009***	***Percentage of Internet Users out of total population (%), 2011***	***Facebook Users, (million) December, 2012***
Belgium	32.95	75.2	78	4.9
Brazil	11.64	39.2	45	58.6
China	8.35[1]	28.8	38.30	0.6
Denmark	40.19	85.9	90	3.0
France	36.53	71.3	79.58	25.6
Finland	26.79[2]	83.9	89.37	2.3
Germany	24.23[3]	79.5	83	25.3
India	1.80	5.3	10.07	62.7
Japan	30.61	77.7	79.53	17.2
Netherlands	38.10[4]	90	92.3	7.6
Norway	36.27	91.8	93.97	2.8
Russia	13.60	42.1	49	8.0
Sri Lanka	1.43[4]	8.7	15	1.5
Sweden	34.45[4]	90.3	91	5.0

Countries	*Fixed (wired) Internet subscriptions per hundred inhabitants, 2011*	*Internet users (per 100 people), 2009*	*Percentage of Internet Users out of total population (%), 2011*	*Facebook Users, (million) December, 2012*
United Kingdom	32.74	83.2	82	33.0
United States	27.75[4]	78.1	77.86	166.0

Notes: 1. Data from 2009.
2. Data from 2004.
3. Data from 2005.
4 Data is from 2010.
Sources: International Telecommunications Union, Internet World Stats: Usage and Population Statistics (http://www.internetworldstats.com/) and World Development Indicators

12.2.1.16 The objective of this analysis is to show that while the numbers are impressive in the Indian context, Kerala still has a long way to go before becoming an information economy.

Access to computers as a percentage of total households

12.2.1.17 The Census 2011 shows that in that year, 15.7 per cent of total households in Kerala had computers, but only 6.3 per cent of households had computers with Internet (Table 12.8)[10]. Kerala tops in terms of the number of households having computers among the Southern states. This is not because of its urban areas. In fact its urban figures are lower than those for Karnataka. The story lies in its rural numbers. The percentage share of rural households possessing computers is not only the highest amongst the Southern states but also among the rest of India (excluding Delhi, Goa and Chandigarh). The number of rural households having computers with Internet in Kerala is also the highest amongst the Southern states.

Table 12.8: Percentage of Households with Computers (%), 2011

India/State/ District	*Computer/Laptop*			*Computers with internet*		
	Rural	*Urban*	*Total*	*Rural*	*Urban*	*Total*
Kerala	11.6	20.4	15.7	3.9	8.9	6.3
Andhra Pradesh	4.4	16.7	8.4	0.5	7.1	2.6
Karnataka	5.6	23.6	12.8	0.7	11.0	4.8
Tamil Nadu	4.8	16.9	10.6	1.0	7.6	4.2
India	5.1	18.7	9.4	0.7	8.3	3.1

Source: Census of India website: Office of the Registrar General and Census Commissioner of India. 2011. www.census.gov.in

[10] Census of India website: Office of the Registrar General and Census Commissioner of India. 2011. www.census.gov.in.

But nonetheless, Kerala is far below the rest of the world in terms of computer ownership and Internet (Table 12.9).

Table 12.9: International Comparison: Personal computers (per 100 people), 2005

Countries	*Personal Computers (per 100 people)*
Brazil	16.1
Belgium	37.7
China	4.9
Denmark	69.6
France	57.5
Finland	50
Germany	60.6
India	1.6
Netherlands	85.4
Norway	59.4
Russia	12.2
Sri Lanka	3.7
Sweden	83.6
United Kingdom	75.8
United States	77.9

Source: World Development Indicators

District-wise variations in access to computers

12.2.1.18 Table 12.10 shows the percentage of households that have computers and computers with Internet at the district level from the Census 2011[11]. Inter-district variations are not large in either of these categories. However, inequities seem more pronounced for computers with internet.

Table 12.10: Percentage of Households with Computers by District (%), 2011

India/State/	*Computer/Laptop*			*Computers with internet*		
District	***Rural***	***Urban***	***Total***	***Rural***	***Urban***	***Total***
Ernakulam	15.6	26.9	23.3	6.4	13.5	11.2

[11] Census of India website: Office of the Registrar General and Census Commissioner of India. 2011. www.census.gov.in.

Kottayam	15	23.8	17.5	6.4	11.6	7.9
Pathanamthitta	14.3	25	15.5	5.8	12.6	6.6
Malappuram	13.6	17.9	15.5	3	4.3	3.6
Thrissur	12.8	20.4	17.9	4.6	9	7.5
Kozhikode	12.1	17.6	15.7	3.2	6.5	5.4
Alappuzha	11.6	15.2	13.6	4.4	6.3	5.5
Thiruvananthapuram	11.2	25.5	18.7	3.4	13.3	8.6
Kannur	10.4	18.4	15.5	3.6	7.4	6
Kollam	10.3	15.4	12.5	3.5	6.4	4.8
Kasaragod	9.7	16.1	12.1	2.7	5.7	3.9
Palakkad	8.8	18.1	11.1	2.9	8.7	4.3
Idukki	8.2	24.9	9	2.6	11.4	3
Wayanad	8.2	18.1	8.6	2.4	7.6	2.5
Coefficient of variation	21.2	20.3	27.0	35.4	34.5	41.8

Source: Census of India website: Office of the Registrar General and Census Commissioner of India. 2011. www.census.gov.in

Internet café

12.2.1.19 Other than home ownership of computers, people access the Internet though I,nternet café,s either privately owned or public ones, i.e. the Common Service Centres (CSCs). The CSC Scheme as approved by Government of India in September 2006 for setting up of one lakh Internet- enabled centres in rural areas under the National e-Governance plan (NeGP) is being implemented in a Public Private Partnership (PPP) mode. Kerala has rolled out hundred per cent of its Common Service Centres (CSCs). Other states that have done the same are Arunachal Pradesh, Chandigarh, Gujarat, Kerala, Madhya Pradesh, Manipur, Meghalaya, Mizoram, Sikkim , and Tripura.

12.2.1.20 Kerala was a pioneer in Common Service Centres (CSCs) starting as *Akshaya e-Service Centres* in 2002, which were then absorbed in the CSC program of the Central Government[12]. The Akshaya program served as a model for the Central Government initiatives in the CSC program. The idea originated as an initiative to address the backwardness of Malappuram district, which then spread throughout the state[13]. The modus for this was the establishment of grassroots level ICT centres at the Panchayat/Municipal ward level. The Malappuram Akshaya pilot project that started as a State wide flagship programme was very successful, and it was subsequently declared the first totally e-literate district in the country. With the Malappuram experiment being a big success, Akshaya e-services was implemented in eight districts in the second stage. In the third phase, Akshaya

[12] Mohanan, P. 2004. Akshaya at a Glance. *Information Technology in Developing Countries*. 14(1). International Federation for Information Processing (IFIP) Working Group 9.4. Centre for Electronic Governance, Indian Institute of Management, Ahmedabad.

[13] The Akshaya website has been used as reference for the write-up on these centres unless and until mentioned otherwise. http://www.akshaya.kerala.gov.in/

activities are being rolled out in the remaining districts of the State. On completion of the third phase rollout, the project will provide self-employment to more than 3,000 persons and direct employment to about 3–5 persons in each of the multipurpose community technology centres called Akshaya e-kendras and would bring in an investment of around Rs 100 crores in the State. There are 2,694 e-service centres as of March, 2012[14]. The majority are located in the rural areas. The target is to open 3,180 centres. There will be at least two centres in every village Panchayat. These targets are already being fulfilled. Each e-kendra, set up within 2–3 kilometres of every household, caters to the requirements of around 1,000–3,000 families and makes available the power of networking and connectivity to the common man.

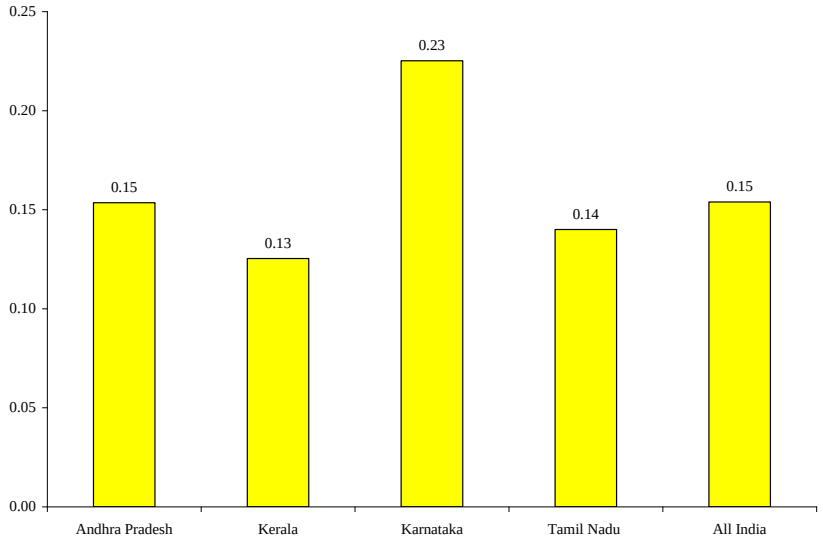
12.2.1.21 The e-service centres provide e-literacy. So far, around 33 lakh beneficiaries have been trained. Malappuram and Kannur districts were already declared 100 per cent e-literate. In addition, Kollam, Kozhikode, Thrissur, and Kasaragod districts have achieved above 90 per cent e-literacy. The centres also conduct e-learning programmes, programmes from Indira Gandhi Open National University, Malayalam Computing, Medical Transcription, and other courses.

12.2.1.22 Twenty-two citizen services are provided through these centres including UID, ration card, e-filing of commercial taxes, SPARK, e-delivery of admit cards, land revenue systems, public grievances redressal, and agency services for implementing insurance. One may also e-Pay at these centres, including payment of utility bills. Together the transactions have crossed the Rs 200 crore transactions mark. Kerala has achieved 100 per cent VAT returns.

12.2.1.23 However, when we examine the number of cybercafés and CSCs together per 1,000 people, Kerala ranks below its peers (Figure 12.3).

[14] Department of Electronics and Information Technology (DeitY).

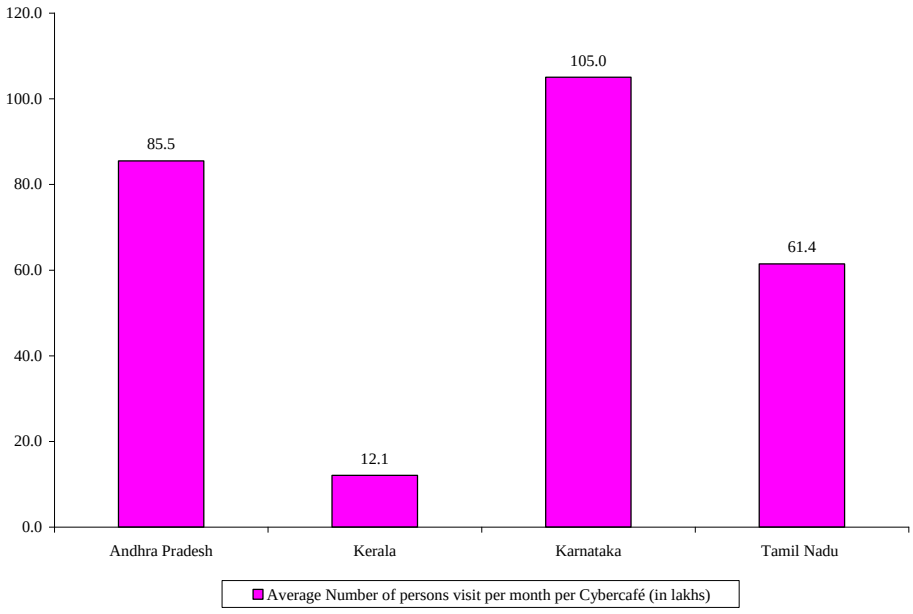
Figure 12.3: Cybercafés and Common Service Centres per 1,000 people, 2011–12



Note: The Common Service Centres are the Akshaya centers.
Source: Cybercafé Association of India and Department of Electronics and Information Technology

12.2.1.24 The average number of persons visiting cybercafés per month is also the lowest for the state of Kerala whether in absolute numbers or relative to the population. The average number of visits in cybercafés per month is only 12.1 lakh as compared to Karnataka (105.0 lakh) and Andhra Pradesh (85.5 lakh) (Figure 12.4).

Figure 12.4: Average number of persons visit per month per Cybercafé, 2011–12 (lakh)

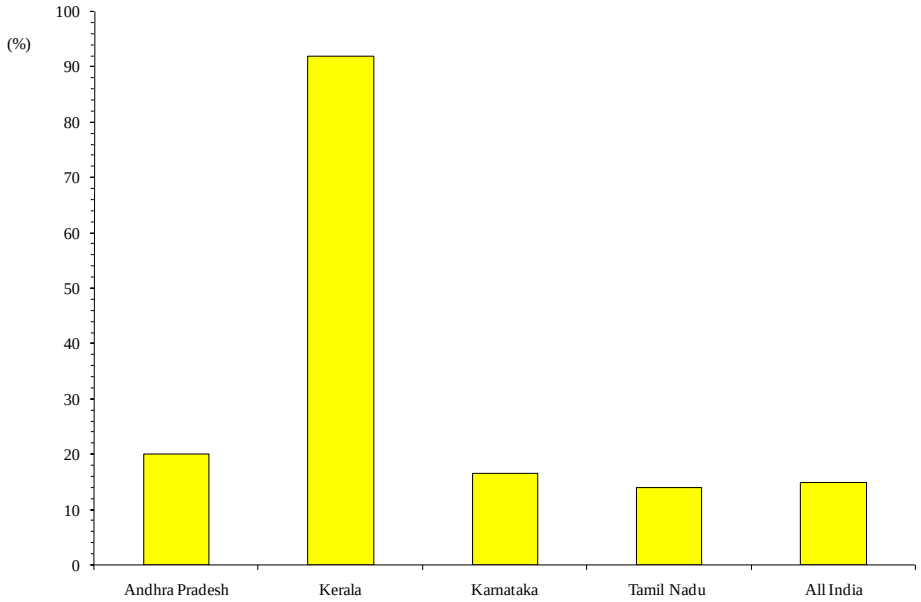


Source: Cybercafé Association of India

12.2.1.25 While viewing it from another perspective, Kerala tops in terms of the percentage share of villages with Internet cafés (91.8%) as compared to other states in 2012 (Figure

12.5)[15]. From 2010 to 2012, these Internet cafés, on an average, were growing at the rate of 5.5 per cent only.

Figure 12.5: Percentage of Villages with Internet Café in 2012



Source: ASER. 2013. *Annual Status of Education Report (Rural) 2012*. ASER Centre, New Delhi.

Computer literacy: A successful programme

IT@School

12.2.1.26 Kerala had set up a policy in 2001 for IT in schools (Box 12.1). It ranges from e-governance programmes, delivering broadband to schools, to developing free educational software and delivering it to schools. IT education is compulsory from class 8 onwards. The data supports Kerala's initiatives in inducting computer education in schools. It scores above the other Southern states in terms of the percent of schools having computers (Figure 12.6). It is only ranked behind Lakshadweep (97.8%) and Puducherry (94.6%)[16]. The District System for Education has started reporting the number of functional computers in the schools that possess computers. In this regard, Kerala scores the lowest. This is supported by the impact study of IT@School programme in Kerala, which shows that while the first phase of the programme has been hugely successful in terms of IT education of both students and teachers,

[15] Daman and Diu is the second in rank with barely 30 per cent of its villages with internet café as per the ASER, 2012. This shows the tremendous achievement made by Kerala in making ICT infrastructure accessible to all its denizens and bridging the urban-rural digital divide within the state.
[16] Similar data are not available for higher education but conversations with stakeholders hint at the lack of ICT infrastructure at this level.

the variation of quality in IT infrastructure lessens the positive impact[17] [18]. Overall, the challenge is to ensure functional IT infrastructure in schools.

Box 12.1: IT@School

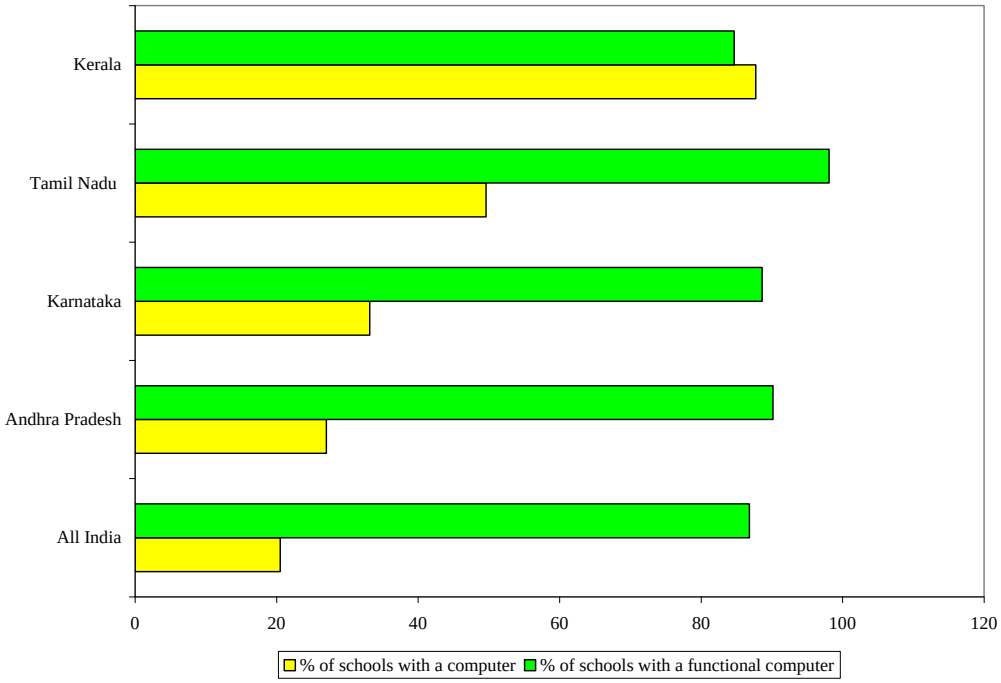
- Initially, the IT@School focused mainly on teacher empowerment programmes. In 2003, Information Technology was made a compulsory subject in class 8.
- The training contents were mostly developed on proprietary software in association with Intel.
- Free software has been developed now for the whole project. Apart from this, several educational free software programmes, like Dr. Geo, Rasmol, K-Tech lab, Geogebra, Chemtool, and Kalcium, etc., are being extensively customised by the Project in developing teacher friendly applications for facilitating complete ICT enabled education in the state.
- The Project has also prepared interactive multimedia CDs, Handbooks & Training modules for ICT as well as Textbooks for IT in classes 8, 9 and 10.
- The Project has implemented several e-governance programmes in the state, which include the online transfer and posting of teachers, single window admission process for plus one admissions, noon meal distribution computerisation, youth festival software, pre metric scholarship, centralised online textbook intent system, total physical fitness programme, etc. All these initiatives are being developed and implemented using free software applications.
- The Project has also ensured that all the valuable content that is developed has reached the schools. This process has eventually resulted in the Free Digital Library at schools.
- With all schools provided with Broadband connectivity, most of this content was also made available online.
- There are three main phases: first phase, 2001–2009 consisted of IT Education; second phase consisted of IT Enablement of education; and the third phase consisted of IT Embedded education.

Source: https://www.itschool.gov.in/otherprograms.php#6.

[17] T.A. Pai Management Institute (TAPMI). 2010. "IT@School Excellence & Quality in Education – No Exceptions – No Excuses": Impact Study Report."
https://www.itschool.gov.in/pdf/impact_study_rpt_TAPMI21072010.pdf. Manipal.

[18] The IT@schools program claims that by 2009 all schools were covered under the program but the DISE data does not support that claim. This mismatch in evidence points towards the need for regular assessment of the ICT infrastructure in schools in the state.

Figure 12.6: Percent of Schools having Computers (%), 2011–12



Note: The percentage share of schools having functional computers is calculated out of total schools having computers.

Source: District Information System for Education. 2012. *Flash Statistics 2011–12*. National University of Educational Planning and Administration (NUEPA), New Delhi

Higher Education

12.2.1.27 The Kerala State Higher Education Council has published an online database of colleges in Kerala[19]. There were 1,063 colleges in Kerala in 2010–11[20]. Using these two data sources, we calculate the share of ICT amenities in the colleges in Kerala. Amongst the amenities as of September 18, 2013, the share of colleges with a computer centre is 73.6 per cent, Edusat connectivity is 15.8 per cent, Internet connectivity is 69 per cent, and online journals is 26 per cent. There is no data on quality. CII and PwC (2012) list the technological challenges facing the higher education in India: (i) absence of effective e-content in regional languages; (ii) low penetration of ICT in higher education institutes; (iii) lack of ICT infrastructure; and (iv) budget constraints[21].

12.2.1.28 Raji and Godsy (2010) examine ICT use among 200 students of Arts and Science Colleges in five districts of Kerala[22]. The survey was conducted in 2008–09. It finds a

[19] Kerala State Higher Education Council website. http://www.kshec.kerala.gov.in/edusearch/scripts/databank_home.php. Accessed September 18, 2013.
[20] University Grants Commission (UGC). 2012. *Higher Education in India at a Glance*. www.ugc.ac.in New Delhi, India. 21st March.
[21] Confederation of Indian Industry and Pricewaterhouse Coopers Private Ltd. 2012. *Taking Stock: A sector wide scan of Higher Education in India*. Pricewaterhouse Coopers Private Ltd., New Delhi, India. October.
[22] Raji and Godsy. 2010. *ICT use among the Students of Arts and Science Colleges in Kerala*. Research Report RR1. Society for the Promotion of Alternative Computing and Employment, Thiruvanthapuram, Kerala.

positive impact of the decade old IT@school programme on college students, in the sense that students who went through this free and compulsory programme had exposure to computers. The results indicate a wide gap between boys and girls in their use of Internet across different socio-economic groups. Many colleges do not provide free Internet access to students. Girls more acutely feel problems in Internet access as they are restricted by social norms from visiting Internet cafes. Fewer girls than boys felt confident in using the Internet. Of course, with Internet available over mobiles, the results may have improved.

Training Programmes

12.2.1.29 Kerala has forged ahead with offering a Post-Graduate diploma in e-Governance from the Indian Institute of Information Technology and Management-Kerala (IIITM-K)[23]. The programme focuses on capacity building in e-Governance through developing foundations in IT, Management, Government Process Reengineering and Change Management. The Institute of Management in Government (IMG), the apex training institute of the Government of Kerala has short-term training courses to build up capacity for e-Governance and is collaborating with IIITM-K on long-term programmes[24]. Given the tremendous amount of work that has taken place in e-Governance and m-Governance in Kerala, this area can be developed as a topic of specialisation in the state.

Performance

Widespread usage by wireless subscribers

12.2.1.30Wireless subscribers can either use Global System for Mobile Communications (GSM) technology or Code Division Multiple Access (CDMA) technology. 89 per cent of wireless subscribers in Kerala use the GSM (Global System for Mobile Communications) as of September 2012[25]. The Average Revenue per User (ARPU) per month in Kerala for a GSM subscriber is Rs 125 per month. This is substantially higher than its neighbouring states of Andhra Pradesh (Rs 111), Karnataka (Rs 107), and Tamil Nadu (Rs 105). The total minutes of usages (MOU) per subscriber per month are also higher in Kerala, which is 398 minutes. The corresponding numbers for the other neighbouring circles are lower: Andhra Pradesh (369), Tamil Nadu (335), and Karnataka (362).

12.2.1.31 The ARPU among CDMA subscribers is Rs 67 per month, lower than Andhra Pradesh (Rs 86), Karnataka (Rs 91) and Tamil Nadu (Rs 93). The MOU per subscriber per month in Kerala is at 237 minutes which is similar to that in other states – Andhra Pradesh (242), Karnataka (185) and Tamil Nadu (152). Clearly, the CDMA services are cheaper in the state.

[23] Post-Graduate Diploma in e-Governance. http://www.iiitmk.ac.in/admission/About-PGDeG.html
[24] Institute of Management in Government website.
http://www.img.kerala.gov.in/index.php?option=com_content&view=article&id=595&Itemid=265.
[25] The data in this paragraph and the rest of the section are from Telecom Regulatory Authority of India unless mentioned otherwise.

All India e-Readiness assessment of states has been carried out by NCAER since 2003 based on surveys from states. It is observed that since 2005, Kerala has consistently performed as a leader in the e-Readiness indices. The Akshay e-service centres are a re-sounding success. The IT programme in schools – IT@school and Intel School are well known. The Malappuram district was declared the first district with 100 per cent e-literacy. The IT programme in schools – IT@school and Intel School are cited as case studies for their stellar performances.

12.2.1.32 Kerala has historically been a leader in its adoption of and orientation to telecommunications. According to a report issued by the Government of India's Planning Commission in 2008, Kerala was the "first state in India to automate all telephone exchanges, the first to link the exchanges through STD facility, the first to provide public telephone facilities in all panchayat headquarters, and the first to provide public telephones in every village"[26]. This same report highlights the fact that in 2005 the state's teledensity, or the number of telephones per 100 people, was significantly higher than the rest of India—19.5 in Kerala compared to 9.7 for the country. Diffusion of IT in the state is a reflection of this culture, in part.

12.2.1.33 The ASER (2012) study indicates that 61.6 per cent of rural households in Kerala had at least one person who knew how to use a computer in 2011[27]. The corresponding numbers for Andhra Pradesh, Karnataka, and Tamil Nadu are 10, 12.7, and 16.2 per cent respectively. Goa is the closest state to Kerala in its achievements in this category, at 55 per cent.

12.2.1.34 Therefore, the quality of the programmes leaves some concerns and needs independent and continuous evaluation.

12.2.2 ICT in governance

E- Governance: Extensive Infrastructure

12.2.2.1 Kerala's e-Governance programme is exemplary. The core infrastructure for e-Governance consists of the following:

- **State wide Area Network (SWAN):** SWAN is an advanced telecommunication infrastructure, which is used extensively, for exchange of data and other types of information between two or more locations, separated by significant geographical distances[28]. It will connect all 14 districts, 152 blocks and 1600 remote offices to

[26] Planning Commission, Government of India. 2008. Kerala Development Report. Academic Foundation.
[27] ASER. 2012. *Annual Status of Education Report (Rural) 2011*. ASER Centre, New Delhi.
[28] http://deity.gov.in/content/state-wide-area-network-swan.

the State capital. Out of the 1600 offices, 1400 have already been connected. More than 165 IP phones are already on the network[29].

- **Secretariat Wide Area Network: This** is being established. This network facilitates the information-system services in the offices of the ministers and the heads of all the administrative departments of the government of Kerala located within the Secretariat.

- **State Data Centre:** State Data Centres, established in 2005, consolidate services, applications and infrastructure to provide efficient electronic delivery of G2G, G2C and G2B services[30].

- **State Service Delivery Gateway:** The State Service Delivery Gateway project has been formulated under the National e-Governance Plan (NeGP) to fulfil the vision of providing easy and convenient services to the citizens through Common Service Centre and enabling the State Portal (by implementing the key components of State Portal, viz. SSDG, electronic Form ("eForms"), Application and Computing Infrastructure.

12.2.2.2 Under the NeGP Capacity Building Programme, a State e-Governance Mission Team has been formed for training. The Institute of Management in governance is the apex institution that trains government employees in Kerala. Kerala has also set up an award in e-Governance to reward the best initiatives in e-Governance in the state. Obviously this induces departments to compete with each other to digitise[31]. The government of Kerala is present on social media platforms, starting with the Chief Minister.

M-Governance[32]

12.2.2.3 Kerala is also implementing mobile governance (M-Governance). The M-Governance project in Kerala is a comprehensive project aimed at m-enabling the 90 Government Departments and m-powering the people. The three channels of mobile communication (voice, signalling, and data) and a wide range of technologies (voice applications, applications using signalling channel, and data service based applications) are being used for this purpose. An encapsulated and comprehensive integrated Service Delivery Platform is being created, enabling the Departments to roll out various m-services in a "Plug and Play" fashion. The focus is to build a centralised platform into which the services/solutions for each and every Department can be integrated. The accesses for m-services are being developed from the basic to the smart phone.

[29] United Telecoms Limited website. http://www.utlindia.com/utl/v1/html/group_governance_kswan.html.
[30] Department of Electronics, Information Technology (DeitY), Government of India website. http://deity.gov.in/content/data-centre.
[31] Kerala State IT Mission, Department of Information Technology, Government of India website. http://www.itmission.kerala.gov.in/.
[32] This section is taken from the Kerala State IT Mission, Department of Information Technology, Government of India website. http://www.itmission.kerala.gov.in/.

12.2.2.4 A Unique Short-Code has been developed for the state government. The Short-Code enables the Citizens to pay for the services. Further, an M-Governance Service Delivery Platform (SDP), enabling the departments to easily m-power the legacy applications, has been set up.

The M-Governance Service Delivery Platform established has the following components:

- E-SMS (Short Messaging Service)**:** The official SMS gateway for GoK: The e-SMS is an exclusive SMS Gateway established by the Kerala State IT Mission for use by various Government departments. It is being used by the department officials for intra and inter-departmental communication.
- MMS (Multimedia Messaging Service) Gateway**:** A dedicated MMS gateway, which can be the departments.
- Out Bound Voice Dialers**:** A dedicated Out Bound Calling facility has been set up for M- Governance. The plan is to also provide the facility for recording of voice prompts, transliteration from English to Malayalam, and scheduling of Voice SMS as additional services.
- Bluetooth Kiosks**:** Bluetooth Kiosks can play an important role in information dissemination. Bluetooth Kiosks will be deployed in places like bus-stations, railway stations, and airports. Citizens can turn on the Bluetooth in their handsets and receive information regarding Government schemes, tourism, etc., on their phones.
- Servers**:** Dedicated servers will be deployed for voice applications, MMS/SMS services, and USSD services at the State Data Centre.

E-Governance: Limited usage

12.2.2.5 Usage of these programmes is indicated by the electronic transactions on e-services, which are reported by the NeGP. These electronic transactions are divided in three categories:

Category A: All statutory/non-statutory services in G2C, G2B segment:

- Payment of taxes by citizens
- Payment of subsidies/ Scholarships/ Social welfare transfers
- PDS/Rural development transfers
- Web based self-service e-Gov transactions to citizens

Category B: Utility payments

Category C: Other B2C Transactions:

- All e-Transactions not covered by Categories A and B
- All Category A and B transactions involving multiple visits to counters

12.2.2.6 Table 12.11 shows the electronic transactions in Kerala by category as of January–March, 2013. Kerala is a leader in Category C type of transactions but not in A or B. Andhra Pradesh is the leader in Category A type of transactions, followed by Tamil Nadu. This speaks volumes about the extent of work that has yet to be done by Kerala, i.e. even though people are literate, and facilities exist, usage still seems to be limited, or alternatively there could be reporting problems. There is need to record and report the transactions, programme-wise, to better understand and evaluate the usage and therefore the usefulness of these services.

Table 12.11: Comparison of Electronic Transactions of Kerala

Name of the State	*Category A (Rs 10 lakh)*	*Category B (Rs 10 lakh)*	*Category C (Rs 10 lakh)*	*Total (Rs 10 lakh)*	*Category A per capita*	*Category B per capita*	*Category C per capita*	*Total per capita*
Andhra Pradesh	147	37.17	3.63	188.29	1.74	0.44	0.04	2.22
Karnataka	24.88	11.66	0.33	36.87	0.41	0.19	0.01	0.60
Kerala	6.45	1.26	30.72	38.45	0.19	0.04	0.92	1.15
Tamil Nadu	61.67	5.03	0.01	66.72	0.85	0.07	0.00	0.92
Total	760.09	138.09	136.29	1035.02	0.63	0.11	0.11	0.86

Sources: National e-Governance Program website, http://negp.gov.in/# and Census 2011.

12.2.2.7 The e taal is a recently established web portal for dissemination of e-Transactions statistics of National and State level e-Governance Projects including Mission Mode Projects[33]. It receives transaction statistics from web based applications periodically on near real time basis. The top five states as of 17 September, 2013, are Gujarat, Maharashtra, Andhra Pradesh, Uttar Pradesh, and Haryana. The e-transactions data on state government projects are available state-wise. They show that the number of e-transactions in Kerala has gone up from 9.5 lakh in 2012–13 to 35.7 lakh between April, 2013 and September 16, 2013. The data for the latter period shows that the certificates had the largest number of e-transactions of 26.6 lakh, 35 in utility services and bill payment, 3.6 lakh transactions in transport, four in education, 5.2 lakh in health, 0.1 lakh in e-Procurement, 98 in Industry and Commerce, 2,880 in Passport and Visa services, and 0.2 lakh in other services[34].

[33] The source for the information for this paragraph is from the website: Electronic Transaction Aggregation and Analysis Layer website. www.etaal.gov.in.

[34] FRIENDS (Fast Reliable Instant Efficient Network for Disbursement of Services) is a single window 'no queue' integrated remittance centre, where the citizens have the opportunity to pay all taxes and other dues to the Government, under one roof at no extra cost. An on going project of KSITM, FRIENDS is now operational in all 14 districts of Kerala. FRIENDS accept payments of the Kerala University, MG University, Calicut University, Local Bodies, Kerala State Electricity Board, Kerala Water Authority, Revenue, Civil Supplies, Motor Vehicles, Electrical Inspectorate, and BSNL. Railway reservations can also be made in the three centres at Wayanad, Pathanamthitta, and Malappuram. However, the e-transactions data from e-taal do not show major transactions for education or utility categories. Neither does data reported in Table 12.11.

12.2.2.8 The above analysis shows that Kerala has done well in the e-governance category[35]. However, evidence suggests that the impact of the e-Governance programmes in Kerala Police or other departments do not translate into changes in ground realities. CDS (2010) conducted a field survey of Panchayats in 2009 to understand the demand side aspects of e-Governance and interviewed various stakeholders[36]. The survey finds that there is a mismatch between government claims of supply and the citizens' actual use of those services. For example, 88 per cent of the local elected representatives approached them for speeding up services available in e-mode and 71 per cent of the representatives thought it a worthwhile effort to spend time on it. 97 per cent of the Panchayats in Kerala have prepared a citizen's charter but only 42 per cent are aware of this. There are supply side issues like inadequate training of staff, non-availability of software, etc. The main point that is coming out of this analysis is that there is a difference between government claims and the services actually reaching the citizens, which has to be resolved in the strategic framework.

12.2.2.9 The NCAER has been constructing an e-Governance measure since 2008. It ranks Kerala as being amongst the leaders/aspiring leaders category, but it is ranked lower than its neighbours. The sheer number of e-services and m-services is mind-boggling in Kerala but the impact on all the stakeholders is unclear. The issues of quality are still not thrashed out in Kerala. Data on transactions and usage which can be analysed are not available on a systematic basis.

12.2.3 Use of ICT in economic sectors

12.2.3.1 ICT in economic sectors can be examined through various lenses. The three main lenses include:

- Development of ICT industry.
- ICT adoption in the sectors to increase productivity.
- E-Commerce / m-Commerce, which is buying and selling of goods over the Internet or over the phone, respectively.

Detailed data at the state level are not always available to make a rigorous comparison.

Development of IT industry

12.2.3.2 **Extensive infrastructure:** The development of IT industry has topped Kerala state's agenda for quite some time now. Technopark in Trivandrum is the first and the largest IT

[35] There is difference between implementing programs and the extent of its usage. For example, the Service and Payroll Administrative Repository (SPARK) for Kerala is an Integrated Personnel, Payroll and Accounts Information System for all the Employees in Government of Kerala which was rolled out in 2007. However, evidence based on a yet unreleased survey suggests that less than 20 per cent of employees' salaries are deposited electronically and 100 per cent leave records are maintained electronically. No other employee record is stored electronically. This implies that quality of programs implemented need careful and constant monitoring.

[36] Centre for Development Studies. 2010. "Research Units on Local Self Government". March.

Park in the state. The shift to being an IT savvy state started when the State enacted the Information Technology Act in 2000. Kerala has developed its IT initiatives in a "hub and spoke model". The major IT parks in the state, namely Technopark Trivandrum, Infopark Kochi and Cyberpark Calicut, acts as the IT hub of the state (Table 12.12). The secondary spokes are being developed in other major cities and towns. The government has set up two such parks in Kadakkal and Perinad Grama Panchayats in Kollam District. Kerala State IT Infrastructure Limited (KSITIL) is the main implementing agency of this scheme. This is a Special Purpose Vehicle (SPV), owned 51 per cent by government and 49 per cent by private stakeholders. KSITIL has a land bank of about 1,000 acres that is already in their possession for developing about 10 IT/ITES Industrial Parks/ township.

Table 12.12: Major IT Parks

Name	*Area*	*Type of development*	*Status*
Technopark, Thiruvananthapuram			
Technopark, Phase-1, Thiruvananthapuram	180 acres	Non-Special Economic Zone (Non- SEZ)	Completed
Technopark, Phase- 2, Thirvananthapuram	86 acres	Special Economic Zone (SEZ)	Under progress
Technopark, Phase-3, Thiruvananthapuram	92 acres	Special Economic Zone (SEZ)/ Non-Special Economic Zone (Non-SEZ)	Under progress
Technocity, Phase-4, Thiruvananthapuram	450 acres	Special Economic Zone Status for an area of 47.5 acres	Under progress
Technopark, Kollam	44.46 acres	Special Economic Zone (SEZ)	Under progress
Infopark			
Infopark, Kochi	100.86 acres	Specific Economic Zone for an area of around 80 acres	Completed
Kochi, Phase-II	160 acres	Mix of SEZ and non-SEZ clusters	Under progress
Cherthala	66 acres	60 acres has been notified as a sector specific SEZ	Under progress
Ambalapuzha	100 acres	33 acres notified as Special Economic Zone	Under progress
Thrissur	30 acres	Non-SEZ development	Completed
Cyberpark			
Kozhikode	69.19 acres	SEZ	Under progress
Kannur	25.62 acres	SEZ	Under progress
Kasaragod	99.83 acres	25 acres as SEZ	Under progress
ITES Habitat Centre	0.34 acres	India's first exclusive ITES training centre	Completed
Rural IT Parks / Technolodges	?	Rural IT parks	Planned
Other Parks	?	Private IT Parks	Planned
Smart City – Kochi	250 acres	SEZ	Planned/ Under progress
Muthoot Technopolis	0.00815 acres ?	SEZ	Completed

Source: Kerala State IT Infrastructure Limited and KINFRA

12.2.3.3As a result of government efforts, IT exports increased sharply in Kerala. In 2004–05 they stood at Rs 270 crore. By 2010–11, they increased almost 10 fold to Rs 2,071 crore (Table 12.13).

Table 12.13: State-wise IT exports: 2000−01 to 2010−11 (Rs crore)

State	*2000−01*	*2001−02*	*2002−03*	*2003−04*	*2004−05*	*2005−06*	*2006−07*	*2007−08*	*2008−09*	*2010−11*
Andhra Pradesh	2,017	2,805	3,668	5,025	8,270	12,500	18,582	26,122	31,039	28,675
Gujarat	102	122	105	141	187	247	564	681	1,268	1,251
Haryana	1,450	2,140	2,734	4,292	5,953	8,358	9,287	10,960	12,410	13,651
Karnataka	7,475	9,904	12,350	18,100	27,600	37,000	48,700	55,000	70,375	70,241
Kerala	141	159	165	212	270	452	750	1,201	1,803	2,072
Madhya Pradesh	50	88	107	102	140	189	220	185	198	247
Maharashtra	2,570	4,603	5,508	8,518	11,542	15,500	27,625	35,374	42,361	49,874
Orissa	200	213	260	319	400	465	732	844	1,162	1,253
Punjab	50	70	70	182	267	182	195	228	230	438
Rajasthan	30	45	47	130	200	271	312	275	358	492
Tamil Nadu	2,954	5,014	6,305	7,621	10,790	13,960	20,745	28,295	28,356	28,290
Uttar Pradesh	1,660	2,000	2,542	2,750	3,825	5,476	8,453	10,695	10,264	10,945
West Bengal	250	604	1,200	1,600	2,000	2,500	3,500	4,500	5,129	5,665

Source: Software Technology Parks of India website. http://www.stpi.in/index.php?langid=1

12.2.3.4 Inter-state comparison, however, indicates that Kerala lags far behind the leading states. It does not even form 1 per cent of the country's total exports as per the 2010–11 statistics. The Technopark, situated in a Thiruvananthapuram suburb, Kazhakootam, has about 125 companies, generating about Rs 100 crore in annual revenues. The 3,000 people employed in the Thiruvananthapuram Technopark are at best an average number for a tech city. The latest data available till 2010–11 shows that software exports by the STPI from Thiruvananthapuram forms only 0.96 per cent of the total software exports of India. Overall, Kerala's IT infrastructure does not show much dynamism. Its exports are very low compared to its three Southern neighbours of Karnataka (leader), Andhra Pradesh, and Tamil Nadu (Table 12.13). This is despite the Government of Kerala's continuous efforts to woo the private companies in the IT sector in terms of providing space (land) to the industry.

12.2.3.5 Kerala is a paradox. It was a pioneer and a leader, and in the late 1990s embarked to make ICT a priority in all aspects of the economy and society. In addition to the government's efforts, Kerala has some competitive advantages in the IT sector. It has the highest Human Development Index in India measured in terms of educational and health attainment. In addition, the state also has the advantage of a fairly well developed e-infrastructure. Despite these advantages and its early beginnings, Kerala lost out due to the absence of a growth environment. All the favourable factors have not made Kerala an ICT hub, even nationally.

Adoption of IT in economic sectors

12.2.3.6 The National Manufacturing Competitiveness Council (NMCC) and NASSCOM in their report titled, "A Roadmap to Enhance ICT Adoption in the Indian Manufacturing Sector**"** carried out a survey in 2010 to examine the adoption of ICT in micro, small and medium industries (MSME) in India[37]. It shows uneven adoption of ICT and massive potential for improvement, thereby increasing productivity of industry in India (and Kerala). The report distinguished between "ICT Adoption" and "ICT Deployment". "ICT deployment" refers to the overall usage of ICT within a firm; "ICT adoption" refers to the ICT enablement of the firm's critical business processes. A firm with high ICT deployment levels overall can still have low ICT adoption levels. ICT solutions can be categorised into various levels on the basis of their co-relation with the typical core business processes of a manufacturing firm:

- Basic ICT includes communication, collaboration, HR/payroll management, and finance & accounting.
- Core ICT includes procurement and inventory management, order processing and customer management, quality management, product management, enterprise resource planning, product lifecycle management, and decision support systems.

12.2.3.7 The report found that adoption and usage are high in two areas - communication (57% adoption and 92% usage), and finance and accounting (74% adoption and 75% usage). But other areas, namely, Payment, HR & Management, Order Processing and Customer Management, Procurement/Material and Inventory Management, Process Applications, Quality Management, Centralised System (ERP), and Decisions Support system show a percentage of usage below 20 per cent. Another key result that comes out from this report is that bigger firms tend to make greater use of ICT.

12.2.3.8 Tourism and fishing are two sectors where ICT has been successfully adopted. The state also has programmes for e-health. In other sectors, however, the potential has not been fully captured. A significant challenge is to use ICT in a significant way especially if Kerala wants to be a high productivity economy in the next twenty years.

E-Commerce/m-Commerce

12.2.3.9 E- Commerce is increasingly rising in India. The industry was estimated be worth around $10 billion, though travel-ticket sales alone accounted for $8.4 billion in 2011[38]. Mobile shopping is also increasingly going up and forms almost 25 per cent of e-Commerce.

12.2.3.10 There is very little e-Commerce data. Table 12.11 shows us that the other B2C (Category C) transactions per capita are the highest in Kerala amongst its neighbouring states.

[37] The rest of this section has been used from the above report.
[38] A.A.K. 2012. Sell now, pay later. *The Economist*. April 25. Accessed March 21, 2013.

The eBay Indian Census is used to indicate activity in this sector in Kerala. The eBay Indian Census has been tracking buying and selling transactions on eBay over the last 18 months between July 1, 2011 and December 31, 2012[39]. Its key findings are:

- Kochi, Kerala is ranked twentieth in terms of value of transactions amongst the selected cities.
- Kerala is not included amongst the top ten e-Commerce Hubs.
- None of the top ten e-Commerce companies (listed as of January 2013), like flipkart.com, snapdeal.com, jabong.com, etc. have their headquarters in Kerala.
- Karthikappally, Chirayinkeezhu and Kunnathunad figure in the top ten rural hubs of the country. Rural Hubs are places where eBay users are buying or selling from Indian Rural locations as classified by the Census of India, 2011. Kerala's rural areas seem to have exhibited relatively better performance.

12.2.3.11 Kerala's IT Policy reflects dynamism to keep updated with the latest technologies and bring the maximum benefits of that to all the stakeholders, including industry, business, and government. Despite the best efforts, however, it is not translating into transforming Kerala from being in the backwaters to being in the forefront in the ICT sector in the country.

12.2.4 Low in Innovation

12.2.4.1 The latest R&D expenditure for only twenty one states are available till 2005−06 in the R&D 2007 report[40]. Kerala is ranked seventh, spending 5.3 per cent of its GDP on R&D. It is ranked equally with Andhra Pradesh below Karnataka (ranked second), Gujarat (third) and Tamil Nadu (fifth)[41]. Maharashtra is the leader in this measure, spending 12.3 per cent of its GDP on R&D.

12.2.4.2 There is a growing realisation that innovation is an important aspect of digitalisation. In order to promote innovation, Kerala has established an autonomous university, namely Indian Institute of Information Technology and Management in Technopark, Thiruvananthapuram. It focuses on Computer Science and IT, Computational Sciences, Informatics, and Humanities & Management. It is expected that its location in the Technopark should help interaction between industry and academics, which in turn should foster invention and innovation.

[39] http://shopping.ebay.in/census/index.php.

[40] Department of Science and Technology, Ministry of Science and Technology, Government of India. 2007. "Research and Development Statistics". http://www.nstmis-dst.org/Rndstst07-08.aspx. Accessed April 13, 2013.

[41] Kerala ranks seventh in the e-Innovation category in the e-Development Index developed by NCAER and DeitY. National Council of Applied Economic Research (NCAER) and Department of Electronics and Information Technology, Ministry of Communications and Information Technology, Government of India (DeitY). 2012. "e-Development Index". March 23.

12.2.5 e-Inclusion

12.2.5.1 It has been observed that the ICT sector has created employment opportunities for women and has offered them better economic prospects. Employment rates for women in Kerala were higher in the ICT industry (40 per cent) than Indian averages[42]. It is significant that micro units have been set up under the Kudumbashree programme of Kerala. Approximately 780 women are members of the Kudumbashree IT units and 642 are on contract. A survey of 36 (out of 72) ICT based micro units in Kerala under the Kudumbashree programme[43] during 2008−09 and 2009−10 reveals the following:

- Majority of the units' core activity was data-entry which they received from the government sector. Other activities include, providing IT manpower, providing IT training and, to a much lesser extent, web designing and animation/designing jobs.
- Majority of the enterprises earn between Rs 20,000 to Rs 50,000 per month.
- The enterprises are heavily dependent on Kudumbashree to identify customers and get work.

12.2.5.2 These units are being touted as case studies for inclusiveness. This model needs up gradation, both in terms of scale and business sustainability.

12.3 Strategic Framework

12.3.1 Vision

12.3.1.1 Kerala will be on par with the Nordic countries, which, according to the World Economic Forum ranking, are at the top in terms of ICT development. They are also the most successful across the globe at leveraging ICT. They have fully integrated ICT in their competitiveness strategies to boost innovation. ICT is present everywhere and in all areas of society, such as education and healthcare.

12.3.1.2 Kerala will have a vibrant, innovative and sustainable ICT sector to drive an integrated knowledge economy and contribute to its sustainable prosperity. The state will be 100 per cent e-literate and digitised. In the knowledge economy of Kerala, digital technologies will be used to drive productivity and create new growth opportunities across the whole economy. It will catapult Kerala to the league of major knowledge economies by enabling digitisation of information.

[42] Bajpai, N. and J. Sachs. 2000. India's Decade of Development. *Working Paper Number 46, Center for International Development*. Harvard University, Cambridge, MA, US and
Arun, S., Heeks, R. and S. Morgan. 2004. ICT Initiatives, Women and Work in Developing Countries: Reinforcing or Changing Gender Inequalities in South India? *Development Informatics Working Paper No. 20.* Institute for Development Policy and Management. Manchester, UK.

12.3.2 Mission

"Accelerate development of ICT-enabled solutions to add value in economic sectors with significant global growth potential. The updated ICT strategy aims to help the ICT industry achieve a rate of growth that exceeds the GSDP rate of growth."

12.3.3 Targets

- ICT Infrastructure close to Nordic countries' standards:
  - Hundred per cent of rural households with access to phones.
  - Hundred per cent of households with access to Internet.
  - Hundred per cent of schools with functional computers.
  - Hundred per cent of colleges with access to functional computers on campus and internet connectivity.
- Readiness to use ICT:
  - Hundred per cent of households with at least one person who is capable of using the computer.
- Industry:
  - ICT Exports from Kerala as 5 per cent of total Indian exports from current less than 1 per cent.
  - ICT readiness in MSME Industries.
- The share of ICT in GSDP to increase to 5 per cent from its current negligible share.
- Global competitiveness in R&D capabilities.
- Electronic delivery of services to citizens and business across all departments and functions, so as to achieve the objective of transparency and efficiency.
- Enable 'SMART' (Simple, Measurable, Accountable, Responsive and Transparent) governance through digital workflow and automation systems[44] [45]

12.3.4 ICT Strategies: Digital Kerala by 2030

12.3.4.1 The information economy sector is a significant enabler of other sectors. The use of digital technology and information is a key element of most parts of the economy, which means the strategy has the potential to make a real difference not only in Kerala's IT sector

---

[43] Prakash, C.S.S. 2012. "Kudumbashree ICT Movement: Analysis of Revenue, Customer Acquisition and Competition". *International Journal of Social Sciences and Interdisciplinary Research*. 4. April.

[44] Bajpai, N. and J. Sachs. 2000. India's Decade of Development. *Working Paper Number 46, Center for International Development*. Harvard University, Cambridge, MA, US and
Arun, S., Heeks, R. and S. Morgan. 2004. ICT Initiatives, Women and Work in Developing Countries: Reinforcing or Changing Gender Inequalities in South India? *Development Informatics Working Paper No. 20.* Institute for Development Policy and Management. Manchester, UK.

[45] This is a concept to guide e-Governance initiatives. Department of IT. 2012. *Information Technology Policy 2012*. www.keralait.org. Government of Kerala, Thiruvanthapuram.

but also across the whole economy. The broad approach will be to develop the "ICT eco-system".

Pillar 1: Technology

Capacity creation to build world-class ICT-related research capabilities while increasing the emphasis on commercially valuable research

12.3.4.2 This is going to be a continuously evolving process. Given the current state of affairs, Kerala will need to focus on adapting technologies. Few current examples include, cloud computing and machine-to-machine computing. Kerala should keep a repository of technologies around the world that can then be adapted in the state. However, over the long-run Kerala should be thinking of developing technologies which can then be exported to other states in India and countries. It does not have to be hardware technologies, but can also be software solutions.

- **R&D infrastructure:** Kerala will create a globally competitive research and development environment by promoting suitable R&D infrastructure in those areas that offer the greatest value-added benefits to the economy. It includes both hardware and software solutions. It will also keep a repository of technologies around the world that can then be adapted in the state. The government is already planning to create innovation zones and incubators. These facilities need to be planned in a comprehensive way after a careful analysis of the value chains.

- **Patents:** Since 2000, there has been a continuous increase in the number of patents in the IT sector in India. Until 2008, there were 558 patents filed from India. In 2007, 123 patents were filed but thereafter the number declined. It is observed that majority of the patents were filed by private industry (327) followed by individuals (60). The government sector had only 38 patents. Patents are owned by Indian companies and research centres of foreign companies especially from the US, operating in India to carry out R&D activities. One agenda of the government should be to attract research centres of foreign companies by offering a critical mass of ICT researchers and a conductive environment for R&D. The proposed innovation zones could be used as the platform for attracting these research centres.

- **Convergence of ICT with other areas:** The convergence of various areas with ICT will trigger off a "revolution" of innovations, new markets, and applications in the 21st century. The competitive ability of countries, regions, and companies in the next 10–20 years will be influenced dramatically by the ability to realize these 'converging technologies'. These emerging opportunities need to be identified and research initiated to explore these possibilities.

- **Awards**: Awards should be given to institutions located in Kerala, which file the maximum number of patents in a year.

Pillar 2: e-Governance Initiatives

12.3.4.3 *A transparent smart e-governance with seamless access, secure and authentic flow of information crossing the inter-departmental barrier and providing a fair and unbiased service to all the stakeholders is the need of the hour.*

- APJ Abdul Kalam[46]

- Department centric to Citizen centric e-governance: From isolated departments to integrated service providers to citizen centric integrated government[47].
- Kerala has made impressive achievements in e-governance. There is now a need to assess e-Governance solutions for quality. The Department of Administrative Reforms and Public Grievances has issued detailed guidelines for Indian government websites. These guidelines need to be adhered to.
- The UN e-Government Development Index talks about the four stages of e-Government evolution from emerging information services to enhanced information services to transactional services to connected services[48]. The Republic of Korea was the best performer in 2012 and is a good model for e-government development for Kerala (Box 12.2).
- Mobile services need to be integrated with e-services as is currently taking place. The key is coordination between all efforts. When a new service is offered, one should immediately think in terms of e and m-service.
- Kerala has done stellar work on e-Districts and Panchayats. It needs to extend that work also to municipalities, especially census towns, which will require careful handling to manage their transition from rural to urban areas.
- Usage of Social media to better deliver services is to be enhanced.
- e-Governance initiatives should be inclusive like further development of Malayalam computing, computing for linguistic minorities, computing for the disabled, etc.
- The government is collecting a lot of data from various areas. However, the current system is extremely tedious as one has to go to various websites to get information. Data visualisation tools may be made available and also be used on the website. They will immensely help in research and analysis and also for transparency. In Germany, for instance, all data is made available at a centralized state website.

[46] Institute of Management in Government website. http://www.img.kerala.gov.in/index.php?option=com_content&view=article&id=595&Itemid=265.
[47] Ali-Khouri,A.M. 2011. An Innovative Approach for e-Government Transformation. *International Journal of Managing Value and Supply Chains*. 2(1). 22–43.

Box 12.2: World leader in e-government development 2012: Republic of Korea

The Government's main website has developed into an integrated portal where citizens can find almost every service they want, on both national and local level. The main government portal is a gateway to services through multiple channels, by theme and subjects. Citizens can also have a customized channel by inputting their own age, gender, and services of interest. Back-office integration across many departments brings together a powerful search engine offering advanced categorizing function, which can list results by websites, services, and news, including at the local level. A key reason for its continued leadership in world e-government progress is the significant development and provision of downloadable mobile applications that are available from its national portal. The cross sector mobile applications for citizens are both iPhone and Android compatible, including for e-Learning, which allows students to learn on their mobile phone in areas such as Social studies, Math and English. For employment opportunities, Jobcast provides information on availability of jobs in the Republic of Korea along with the relevant legislation governing labour.

Source: Department of Economic and Social Affairs. 2012. *United Nations: E-Government Survey 2012, E-Government for the People*. United Nations, New York, 2012

12.3.4.4 **Pillar 3: e-Readiness**

- Kerala is already e-ready. However, quality concerns remain. These concerns will be addressed to achieve world-class quality.

- In order to achieve 100 per cent e-literacy, e-literacy needs to be defined at various levels. Given Kerala's Akshaya e-services program, the numbers indicate highest users of computers in the rural areas in India[49]. However, careful, continuous, and consistent evaluation needs to be done of the denizens' e-literacy abilities to ensure quality by developing and defining standards for e-literacy. Box 12.3 provides an example of how e-literacy or computer usage is defined for students in Maryland, USA.

[48] Department of Economic and Social Affairs. 2012. *United Nations: E-Government Survey 2012, E-Government for the People*. United Nations, New York, 2012.

[49] The e-literacy program has been successful as evidence by the high degree of households having at least one person who knows how to use a computer in rural areas (ASER, 2011) but there is no consistent definition or standards on e-literacy in the state. Establishment of that will greatly ensure delivery of increased quality of the program. The Akshaya website mentions e-Vidya certificate which gives practical oriented training in Microsoft Word, Microsoft Excel, Internet, Malayalam word processor, World Wide Web and Operating Systems. The Basic Computer Literacy course includes the following topics: computer fundamentals, Windows/ Linux Operating Systems, word processing, Internet and email (Akshaya website, http://www.akshaya.kerala.gov.in/index.php/educational-programs/125-three). Box 12.3 defines standards in

Box 12.3: A Companion to the Maryland Technology Literacy Standards for Students

Computer Use

Basic	Intermediate	Proficient

• Log on and off the computer
• Power on and off the computer
• Open and close applications
• Open, save and close files
• Print documents
• Identify parts of a computer
  ○ Computer (CPU)
  ○ Monitor
  ○ Mouse/trackpad
  ○ Keyboard
  ○ CD/DVD drive
  ○ Printer
  ○ Headphones
  ○ Microphone
  ○ Speakers
• Use input device (e.g., mouse)
  ○ Point
  ○ Select/click or double click
  ○ Click/select and hold
  ○ Drag and drop
• Move cursor
• Type/enter letters and numbers
• Recognize and use icons to perform computer and software functions
• Use special function keys
  ○ Delete
  ○ Shift
  ○ Arrow keys
  ○ Space
  ○ Return/enter
	• Locate and retrieve files in various directories
	• Save the same file in multiple locations (flash drive, My Documents, network folders)
	• Recognize and save files in various formats (.bmp, .jpg, .pdf, .html, etc.)
	• Create folders to organize files
	• Rename files
	• Delete files
	• Select appropriate printer and print
	• Choose appropriate page setup features
	• Use multiple ways to accomplish the same task including keyboard shortcuts, icons and menus
	• Use input device (e.g., mouse)
	  ○ Select/right click
	• Use peripheral devices such as scanners, digital cameras, and projection devices
	• Multitask by using Task Bar and or minimize/maximize command or icon
	• Use special function keys
	  ○ Page up/down
	  ○ Home/end
	• Troubleshoot common technology problems
	  ○ Printer queue
	  ○ Not connected to the network
		• Attach and use peripheral devices such as scanners, digital cameras, media storage (e.g., flash drive), and projection devices
		• View file properties to determine memory size
		• Locate and use accessibility features, as needed
		  ○ Magnifier
		  ○ Sticky keys
		• Multitask in a variety of ways
		• Save a compressed file (.zip)

Source: School Improvement in Maryland website.
http://mdk12.org/instruction/curriculum/technology_literacy/ComputerLiteracySkills.pdf

12.3.4.5 **Pillar 4: Stimulate the growth of the IT industry**

- **Integrate IT hubs with health and education hubs:** The hub and spoke model proposed for Health and Education hubs in Kerala in the Vision plan may give a major thrust to the IT sector. The hubs and spokes of IT will be connected with the other hubs and clusters developed in the state. Ann Arbor, Michigan, USA is known as a university town of 114,925 people. All major IT companies, including Google have offices in Ann Arbor. This is not just because of the talent that the

skills rather than knowledge of various programs. This definition of standardised skills and its independent assessment is crucial in the discussion on e-literacy in Kerala.

University of Michigan offers but also because of huge domestic demand created by the University system. University of Michigan requires massive amount of software development in all aspects – not just for administrative purposes but also for teaching and research. This gives a push to the ICT sector. The implication is that there needs to be dynamic linkages between education, health, and IT in Kerala. This will be more sustainable and less vulnerable to global changes. In this dynamic scenario, Kerala will be able to build an innovative, entrepreneurial environment with start-ups. Unless these linkages are established within the state, 3,000 technology startups cannot be attracted by 2020 as envisaged in the IT Policy 2012. Further, Kerala with its natural advantages coupled with an innovative, dynamic and entrepreneurial environment can hope to attract the best brains from around the world who might be willing to make Kerala their own home, thereby having a multiplier impact on Kerala's economy. Kerala will develop niche-areas like software applications and hardware related to health and education since that is going to be the focus of the Kerala government in the future decades. A mutually reinforcing relationship between innovations in health and IT will spur innovations in ICT and, in turn, will spur dynamism for both sectors.

- **SMART Business rules:** Promotion of start-ups requires SMART business rules. Google, Facebook were all started by people from the University campuses in the USA. Easing business regulations helped their growth. The government recognizes the power of creating a healthy environment for intellectual and innovative thinking. It will put in place rules that are simple, measurable, accountable, responsive, and transparent. Singapore is a role model for that purpose.

12.3.4.6 **Pillar 5: Promotion of IT content across the economy**

- Knowledge economy does not mean the setting up of high tech industries. Instead, it means increase in technology content of all types of industries. The government will need to be industry specific and target the right audience. Since adopting ICT requires investment in both time and financial resources, government will have to identify the early adopters. Exporting firms are the right candidates for it. They need to be given training and the right incentives to adopt IT. This will impact other firms through supply chains. Similarly, some industries are more likely to adopt ICT. For instance, the logistics industry and R&D companies can be encouraged in Kerala. This will also increase demand for IT workers. Further, e-commerce and m-commerce activities can be encouraged through the logistics industry. Direct policy interventions may also encourage firms to adopt ICT tools to meet policy requirements.

- ICT adoption can also involve building an industry or export portal. For example, Taiwan's Council of Agriculture launched several websites to provide a marketing channel for Taiwan's agricultural producers. AgExporter Web is a B2B website

that connects importers to Taiwanese producers. Similarly, the Korean government created the Korean Marketplace Website to showcase products of Korean SMEs to global buyers. Local SMEs can easily connect to the global network by posting offers to buy or sell products. The site hosts over 20,000 homepages of SMEs and e-catalogues of over 120,000 products.

- Backward linkages between industry and services, such that ICT manufacturing will be encouraged in Kerala. For instance, if Kerala develops a specialization in wireless medical services, then industry can manufacture the devices required for these services.

- Some examples of the ICT tools providing direct services in specific sectors are: e-education, e-learning, e-health, e-tourism, smart grids, and CAD-CAM.

12.3.4.7 **Pillar 6: e- Inclusion: Continue the good work**

e-Inclusion policy needs to be an integral part of the ICT policy. It promotes the use of ICT to overcome social exclusion, and improve economic performance, employment opportunities, quality of life, social participation and cohesion. ICT should be used as a tool to target the marginal groups in Kerala like the minorities, women, and senior citizens. The current Kudumbashree programme has only limited impact, with barely 1700 women employed directly or indirectly. Some proposals for the future are as follows:

- Promote rural call centres**:** The ICT micro units can be used as call centres. On the request of the Karnataka State Electricity Board to set up their call centres, Infosys set one up in a rural area, which has proved to be a fast growing call centre. With cost cutting by companies, these centres may turn into profitable ventures for the companies. The Kudumbashree programme can also be treated as an arm for Corporate Social Responsibility of IT Parks.

- The Kudumbashree and similar type of programmes can be integrated with small scale industry to market products across India and abroad. From the e-bay survey, it is known that Kerala houses the top ten rural hubs in marketing some products. As the economy expands in various ways, the marketing of specialty products can be enhanced with workers trained in ICT. For example, organic textiles, organic vegetables, organic rice, coir products, etc., can all be marketed over the Internet or phone through the Kudumbashree and other similar programmes. This can be a win-win situation for all the people involved. A project- based approach may be initiated to promote rural BPOs and call centres.
- Government will set up departmental Call Centres in rural areas to enable the citizens to interact with the Government for accessing various services and to expedite the redressal of grievances.
- Special programmes need to be developed for senior citizens. They need more handholding in using the programmes. Community centres in urban and rural

areas should be encouraged to train senior citizens, even allowing for repeated visits, at a low cost, to make them comfortable and confident in the use of computers.

- Libraries are a hallmark of civilized societies. It is recommended that a library network system be developed throughout Kerala. Kerala should think ahead in terms of a digital library. These libraries have proved to be a good place for instruction in the West. Case studies also show that ICT training is being given to women in these libraries in developing countries as well (Box 12.4).

Box 12.4: Empowering Women and Girls through ICT at Libraries

The Northern Regional Library in Tamale, Ghana established a programme that provides technology training on internet, web 2.0 uses, and search techniques, along with leadership development. The 3-month programme trained 125 young women. The library instituted training hours to make it easier for girls to attend the training while still working during the day. In addition to this training programme, the Northern Regional Library also provides general computer and internet access for the community, hosts regular events on technology, and creates a space where female patrons can participate.

A library in Bogota, Colombia offers young girls aged 5-18 access to not only books and literacy programmes, but also to computers, the internet, and technology training.

Librarians in the southern Ukraine city of Zaporizhia saw an opportunity to help their community when they noticed that many girls were falling prey to drug abuse and other unhealthy choices. They launched a programme to provide girls with ICT training, career advice, and an overall support network. The programme offers basic computer training, as well as more specialized technology training in professions of interest to the girls.

A library in Copán, Honduras offers technology training and digital literacy programmes to the girls and women in their community. Many girls who have been trained at the library later became library volunteers themselves, training other people in the community—particularly girls and women—in ICT and digital literacy. The training has improved school performance and enhanced the education of many, leading more girls to stay in school and actively seek out more educational opportunities.

The National Library of Uganda has introduced an ICT training programme designed for female farmers. After conducting background research in local communities, the library found that female farmers have many unmet information needs, and would benefit from access to weather forecasts, crop prices, and planting information, particularly in local languages. This programme empowers women farmers and increases their economic well-being through technology skills, even helping them set up online markets for their crops. In addition to in-person training, the programme also provides agriculture information to participating women through mobile phones and text messages.

Source: Libraries Powering Development website: http://www.beyondaccess.net

12.3.4.8 **Pillar 7: Environment**

- **Move from parks to integrated smart townships:** The concept of IT/Education/Health Parks should give way to smart townships. These townships will be managed with the aim of sustaining them as a place of vitality, liveability, and spatial interactivity for the residents. Further, the IT Parks will be green in nature. It is not enough to just have trees. The water needs to be harvested and re-cycled. Water bodies need to be cleaned regularly. Green spaces for walks/bicycling can be built around the water bodies that are flowing through the Green Parks. The buildings themselves should be green in nature, following the latest building management techniques to preserve energy. The parks should try and generate their own renewable energy. Waste management, and waste recycling facilities need to be adopted. Selected areas within the parks can be used for organic farming, especially vegetables and flowers. Areas can be used for composting, which can then be used for growing vegetables and flowers. In this way, people working in the areas will not only have access to fresh green organic vegetables, but also will give a fillip ICT applications in agriculture in the process.

- **E-waste management policy:** This is especially important as Kerala has very little land. The four R Policy of reduce, reuse, recycle, and recovery needs to be used to re-cycle electronic products. The e-waste (Management and Handling) Rules have been implemented from May 2012 onwards but Kerala should try and improve upon that with a State e-waste Policy. Further, recycling of waste can become an industry in itself, like it is in Germany. Recycling rare earth recovered from used computers can become an export item for Kerala. Given the major thrust in ICT in the future years, proper management of this problem is key in Kerala. Further, one needs to strategise such that this becomes Kerala's industry thereby promoting growth and employment in this sector in the state.

12.4 Implementation

12.4.1 Institutions

- Implement Central Government laws, if not already implemented like the IT Act 2008;
- Create legislation/rules for Electronic Service Delivery Act;
- Fine- tune Data Policy: Given the significant ongoing digitization, determine how data is going to be maintained and protected?
- Ensure that the Privacy Law protects the privacy of data, especially data relating to citizens ;
- Implement a Cyber Security Policy;

- Extend Knowledge Repository Policy: The Knowledge Repository Policy of the Secretariat needs to be extended everywhere;
- e and m-enable Right to Information with archival policy.

12.4.2 Monitoring and evaluation

12.4.2.1 The ICT indicators that may be collected by the government, and monitored and evaluated are as follows (Box 12.5). Kerala needs to maintain them on a continuous basis, at regular intervals, district wise.

Box 12.5: ICT Indicators

ICT Sector

- Percentage of the ICT sector in GDP
- Percentage of the ICT personnel in total employment
- Revenue expenditure (BERD) of businesses in ICT sector as % of total Revenue expenditure

Broadband and Connectivity

- Broadband connections to individuals and enterprises
- Telephone connections
- Computers
- Access to Internet

ICT usage by individuals

- Individuals who have carried out Internet- related activities
- The purpose of using ICT
- Average time spent

ICT usage by enterprises

- Share of enterprises' turnover on e-commerce
- The type of usage

e-Public services

- E-government usage by individuals and enterprises

E-Commerce by individuals and enterprises

- Individuals having ordered/bought goods or services for private use over the Internet in the last three months

E-Skills of Individuals

- The type of operations individuals can perform on computers based on how e-literacy is defined

12.4.3 Capacity Building

12.4.3.1 **Government Employees:** CDS (2010) points out that lack of capacity is one factor which is hindering effective implementation of the e-Governance programme in Kerala.

- If not mandated, rules may be changed for hiring right from the clerical level, so as to make minimum knowledge of ICT a prerequisite for hiring.
- Orientation sessions for new employees should include an ICT course so that all are brought to the same level.
- Regular ICT training for people from clerical level to leadership level, including Principal Secretary and Secretary.
- Regular ICT training for political leaders at the local level, including Municipalities and Panchayat leaders. The training should include a module on e-Governance courses. These courses will not be a one-time activity but a regular recurring activity. Ideally, the local representatives should be provided with laptops or tablets for official use that is to be returned when they are not in office.
- Other public and private universities should be able to offer courses (recognisable by Government) in e/m-Governance.
- The course content should be regularly revised, especially given the changing nature of the technology.
- The training programmes should be evaluated regularly. The quality of the programme will be assessed on whether the officials are able to fulfil the tasks that are expected of them. The courses can be developed accordingly.

12.4.3.2 ICT enabled and embedded education, R&D and innovation initiatives to deepen within the economy. With its comparative advantage in capacity building program such as the e-Governance Diploma program, Kerala may even highlight this program to attract students from all over the country and world to its educational institution.

12.5 Conclusion

12.5.1 ICT is the lynchpin of the Knowledge Economy that Kerala aspires to build over the next twenty years. It will be integrated with every aspect of the state economy. The state will improve on its e-Readiness to match the standards of the Nordic countries. Citizen centric integrated e-Governance activities will bring the denizens a better quality of life. Kerala will develop comparative advantages in newer areas. ICT and ICT-enabled goods and services will be the major exports of the state.

CHAPTER 13

URBAN and RURAL DEVELOPMENT STRATEGY: STATE SPATIAL STRATEGY

Areal re-classification of areas in Kerala has led to a massive increase in urbanisation between the last ten years 2001 and 2010. The forecasts suggest that further urbanisation will take place over the next fifteen years. Rapid urbanisation poses daunting challenges in infrastructure, with the resulting environmental and social problems. The strategy forward will be based on a holistic approach of developing a "Kerala State Spatial Strategy" within the framework of the Perspective Plan 2030. The State Spatial strategy will safeguard areas of state interest and provide guidelines aimed at maximising the efficiency of human settlements and other productive efforts and enhancing rural urban complementarities. Mixed land use, developing smart, compact, clean and green cities will be the focus of this strategy. Kochi is envisioned to become a global city by 2030. The 4R maxim – reduce, reuse, recycle and recover will be adopted in all areas. Water and sanitation facilities, transit oriented development with emphasis on development of pedestrian and bicycle friendly roads and provision of public transport are elements of urban development. Providing housing for the poor through various models is suggested to achieve the goal of inclusive growth in urban areas. Improved urban governance and improving the revenue base of urban local bodies are suggested to deliver an improved quality of life to the denizens of Kerala. It is recommended that rural areas develop competitiveness in agriculture and rural areas and diversify non-farm income based on the spatial strategy. Smart, clean and compact villages will be developed.

13.1 The Setting

13.1.1 Kerala stands out from the rest of the country in its nature and pace of urbanisation and the resulting challenges to urban development. Urbanisation, as measured by the share of the urban population of the state, has experienced a tremendous increase from 26.39 per cent in 1991 to 25.96 per cent in 2001 to 47.72 per cent in 2011[1]. The past 10 years saw a jump in urbanisation in Kerala, which is missing from the Indian numbers. The corresponding numbers for India were 25.52 per cent in 1991, 27.78 per cent in 2001 and 31.16 per cent in 2011.

[1] The source for all population and urbanisation numbers are from the following source unless mentioned otherwise: Census of India website: Office of the Registrar General and Census Commissioner of India. 2011.

13.1.2 Considering that the economy has been growing at a rate of more than 7 per cent for the past 25 years, the pace of urbanisation not unexpected. However, the nature of urbanisation in Kerala is quite different. In general, urbanisation is accompanied by economic and social transformation. Towns and cities are engines of growth in not only creating skills and wealth for the nation, but also in generating employment for migrants from rural areas. Cities play a crucial role as a hub for economic and innovative activity. Large concentrations of people and goods provide increased opportunities for creativity, larger labour markets, higher levels of productivity and cultural and political opportunities. The productivity benefits they provide to business are important for the regional and national prosperity of an economy.

13.1.3 The growth of urbanisation in Kerala is not fuelled by growth in the major cities but by the growth of census towns. Urbanisation in Kerala has picked up due to the re-classification of rural areas into urban ones. This, in turn, has resulted in a rural-urban continuum especially along coastal lands. The cities of Kerala still hold an attraction in terms of jobs, but people travel to work from the outskirts partly because of the superb rural road network in the state. Census 2011 shows that the major cities show a decline in population, whereas it is increasing in census towns. Urban sprawls are a direct consequence of this growth process, which in turn have both economic and ecological consequences. The cities themselves have very low density.

13.1.4 Rapid urbanisation has posed daunting challenges due to insufficient investment in basic services such as water supply, sanitation, transport and power and civic administration, with the resulting environmental and social problems. The situation is exacerbated by unemployment, overcrowding and the growth of slums. This urgently calls for strategic urban planning and urban development, not just in terms of infrastructure but also capacity building of people to meet the challenges.

13.1.5 The Department of Town and Country Planning of Kerala has recently prepared a report, "State Urbanisation Report Kerala 2031" (henceforth, SURK 2012)[2]. As part of the preparation of this report, it undertook an extensive study of the scattered development pattern of the state, its development issues and the influence on urbanisation in the state. The highlights of its recommendations are as under:

- Kerala should develop a settlement policy that will prevent urbanisation of adjacent suburban areas, thereby saving eco-fragile and fertile farm fields from urban construction.
- Kerala will have five urban corridors in the next two decades: Thiruvananthapuram–Kollam, Pathanamthitta–Kottayam, Alappuzha–Ernakulam–Thrissur–Palakkad,

[2] Department of Town and Country Planning, Government of Kerala. 2012. *State Urbanisation Report Kerala: A Study on the Scattered Human Settlement Pattern of Kerala and its Development Issues*. March.

Malappuram–Kozhikode and Kannur–Kasaragod corridors. These corridors will avoid areas that are environmentally fragile and are used for agricultural purposes. This will enable Kerala to spread its development services to all corners of the state.

- In two decades, Kerala will be a state with 20 mid-level towns and 86 small towns apart from the urban corridors.
- The aim of town planning in Kerala should be a compact urban form.

13.1.6 The present report on the State Perspective Plan 2030 carries forward these proposals as part of the overall development of the state. It proposes that given the settlement peculiarities of the state, Kerala must have a "Spatial Strategy" with an integrated framework for urban and rural development.

13.2 Patterns of Urbanisation in Kerala and Emerging Challenges

13.2.1 Trends

Urban explosion during the past decade

13.2.1.1 Kerala has had a unique experience in urbanisation compared to the rest of the country. Until 2001, the level of urbanisation in Kerala was similar to that of India. In fact, the level of urbanisation was slightly lower in Kerala (25.96%) in 2001 versus India (27.78%). Between 2001 and 2011, urbanisation skyrocketed in Kerala. The decadal growth of the urban population between 2001 and 2011 was 92.7 per cent and the rural population declined by 25.6 per cent. The Average Exponential Growth Rate (AEGR) of Kerala between 2001 and 2011 was 6.56 per cent as opposed to India at 2.76 per cent (Table 13.1).

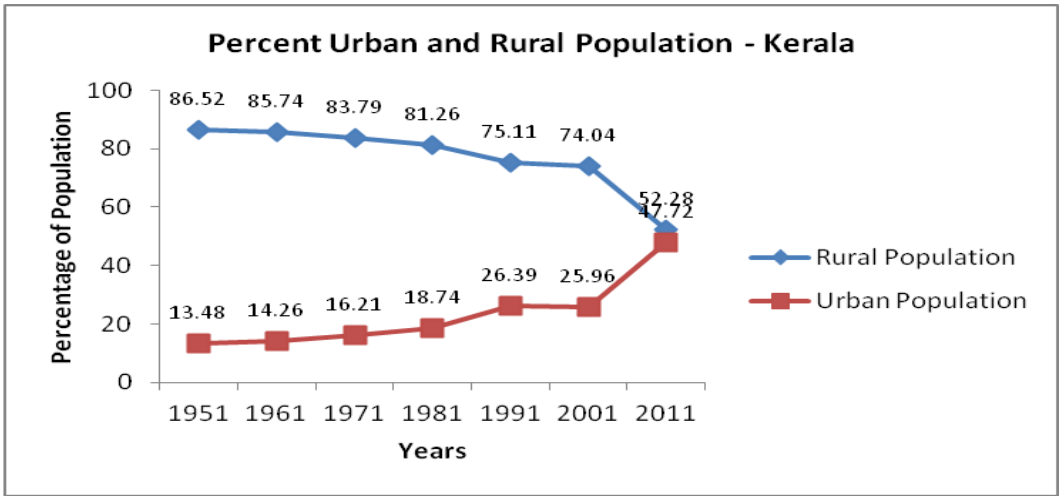
Table 13.1: Annual Exponential Growth Rate of Kerala and India (%), 1951–61 to 2001–2011

Year	***AEGR***	
	Kerala	***India***
1951–61	3.25	2.34
1961–71	3.16	3.23
1971–81	3.15	3.68
1981–91	4.80	3.22
1991–2001	0.74	2.73
2001–2011	6.56	2.76

Source: Census of India website: Office of the Registrar General and Census Commissioner of India. 2011.

13.2.1.2 Consequently, urbanisation increased from 25.96 per cent in 2001 to 47.72 per cent in 2011. This sharp increase in the level of urbanisation is depicted in Figure 13.1.

Figure 13.1: Composition of Rural and Urban Population in Kerala: 1951–2011(%)

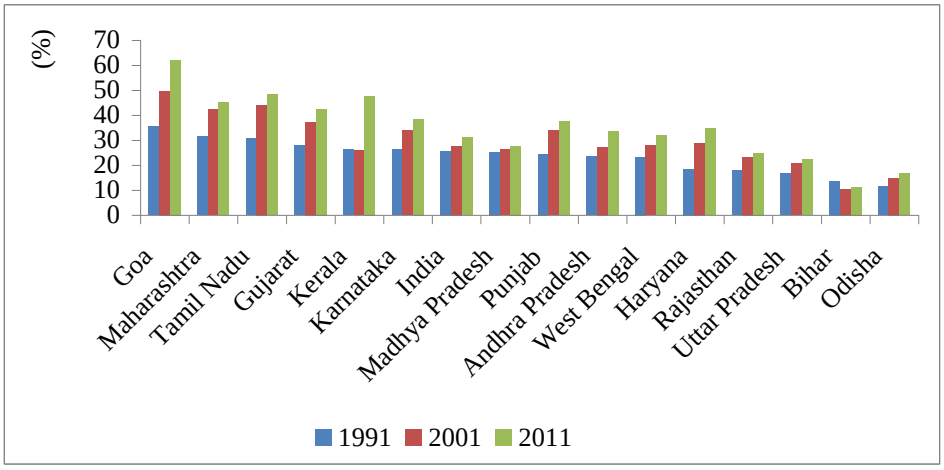


Source: Census of India website: Office of the Registrar General and Census Commissioner of India. 2011.

Highest growth in urbanisation among Indian states

13.2.1.3 Among the major Indian states, Kerala recorded the highest growth in urbanisation over the past decade (Figure 13.2). In 1991, it was the fifth most-urbanised state in the country. By 2001, it was relegated to the eleventh position among 15 states. Over the past decade, however, it raced to catch up with other states and leapfrogged most of them to be ranked second, just behind Goa.

Figure 13.2: Level of Urbanisation in India by State: 1991, 2001, 2011

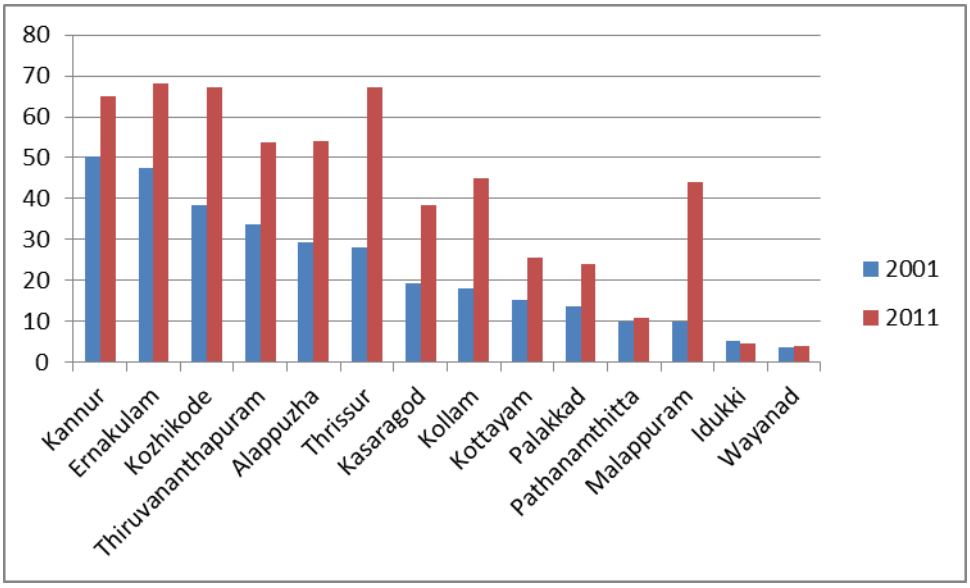


Source: Census of India website: Office of the Registrar General and Census Commissioner of India. 2011.

Urban explosion is widespread across the state

13.2.1.4 In 2001, in only six districts the percentage of the urban population was above the national average. These were Kannur, Ernakulam, Kozhikode, Thiruvananthapuram, Alappuzha and Thrissur. In all other districts, it ranged between 10 and 20 per cent. In 2011, the picture changed. All the districts recorded expansion in the urban population. This increase varied from 15 per cent to 40 per cent across districts. Malappuram witnessed the fastest increase in urban population, from 10 to 40 per cent, on account of the formation of 39 new census towns. Further, Kollam, Thrissur, Kottayam, Kasaragod, Palakkad and Kozhikode had above 5 per cent growth in the level of urbanisation. Overall, Ernakulam emerged as the most urbanised district of Kerala, with 68.1 per cent of its population living in urban areas, followed by Thrissur, Kozhikode and Kannur with levels of urbanisation above 65 per cent. Idukki and Wayanad remained the least urbanised districts (Figure 13.3).

Figure 13.3.: District-wise Level of Urbanisation: 2001 and 2011 (%)



Source: Census of India website: Office of the Registrar General and Census Commissioner of India. 2011.

Urban explosion is likely to continue

13.1.2.5 Urban areas are likely to grow further. SURK 2012, which has projected the urban population for the state of Kerala, provides two estimates. In the first case, the existing trend of urban population growth is assumed to continue. In the second case, the average growth rate of the urban population is assumed to remain the same in the next two decades. In both cases, by 2031 the level of urbanisation will exceed 90 per cent.

13.1.2.6 On the other hand, the NCAER has used the UN methodology of population projection to calculate the rural and urban population of Kerala for the years 2012−31. It shows that for the year 2025, the share of the urban population works out to 63.4 per cent and by 2031 it is likely to increase to 68.87 per cent (Appendix A.13.1). The various estimates indicate that the urban population is projected to grow over the next 20 years and, at the minimum, 70 per cent of the population in Kerala will be living in urban areas.

13.1.2.7 This sudden explosion of urbanisation has posed challenges in the provision of urban infrastructure. These challenges are likely to be compounded by the unique pattern of settlement and urbanisation in Kerala.

13.2.2 Patterns of settlement and urbanisation

Unique pattern of settlement

13.2.2.1 Kerala's settlement patterns differ widely from the rest of the country, where rural hamlets are separated from urban settlements by vast open areas. In Kerala, there is a continuous spread of settlements with not much open area separating them. It is, thus, a rural–urban continuum. This dispersed settlement pattern can be attributed to historical trends, a preference for homestead-type residences and comparatively developed infrastructure in rural areas. No rural settlement is far from a motorable road. Moreover, the linear shape of the state had made it possible to extend fairly good communication facilities throughout the state. However, this poses a problem for policymakers because in terms of planning, when scarce resources are spread thinly over the entire area, the accruing benefit is marginal.

Patterns of urbanisation

13.2.2.2 Kerala shows marked peculiarities in its patterns of urbanisation. In general, an increase in urban population growth rate is the result of over-concentration in existing cities due to a natural increase in population or migration from rural areas. Growth in urban population is due to the areal reclassification as per SURK 2012.

- There are 5 municipal corporations and 60 municipalities. Out of that 12 are first grade, 22 second grade and 26 third grade councils as per Census 2011[3].
- Increase in the number of urban areas (urban areas is defined in Box 13.1)*:* The rapid increase in urban population in Kerala can be explained by the rise in the number of villages designated as towns. These are termed Census Towns (CTs). In 2001, there were 60 statutory and 99 CTs, which adds up to 159 towns. Over 60 per cent of the towns (76% CTs) were concentrated in Kannur, Thrissur, and Ernakulam. In six districts, namely, Wayanad, Idukki, Pathanamthitta, Thiruvananthapuram, Kollam and Malappuram, no village was designated as a CT. In 2011, the scenario changed. The number of statutory towns was reduced from 60 to 59, whereas the number of CTs rose to 461 (an increase of 362). . In 2001, six districts had no CTs, but in 2011 CTs proliferated in all the districts with the exception of Idukki and Wayanad. Ernakulam, Kannur and Thrissur continued to dominate, but their share declined to 50 per cent.

13.2.2.3 These new census towns are unprepared for the changes that inevitably accompany rapid urbanisation. Urban infrastructure build-up is going to be a key factor in meeting the urban challenge and one has to plan ahead in a manner that it is "green". A major challenge is to put in place the development of the census towns in a planned manner.

Box 13.1. Definitions

Urban areas: An urban area can be defined in a number of ways – legal, demographic or economic – but all towns have the basic characteristics of being spatial concentrations of people and economic activities. In India, the definition of 'urban' given by the Census of India, which is generally accepted, is as follows:

(i) A minimum population of 5,000
(ii) At least 75 per cent of the male working population engaged in non-agricultural pursuits and
(iii) A density of population of at least 400 persons per sq.km.

Urban Agglomeration: An Urban Agglomeration (UA) is a continuous urban spread constituting a town and its adjoining urban outgrowth, or two or more physically contiguous towns together and any adjoining urban outgrowth of such towns. In some cases, railway colonies, university campuses, port areas, military camps, etc., would have come up around a city or statutory town outside the statutory limits but within the revenue limits of a village or villages contiguous to the town. Each such individual area by itself may not satisfy the minimum population limit to be treated as an independent urban unit but deserves to be clubbed with the town as a continuous urban spread.

[3] Department of Town and Country Planning, Government of Kerala. 2012. *State Urbanisation Report Kerala: A Study on the Scattered Human Settlement Pattern of Kerala and its Development Issues*. March.

In the 2001 Census two more conditions were added to the concept of Urban Agglomeration.

(i) The core town or at least one of the constituent towns should necessarily be a statutory town and

(ii) The total population of all the constituent units, i.e., towns and outgrowths of an urban agglomeration, should not be less than 20,000 (as per 1991 census).

The following are the possible different situations in which urban agglomeration would be constituted:

(i) A city or town with one or more contiguous outgrowth;
(ii) Two or more adjoining towns with their outgrowths;
(iii) A city and one or more adjoining towns with their outgrowths, all of which form a continuous spread.

Census towns: A census town lacks a notified municipal entity, but satisfies the criteria of urban areas.

Statutory towns: Urban areas with notified municipal entity for governance.

Class I UAs/Towns: UAs/Towns are grouped on the basis of their population in the Census. A UA/Town that has at least 1,00,000 persons as population is categorised as Class I UA/Town.

Source: Census of India website: Office of the Registrar General and Census Commissioner of India. 2011.

- Urbanisation of the peripheral areas of existing major urban centres**:** As discussed above, the number of towns increased manifold between 2001 and 2011, resulting in an urban explosion. However, most of these towns were under the jurisdiction of urban agglomerations or UAs (Box 13.1). In 1971, even after the concept of urban agglomeration (UA) was introduced, no UA was formed in the state. It was only in the 1981 Census that nine UAs were formed, and their number in the 1991 Census increased to 16. The number of UAs increased to 17 with the addition of Kasaragod (UA) in the 200l Census and then to 19 in 2011. UAs account for about 93.74 per cent of the urban population.

13.2.2.4 The percentage share of the urban population that resides in the urban agglomeration population is 100 per cent for the districts of Ernakulam and Kannur, and for the other districts as well, the share of UAs to the total urban population in the district is over 84 per cent (Table 13.2). Most of the 362 new census towns that have emerged in and around existing statutory towns are becoming part of UAs. This also explains the fact that over 94 per cent of the population in urban Kerala is accounted for by UAs. Of the 17 UAs in 2001, 13 were Class I

and 3 were Class II UAs. In 2011, 18 of the 19 UAs were Class I UAs.

Table 13.2: Urban Population Residing in Urban Agglomerations is very High in Kerala (%), 2011

S. No.	***District***	***Share of Urban Agglomeration Population to Total Urban Population in the District (%)***	***Urban Agglomerations***
	Kerala	94.2	
1	Ernakulam	100	Kochi, Kothamangalam
2	Thrissur	94.3	Thrissur, Chalakudy
3	Kozhikode	97.9	Kozhikode
4	Kannur	100	Kannur
5	Alappuzha	98	Cherthala, Alappuzha, Kayamkulam

Source: Census of India website: Office of the Registrar General and Census Commissioner of India. 2011.

Table 13.2: Urban Population Residing in Urban Agglomerations is very High in Kerala (%), 2011 contd.

S. No.	***District***	***Share of Urban Agglomeration Population to Total Urban Population in the District (%)***	***Urban Agglomerations***
6	Thiruvananthapuram	94.8	Thiruvananthapuram
7	Kollam	93.6	Kollam
8	Malappuram	93.5	Malappuram
9	Kasaragod	83.6	Kasaragod, Kanhangad
10	Kottayam	85.8	Kottayam, Changanassery
11	Palakkad	88.6	Palakkad, Chittur–Thathamangalam, Ottapalam

Source: Census of India website: Office of the Registrar General and Census Commissioner of India. 2011.

Ribbon development of UAs

13.2.2.5 Kerala is more urbanised along the north–south corridor on the coastal belt and the midland region, while the agricultural and forest area is concentrated in the midland and highland regions. The coastal land of Kerala is highly urbanised, with 12 out of 19 UAs on the coast (Figure 13.4). The other UAs are mainly in the midlands, and the highlands are mostly

rural/forest land. Urban spread appears to correspond with UAs. An analysis of the built-up urban areas of Kerala in SURK 2012 shows that even the maximum coverage within the high-density built-up areas is only 32 per cent, indicating that there are underutilised pockets within the urban areas of Kerala.

Patterns of urbanisation by size class of towns

13.2.2.6 Although the urban population exploded in UAs, Class I cities' population reported a decline in their growth rates during the past decade. Of the 18 UAs were reported in the 2001 Census, only 10 individual towns reported populations of above one lakh; the number declined to 9 in 2011, with two towns entering the Class II category and one jumping to a Class I city. Further, all the Class I cities reported negative growth rates during 2001–11, implying depopulation in the big cities. Since there are no independent Class I cities/towns in the state and all cities/towns are part of UAs, this implies that there was substantial out-migration from the main cities to peripheral areas (Table 13.3). Class I cities registered a drop of (–) 11.6 per cent over the decade and no city emerged as a primate city.

13.2.2.7 The number of Class II cities increased from 24 in 2001 to 29 in 2011 with a population of 18.9 lakh, registering a growth of 18.9 per cent (Table 13.3). The highest population growth was recorded by Class III (244.8%) and Class IV (312.3%) cities. The number of Class III and IV cities increased from 72 and 37 in 2001, respectively, to 254 and 159 in 2011, respectively.

13.2.2.8 These trends confirm that there has been growth in urban sprawls. The rural–urban continuum in the state has allowed people to live in the countryside and commute to work in cities. This has been possible with the increase in personal vehicles. Kerala has one of the best rural road networks within the country (Refer to Chapter 14). This adds to the urban sprawl, which in turn starts taking over the precious natural resources of Kerala—wetlands and forests that make Kerala unique. This depletes the agricultural areas. Since wetlands act as natural drainage, taking them over only hurts the citizens—all within one generation. This trend may also increase transportation costs and energy consumption. The urban spread demands greater investment in infrastructure development. These patterns are not sustainable—economically, socially or environmentally.

Table 13.3: Distribution of Urban Population by City Size

Class	*Population range*	*No. of towns in 2001*	*Total urban population in 2001*	*No. of towns in 2011*	*Total urban population in 2011*
I	1,00,000 and above	10	36.9	9	32.6
II	50,000–99,999	24	15.9	29	18.9
III	20,000–49,999	72	23.0	254	79.3
IV	10,000–19,999	37	5.7	159	23.5
V	5,000–9,999	15	1.2	61	4.7
VI	Less than 5,000	1	0.05	8	0.4
Total		159	82.7	520	159.3

Source: Census of India website: Office of the Registrar General and Census Commissioner of India. 2011.

13.3 Government of Kerala Initiatives for Urban Development

13.3.1 Elaborate administrative structure

13.3.1.1 The Department of Urban Affairs (formerly Department of Municipal Administration) was formed in 1962 by the bifurcation of the Department of Local Bodies into the Department of Municipal Administration and the Department of Panchayats. In 2002, the Department of Municipal Administration was renamed the Department of Urban Affairs. This department is concerned with the administration of municipalities and municipal corporations, together called Urban Local Bodies (ULBs) in Kerala[4].

13.3.1.2 The Department of Town Planning started functioning in 1957, mainly to ensure planned development of urban settlements in the state. Later, given the unique scattered development pattern of settlements as well as the rural–urban continuum prevalent in the state, it was decided to widen the department's sphere of activity to cover rural settlements as well.

[4] "The Kerala Municipalities Act do not prescribe any criteria for constitution of Municipalities. However Government as per G.O MS 108/67/HLD dated 2nd March 1967 had laid down the following standards for the constitution of new Municipalities: (i) the locality should predominantly be urban i.e. at least 3/4th of the adult population of the area should be engaged in pursuits other than agriculture, (ii) the population of the locality should not be less than 20,000 and the density of population should not be less than 4000 per 2.59 sq.km. except in hilly areas and (iii) Per capita revenue resources of the locality should not be less than Rs 5".
Department of Town and Country Planning, Government of Kerala. 2012. *State Urbanisation Report Kerala: A Study on the Scattered Human Settlement Pattern of Kerala and its Development Issues*. March.

Accordingly, in 1999, this department was renamed the Department of Town and Country Planning.

13.3.1.3 The Kerala Urban and Rural Development Finance Corporation (KURDFC)[5] has been set up as an entity for financing rural and urban development. It provides loan assistance to various local self-government institutions (LSGIs) in Kerala for their development activities. The KURDFC acts as a nodal agency for implementing central government schemes such as housing and shelter upgrading under Nehru Rozgar Yojana (NRY) and low-cost sanitation. The government of Kerala has also appointed the KURDFC as an entity for implementation of the Pooled Finance Development Fund (PFDF) Scheme of the Ministry of Urban Affairs, Government of India. The PFDF scheme has been formulated to enable cities to access market funds for their infrastructure projects.

13.3.1.4 Kerala has been active in the housing sector with several innovative schemes and programmes to help the weak and the needy as part of its social security and support programmes. The government accorded the highest priority to housing for the economically weaker sections (EWS). The Kerala State Housing Board (KSHB) is the nodal agency of the government of Kerala for implementing housing schemes, in particular for the EWS. The KSHB also undertakes schemes such as housing loan schemes, house construction, plotted development schemes, construction of commercial complexes and revenue towers and implementation of the Coastal Housing and Resettlement Programme (CHRP) by mobilising institutional finance. There are government-sponsored programmes for Kochi and Thiruvananthapuram. There are numerous programmes directed towards the development of urban infrastructure and the urban poor.

13.3.2 Policy reforms

13.3.2.1 To give a boost to the building construction sector in the state, in January 2013 the State Cabinet approved a Cabinet sub-committee recommendation to amend the Kerala Building Construction Rules and grant major concessions in the floor area ratio. The floor area ratio has been increased from 2.75 to 3; if a fine of Rs 3,000 per square metre is paid, the ratio can be raised to 4. The amendment allows builders to construct large buildings on small plots. Up to 65 per cent of the total land area can be used for construction[6]. The definition of high-rise buildings has been changed from buildings with a height of 15 metres with four floors to buildings with a height of more than 16 metres.

---

[5] Kerala Urban and Rural Development Finance Corporation website. http://www.kurdfc.org/index.php/6-666.

[6] Government of Kerala. 2013. Local Self Government (RD) Department Notification. http://www.go.lsgkerala.gov.in/files/gz20130201_8162.pdf. 2(325). 5th February.

13.3.2.2 Another major change is the stipulation that five metres of vacant space should be left on all sides of the building[7]. This stipulation is now limited to the front portion and any one side of the building. There are also concessions on the height of the building based on the width of the approach road. Under the new amendments, subject to certain conditions, residential complexes and commercial complexes will be permitted in the islands. A high-level authority will be set up to grant permission to large projects. The government plans to effect amendments to the building rules under the panchayat areas as well.

13.4 Situation Analysis of Urban Kerala

13.4.1 Quality of Infrastructure

Housing

13.4.1.1 Some highlights of the Census 2011 are as follows[8]:

- The share of vacant census houses is higher in Kerala (10.6%) versus India (7.5%). The percentage share of occupied census houses that were locked was also higher in Kerala.
- In terms of the quality of housing as per the materials used for roof, walls and flooring, Kerala fares better than the national average since 48 per cent of the houses use concrete as the material for roofs versus 29.1 per cent in India. For flooring, cement followed by mosaic floor tiles is the pre-dominant material used; in contrast, 46.5 per cent of households in India use mud.
- In terms of space, a small percentage (0.9%) of urban households in Kerala have no exclusive room compared with 3 per cent in urban India.

13.4.1.2 Kerala has been a leader in terms of providing housing for the poor. Even before the major initiatives of the central government in providing housing for the poor, the government of Kerala accorded the highest priority to housing for the economically weaker sections (EWS), and initiated several innovative schemes to provide affordable housing to the weak and poor. Yet households at the lowest rung of the socio-economic ladder have been unable to construct houses. An analysis of the public housing schemes reveals the following:

[7] Government of Kerala. 2013. Local Self Government (RD) Department Notification. http://www.townplanning.kerala.gov.in/KMBR/kmbr_247-2013.htm. 2(1982). 8th July.
[8] Census of India website: Office of the Registrar General and Census Commissioner of India. 2011.

- Inadequate coverage of the marginalised sections of society, the destitute, women-headed households and the poorest of the poor;
- Need for greater thrust in meeting the housing needs of landless tribals, fishermen and the traditionally employed, recognising their requirements on spatial and economic considerations;
- Inadequate supply of building material and skilled labour;
- A target-driven mode by the implementing agency in housing programmes to achieve the physical and financial targets set, with little concern for the participation of end-users;
- Lack of social infrastructure facilities and poor supply of basic services to the houses;
- Lack of a holistic habitat development approach and inadequate livelihood support programmes integral to the housing schemes[9].

13.4.1.3 As part of the Rajiv Awas Yojana (RAY) reforms, the Ministry of Housing and Urban Poverty Alleviation (MoHUPA) circulated a draft of the "Model Provision for Amendment to the Respective Municipal Act(s)/Town Planning Act/Urban Development Act/ Preparation of new legislation, etc. as applicable, for reservation of Land for Housing to Economically Weaker Sections (EWS) and Low Income Groups (LIG)" that aimed to reserve 20 per cent of developed land (10% of gross land) for plotted housing development schemes for the urban poor[10]. This has not yet been implemented in Kerala, although the recent housing policy of 2011 mentions that attempts will be made to do so[11].

13.4.1.4 The Ministry of Housing and Urban Poverty Alleviation (MoHUPA) and National Buildings Organisation (2012) (henceforth, TG–12) noted that the shortage of housing is mostly at the lower economic strata of population across urban India[12] [13]. Further, the TG-12 calculated that the average number of BPL households and *kutcha* households in Kerala is 2.7 lakh, which forms 2.9 per cent of total households in India[14]. The total housing shortage predicted by TG–12 in Kerala was 0.54 million units[15].

---

[9] Department of Housing. 2011. *Kerala State Housing Policy 2011*. Government of Kerala, Thiruvananthapuram, Kerala.

[10] Ministry of Housing and Urban Poverty Alleviation. 2012. *Task Force on Promoting Affordable Housing*. Government of India. November.

[11] Department of Housing. 2011. *Kerala State Housing Policy 2011*. Government of Kerala, Thiruvananthapuram, Kerala.

[12] For all-India, the break-up of housing shortage as per income is the following: Economically Weaker Section (EWS) – 56.18 per cent, Low income group (LIG) – 39.44 per cent and Middle income group (MIG & above – 4.38 per cent. (TG–2012)

[13] The reference for this paragraph is: Ministry of Housing and Urban Poverty Alleviation and National Buildings Organisation. 2012. *Report of the Technical Group on Urban Housing Shortage (TG–12) 2012–17*. Government of India. 22nd September.

[14] Appendix A.13.1 shows the detailed calculations.

[15] Lack of detailed data prevent us from de-composing the housing shortage as per income categories for Kerala.

13.4.1.5 According to NCAER estimates, the above estimate of housing shortage will require a total investment of Rs. 10,800 crore at current prices for the Twelfth Plan period if the Kerala government's norms are adopted. Using the norms of the MoHUPA, the investment required in urban Kerala is Rs. 21,600 crore at current prices for the corresponding period (Appendix A.13.1 shows the detailed calculations).

13.4.1.6 Water supply: The supply of drinking water is far from satisfactory in Kerala. Only 40 per cent of the population has access to tap water from a treated source within the premises compared with 69 per cent in urban India. The dependence on wells is quite high in the state. Covered wells provide water to 15 per cent per cent of the households compared with 1.6 per cent for urban India, and uncovered wells provide water to 44 per cent of urban households in urban Kerala compared with 4.5 per cent in urban India. The dependence on hand pumps, tube wells and tanks is much lower in the state.

13.4.1.7 Further, access to safe drinking water is relatively very low in Kerala compared to the other southern states and the Indian average. In Kerala, only 39 per cent of urban households have access to safe drinking water against 90 per cent of households in neighbouring states and Gujarat who have access to safe drinking water.

*13.4.1.8 Sanitation***:** Latrine facilities within the premises is 97 per cent in urban Kerala compared with 81.4 per cent in urban India. However, the share of the piped sewer system is a mere 15 per cent compared with 40 per cent for urban India. Further, 88.8 per cent of households in urban Kerala have access to bathrooms in comparison with 77.5 per cent for urban India, but only 33.5 per cent of households have access to closed drainage compared with 44.5 per cent in urban India.

13.4.1.9 Drainage: The management and conservation of urban water has become a serious development issue in Kerala as in several developing countries. Even a city such as Kochi, which lies in a heavy rainfall region, now faces a shortage of reliable water, because water in the city is polluted far above safety limits. Also, coastal cities such as Kochi face challenges from changing climatic conditions; a one-metre rise in sea level may submerge almost 80 per cent area of the city. The changing intensity, frequency and tracks of tropical storms in the Arabian Sea may cause future disasters.

13.4.1.10 Waste management: Solid and liquid waste management is a challenging task in Kerala. Plastic and other solid waste from the domestic sector often block the drainage system and during the summer monsoon flash floods occur in the city. In addition, indiscriminate conversion of low-lying paddy fields, water bodies, ponds etc. has resulted in water drainage problems. Successive governments have taken various initiatives to improve latrine coverage and waste management through intensive Information, Education and Communication (IEC)

campaigns, but these initiatives are yet to catch up with the increasing population. Official studies based on 2006 data indicate that the total solid waste generated in the state is about 8,300 tonnes per day, of which 70–80 per cent is biodegradable. Further, 13 per cent of the waste is generated by the five city corporations, 23 per cent by the 53 municipalities and the rest by the 999 gram panchayats. Of the 60 municipalities, 27 have already constructed solid waste processing plants, which are in the possession of the municipal corporations. But gaps and issues remain. The waste processing plants have been facing issues about water/air pollution. There have been public protests by some urban local bodies and growing public concern over this.

13.4.1.11 Industrial and biomedical wastes also pose severe challenges. The River Periyar is highly polluted by toxic effluents from several factories on its banks. Pollutants such as untreated domestic waste, fertilisers, pesticides and motor oil are also carried into the river through numerous canals. Though the rainfall is high, proximity to the sea and pollution from industrial and domestic sources makes the surface and groundwater unusable.

*13.4.1.12 Infrastructure***:** Traffic congestion, lack of quality public urban transport, a large number of accidents and load shedding are other key issues that plague Kerala. Issues and strategies for urban transport are discussed in detail in Chapter 14 and for energy in Chapter 15.

13.4.2 Functional situation

Municipal Finances in Kerala across various size classes of towns/cities

13.4.2.1 The Thirteenth Finance Commission observes that at the all-India level, own revenue, which formed about 63 per cent of the total revenue in 2002−03, systematically declined to about 53 per cent in 2007−08. In Kerala, the drop was marginal. The percentage share of own revenue came down slightly, from 41 to 40 per cent during this period (Table 13.4).

13.4.2.2 The share of capital expenditure registered an increase for all ULBs during 2002−08 at the all-India level. This trend is true for all classes of ULBs in the developed states of Andhra Pradesh, Gujarat, Haryana, Karnataka, Maharashtra, Tamil Nadu and West Bengal. The backward states of Orissa and Rajasthan also registered an increase. Uttar Pradesh and Punjab are the two states where the share of capital expenditure remained stable. Kerala is the only state where the share of capital expenditure has gone down, from 43.4 per cent to 41.3 per cent during 2002−08. Property tax and professional tax are the most important sources of income for Kochi in Kerala[16].

[16] Mohanty, P.K., Misra, B.M., Goyal, R. and Jeromi, P.D. 2007. *Municipal Finance in India: An Assessment.* Department of Economic Analysis and Policy Working Paper No. 26. Reserve Bank of India, Mumbai. December 27.

Table 13.4: Percentage Distribution of Expenditure of ULBs in India, 2002−08

	Share of Revenue in Total Expenditure (%)			*Share of Capital in Total Expenditure (%)*		
Year	***Municipalities***	***Municipal Corporations***	***Consolidated***	***Municipalities***	***Municipal Corporations***	***Consolidated***
Kerala						
2002−03	35.36	46.83	40.86	51.68	34.3	43.42
2003−04	38.19	44.29	40.86	54.67	41.53	48.47
2004−05	33.47	42.27	37.41	47.75	40.33	44.43
2005−06	34.67	44.39	39.06	46.5	47.59	47.06
2006−07	38.24	41.56	39.69	42.69	34.81	38.79
2007−08	37.57	42.09	39.52	43.86	38.76	41.27
All-India						
2002−03	41.51	75.62	62.95	31.28	24.22	27.47
2003−04	38.96	75.43	62.02	31.8	25.2	28.7
2004−05	38.13	72.44	60.4	35.57	27.62	30.87
2005−06	34.3	70.44	57.2	40.26	31.67	34.97
2006−07	31.45	68.43	55.24	41.59	32.6	36.1
2007−08	29.33	64.54	52.67	44.88	37.36	39.55

Source: 13th Finance Commission, Finance Commission website (http://fincomindia.nic.in/ShowContentOne.aspx?id=28&Section=1)

Urban poverty

13.4.2.3 All-India urban poverty decreased from 25.7 per cent in 2004–05 to 20.9 per cent in 2009−10, declining by 4.8 percentage points[17]. In Kerala, the poverty ratios came down to 12 per cent for both rural and urban areas. In urban areas, the ratios declined from 18.4 per cent in 2004–05 to 12 per cent in 2009–10, whereas the decline was sharper in rural Kerala, from 20 per cent to 12 per cent. Despite the fact that the poverty rates are relatively lower in Kerala, they are still high when compared with developed nations.

13.4.2.4 .The upshot is that Kerala is a rural–urban continuum and there is little difference between rural and urban Kerala. This also holds true for access to services, infrastructure and markets for the economically better-off sections. Therefore, the proposed development strategy should be one that integrates both rural and urban areas.

[17] Planning Commission, Government of India. 2012. Press Note on Poverty Estimates, 2009–10. http://planningcommission.nic.in/news/press_pov1903.pdf. March.

13.5 A New Urban Development Strategic Approach: Kerala State Spatial Policy

13.5.1 Elements of the strategy

13.5.1.1 Since Kerala has the unique feature of a rural–urban continuum, it needs a unique strategy for urban development that will not focus on urban development alone. Rather, it will be based on a holistic approach of developing a "Kerala State Spatial Strategy" within the framework of the Perspective Plan 2030. "Regional/spatial planning gives geographical expression to the economic, social, cultural and ecological policies of society. It is at the same time a scientific discipline, an administrative technique and a policy developed as an interdisciplinary and comprehensive approach directed towards a balanced regional development and the physical organisation of space according to an overall strategy."[18] The State Spatial strategy will safeguard areas of state interest and provide guidelines aimed at maximising the efficiency of human settlements and other productive efforts and enhancing rural urban complementarities[19].

13.5.1.2 There are four elements in this strategy.

Element 1: Identify across the state**:**

- Education and health hubs
- State industrial and manufacturing zones, eco-industrial parks
- Tourism zones
- Agricultural and allied activity zones (agri-zones, dairy zones, forests)
- Food processing centres and cold chains
- Traditional industry zones and villages
- Special economic zones

Element 2: Develop these zones into compact integrated townships and compact rural human settlements.

Element 3: Link them with trade and transport corridors.

[18] The Council of Europe website. http://www.coe.int/t/dg4/cultureheritage/heritage/cemat/leaflet_en.pdf.

[19] An example of a National Spatial Strategy for Ireland 2002 to 2020 is available here for reference. http://nss.ie/pdfs/Completea.pdf.

Planned new integrated cities along these transport corridors complemented by links to rural service and production centres. This would enhance the competitiveness of economic activities, efficiencies of upgraded infrastructure and, above all, the viability of both rural and urban areas.

Element 4: Initiate a programme for upgrading infrastructure and services within the existing urban centres and existing intercity networks to improve the quality of both rural and urban areas.

13.5.1.3 The new Spatial Policy will be implemented by bringing together state and local government bodies and business and community leadership to formulate comprehensive plans and carry out co-ordinated targeted investments. The Department of Town and Country Planning along with the Departments of Urban Affairs and Rural Development, panchayats, water, forest and transport infrastructure authorities will co-ordinate to draw up a detailed spatial plan for the state. Investments in urban and rural areas will be enhanced through public-private partnerships and other innovative modes.

13.5.1.4 In short, the authorities would select a concentration of urban and rural settlements and develop compact urban and rural areas through deliberate planning so as to contain the urban spread. The State Urban Report of Kerala (SURK), 2012 has identified five urban corridors in 2031 based on the concentration of population:

i. Thiruvananthapuram–Kollam
ii. Pathanamthitta–Kottayam
iii. Alappuzha–Ernakulam–Thrissur–Palakkad with a special emphasis on Ernakulam and Thrissur
iv. Malappuram–Kozhikode
v. Kannur–Kasaragod

13.5.1.5 Based on the spatial and demographic analysis, it has also identified 10 urban clusters: Thiruvananthapuram, Kollam, Alappuzha, Kochi, Thrissur, Palakkad, Kozhikode–Malappuram, Kottayam–Pathanamthitta, Kannur and Guruvayoor.

13.5.1.6 These urban clusters are also the economic nodes proposed in the present report. While it is proposed to develop Thiruvananthapuram, Thrissur, Palakkad, Kozhikode, Malappuram, and Pathanamthitta as education and health hubs, Kollam, Kannur and Alappuzha will be developed into hubs of traditional industries. The Ernakulam–Palakkad corridor is proposed to be a state manufacturing and investment zone. Kochi is proposed to be a global city. Indeed, population concentration in these nodes is likely to increase further and this calls for the development of new cities and the updating of old ones. These will then be inter-linked through trade and transport routes. It would also require the preservation and development of rural areas

by limiting urban sprawl. In what follows, urban and rural development strategies will be discussed comprehensively.

13.5.2 Development of smart, green and compact cities

13.5.2.1 Urban development will have four pillars:

- Physical planning and regulations
- Attempts to influence citizen behaviour
- Urban governance
- Transformation of Kochi into a global city

Pillar 1: Physical planning

13.5.2.2 Physical planning will be based on the principles of high density, better options for walking or public transport, less need for transportation by cars, increased accessibility, preservation of green areas outside the cities, promotion of existing infrastructure, better quality of life, better relations with neighbours, and greater safety. There are nine elements in physical planning.

Element 1: Land management

13.5.2.3 Land supply plays a critical role in supporting quality of life. Land use will be improved through (i) appropriate and affordable land use, building standards and regulations; (ii) improving procedures for land transfers (including cadastral mapping, titling, and registration); (iii) implementing measures to stop land being held vacant for speculative purposes; and (iv) providing information to the public on land market indicators. Digitisation of land records, GIS maps are all critical elements here.

13.5.2.4 Ecologically sensitive land (whether in rural or urban areas) needs to be zoned off, i.e., no conversion should be allowed in non-occupied wetlands. Human settlements' zoning needs to be based on the principle of "mixed land use" to facilitate the development of integrated townships. Current and future high-density zones within the urban agglomerations may be identified under the regional spatial strategy. In other words, there should be integrated development of its urban and rural areas. High-quality housing, commercial establishments, public utilities, urban public/community spaces, social infrastructure, etc. will be the future requirements in Kerala.

13.5.2.5 For the economically weaker sections, the community land trust model proposed

in the chapter on Land, Labour and Capital may be explored for building houses. It is important that housing schemes for the poor should mobilise the beneficiary participation in the program.

Element 2: Compact cities

13.5.2.6 The compact city does not have an exact definition, but three characteristics define a compact city[20]:

- Dense and contiguous development patterns[21]
- Urban areas linked by public transport systems
- Accessibility to local service and jobs

13.5.2.7 The concept of a compact city has been at the core of urban planning in most developed countries. Since Kerala is a land-scarce state, compact city is the ideal policy for urban revitalisation and the formation of new cities.

13.5.2.8 OECD (2011) points out the need for flexibility of building forms. High rise buildings are not a guarantee for high density[22]. The study compares and contrasts a Parisian district with 6 to 7 stories, which is denser than a 20- or 30-storey building neighbourhood in Hong Kong on the same land. Mixed land use zoning is necessary to achieve accessibility to local service and jobs.

13.5.2.9 Urban design guidelines will evolve based on citizens' preferences and mainstreaming ideas of sustainability, gender[23] and even arts. While newer areas need to develop, older neighbourhoods need guidelines to re-develop while preserving their cultural heritage. All the elements together should improve the quality of life for the denizens. A common element that is suggested is the encouragement and preservation of public spaces

[20] Organisation for Economic Cooperation and Development (OECD). 2011. *Compact City Policies: A Comparative Assessment – Final Report*. http://esci-ksp.org/wp/wp-content/uploads/2012/03/Compact-Cities-Report-DRAFT.pdf.

[21] Kerala is already one of the most densely populated states (859 people per square kilometer, km in 2011). However, the SURK (2012) shows that the cities are not. As per 2001 data, Kollam was the most densely populated with 6,095 people per square km. The population density of Kochi was 2,995.7 people per square km whereas the population density in million plus cities vary between 12,000 to 24,000 in India.

[22] Organisation for Economic Cooperation and Development (OECD). 2011. *Compact City Policies: A Comparative Assessment – Final Report*. http://esci-ksp.org/wp/wp-content/uploads/2012/03/Compact-Cities-Report-DRAFT.pdf.

[23] Vienna in Austria is a model for gender mainstreaming of cities, which was adopted as a philosophy by the city in 2005. The city asked women what made them feel safe. This has the added benefit of increasing security of women in Kerala, which is mentioned in the Social Justice chapter as a significant problem. City of Vienna website. http://www.wien.gv.at/english/administration/gendermainstreaming/

especially community areas[24]. Developing parks within cities are important elements of healthy living.

Element 3: Smart cities

13.5.2.10 While general urban development in Kerala will be based on the principle of compact cities, the global hubs of education and health will be more advanced. These will be knowledge-based "smart cities". One definition of smart city is "a city well performing in a forward-looking way in economy, people, governance, mobility, environment, and living, built on the smart combination of endowments and activities of self-decisive, independent and aware citizens"[25]. Cities, companies and universities are exploring Smart City opportunities.

13.5.2.11 The government will explore solutions to plan the new cities based on these principles.

Element 4: Mobility and transport (strong infrastructure and sustainable transport systems[26])

13.5.2.12 One key principle of a compact city is a good public transport system. The city has to be designed to encourage usage of the public transport system. The model that is suggested for development of new cities and regeneration of old cities in Kerala is transit-oriented development (TOD).

13.5.2.13 Suzuki et al. (2013) lay down two particular characteristics of transit-oriented development:

- Proximity to and a functional relationship with transit stations and terminals and service provision by high-quality public transit (Bus Rapid Transport or BRT systems, underground trains, and so forth). Given the lack of road space in Kerala, BRT development may be impractical. Right of way to buses may be provided as an alternative.

---

[24] A discussion on public and private spaces is required to not only prevent the familiar encroachment story but to preserve it for the use of the generic community. Road outside one's house is a public space that is cleaned by the homeowner for the benefit of the community. This is a philosophy that is adopted by the West. India needs to re-adopt the concept of preserving commons. The road outside one's house is not for one's personal use like parking but for the use of the community at large. This change in behaviour needs to be inculcated within the citizens.

[25] Giffinger, R., Fertner, C., Kramar, H., Kalasek, R., Pichler-Milanović, N., and Meijers, E. 2007. *Smart Cities: Ranking of European Medium-Sized Cities*. Vienna, Austria: Centre of Regional Science (SRF), Vienna University of Technology. Available from http://www.smartcities. eu/download/smart_cities_final_report.pdf.

[26] This is a reproduction of Box 1.5 (Page 37) from the following reference. This is used as a reference for this section unless mentioned otherwise.

Suzuki, H., Cervero, R. and K. Iuchi (2013). *Transforming Cities with Transit.* World Bank

- Compact, mixed-use buildings and neighborhoods that, because of their design, encourage walking, cycling, and use of public transit by residents, employees, shoppers, and visitors .

13.5.2.14 They elaborate that successful TOD includes strategic (macro) and design (micro) elements such as a strong development climate and master plans for multi-use, high-intensity development supported by implementation plans. They also include investments that promote the following:

- Easy and direct pedestrian, bicycle, and public transit access.
- Good signage and a pleasant environment to attract substantial pedestrian flows.
- Significant regional accessibility to major job and activity centres.
- Short, direct connections between transportation modes and transit facilities.
- Bicycle lanes and parking facilities that feed stations.
- Attractive facilities that are well integrated with the surroundings (public spaces, street furniture and so forth).
- Safe and secure designs, including adequate lighting.
- Effective parking management around stations.

13.5.2.15 As Box 13.2 shows, TOD can fit into the regional spatial strategy that is being suggested for Kerala. Further, the literature shows that transit-oriented development leads to increased public transit ridership, improved access to regional jobs and reduced commuter times per household worker. Box 13.2 illustrates the cases of Singapore and Copenhagen, which planned their urban development strategy much in advance and then developed the transport network. The two countries adapted the model to suit their economic needs and geography.

Box 13.2: Transit-Oriented Development

Singapore has embraced Scandinavian planning principles that call for radial corridors that interconnect the central core with master-planned new towns. Its spatial plan has the appearance of a constellation of satellite "planets" (new towns) that surround the central core, interspersed with protective greenbelts and interlaced with high-capacity, high-performance rail transit.

Copenhagen's Finger Plan is a textbook example of a long-range planning vision shaping rail investments, which in turn shaped urban growth. They identified corridors to channel overspill growth from urban centres early in the planning process. Rail infrastructure was built, often in advance of demand, to steer growth along desired growth axes.

Source: Suzuki, H., Cervero, R. and Iuchi, K. (2013). *Transforming Cities with Transit.* World Bank.

Element 5: Quality of roads and transport development[27]

- The cities should be completely integrated within and between each other through transport networks.
- Good, efficient, on-time inter-modal public transport system is crucial especially for senior citizens and women. Both the timings and tickets will be integrated.
- Bus and rail terminals should be next to each other as in Thiruvananthapuram. A footbridge is required to connect the rail terminal and the bus terminal. Cities should be pedestrian-friendly. While a Bus Rapid Transport System may be difficult to construct within the cities of Kerala, buses can be given right of way.
- All lanes in the cities are to be paved. The roads should have at least two lanes with a sidewalk on at least one side and strict speed limits should be implemented for motor vehicles. All houses should leave some public space from their private land for roads and lanes. Further, all roads and lanes in Kerala especially in urban areas need to have a name such that locals, tourists and visitors can easily find their way through the roads. Every road should have road signage for easy navigation. Motion sensor streetlights need to be used. These policies need to be implemented starting from the panchayat level due to the rural–urban continuum in Kerala.
- ICT is the lynchpin of any smart city but especially of an on-time public transport network.

Element 6: Cultural facilities[28]

13.5.2.16 Cultural facilities are a determining factor in how individuals choose where to live and work. Promotion of festival marketplaces, entertainment districts, fine arts' galleries, performing arts centres, sports arenas, convention centres and office complexes are important components in urban revitalising strategies.

13.5.2.17 In the tourism chapter, cultural tourism, especially museum tourism, is advocated. It is a way to conserve and promote the rich cultural heritage of the state. The majority of domestic tourists come from within the state. The Kerala 2011 Tourist policy discusses hop-on-hop-off buses for tourists. The tourism department should co-ordinate with the public transport system. This strategy has been very successful in Delhi.

Element 7: Community facilities to enhance the working, living and business environment of the Cities[29]

[27] Kuala Lumpur Structure Plan 2020. http://www.dbkl.gov.my/pskl2020/english/index.htm
[28] Kuala Lumpur Structure Plan 2020. http://www.dbkl.gov.my/pskl2020/english/index.htm.
[29] Ibid.

13.5.2.18 Social infrastructure is important for a smart city. The provision of community facilities contributes to developing social capital by bringing citizens together. Facilities such as urban centres, public networked libraries, clubs, local play areas and parks are crucial components of healthy urban living[30]. ICT can be used to announce activities and events being organised in various parts of the city. Libraries are an important place for all generations of people to meet and network. ICT-embedded libraries are a marked feature of the Western developed world that needs to be brought into the very literate and aware Kerala.

Element 8: Encourage academic courses on Architecture and Urban Planning

13.5.2.19 There are college degrees offered in architecture and urban planning; these need to be strengthened. Further, a process of interaction between colleges and communities needs to be initiated. Organising design competitions among students for the various types of communities can get creation and innovation flowing, which will address the changing challenges.

Element 9: Provision of utilities

13.5.2.20 Upgrading the energy, water, sanitation and waste management infrastructure is crucial for the development of smart cities. All departments need to co-ordinate. In India, it is often the case that one utility company digs up the road, lays the cables and repairs the road, only to have another utility company dig up the road again. This impacts the quality of life of the people. One needs to co-ordinate, plan the necessary infrastructure or the changes required and then dig up the road.

13.5.2.21 *Energy*: Cities and towns need to explore green energy options. Since the Kerala Perspective Plan 2030 is emphasising on health and education as the growth engines, the future growth of the state may be be building-intensive. Therefore green building norms should be standardised and implemented. Old buildings need to be upgraded.

13.5.2.22 *Water*: The government needs to develop a water management programme. This will have the following components:

[30] A good public library system is a hallmark of civilisation. The concept of a library has changed from being a just repository for books or even digital content to even more. Its space is now used as a place to meet for the community, a place for lifelong learning, a place where children can learn and play. The Western library system is a model not only for its network but for the intrinsic value of the building themselves and are a part of the itinerary of any tourist. Kerala should build such a public library system with the library doubling up as a community space. Further the buildings in the main three cities and the networks within them should serve as symbol of modern tourism and guided tours are organised within the library.

- Augmentation of water resources
- Conservation of water resources through reduced use
- Water treatment and its re-use for non-drinking activities
- Designing housing societies so as to minimise water supply and drainage problems
- Safe disposal of liquid waste
- Laws on rainwater harvesting

13.5.2.23 The chapter on water discusses various strategies in detail.

13.5.2.24 *Sanitation***:** The government will promote the setting up of an underground sewerage system and liquid waste treatment plants by drafting a Sanitation Policy. To make the urban structure an effective tool that caters to people's needs, administrative reform is necessary and outdated laws are to be redrafted. The chapter on water discusses the integrated policy for water and sanitation in detail.

13.5.2.25 *Solid waste***:** It is proposed that Kerala will draft a Waste Management Programme. The components of this plan will be:

- Appointment of waste planner within the urban and rural departments
- Imposition of an Environment Fee on all citizens for waste management
- Profiling of waste and its projections by district
- Designing the waste management strategy. Components of the strategy would include collection, recycling, reuse and reduction.

  - Collection: The policy will provide for haulers to collect refuse and recycling from commercial and multi-family properties.
  - Reduction: This will be encouraged as the most desirable behaviour. Reduction of solid waste is the most efficient way to keep materials out of the landfill, reduce costs of collection and reduce air pollution from collection trucks.
  - Reuse: Reusing materials is an excellent way to reduce solid waste.
  - Recycle: When the first two steps of collection and reduction cannot be avoided, recycling of all possible materials reduces the amount of material going to the landfill and produces new products from waste. There has been an explosion in waste management technologies. Civic bodies have the option to adopt a suitable technology or a combination of technologies to process waste and reduce untreatable waste. Waste, for instance, can be converted into energy. Waste-to-energy plants, where waste is converted into electricity, can supply power to the city. This reduces the volume of waste by 90 per cent, thus decreasing the amount sent to the landfill. The largest landfill

station of Los Angeles has been closed down after the new waste-to-energy plant was set up.

- Landfill: The solution of last resort is when waste is buried in the ground. Importance has to be given to the selection of landfill sites. These should be identified based on an examination of environment issues. They should be away from habitation clusters, forest areas, water bodies, monuments, national parks, wetlands and places of important cultural, historical or religious interest. Also, they should be away from airports and airbases by at least 20 km. They should be large enough to last 25 years.

- Promoting private waste management and recycling companies. These will be new types of enterprises that will ensure sanitation, resource recovery, employment and economic prosperity. The ULBs could also make earnings from the sale of locally produced compost.
- Changing public attitudes and behaviours will be an important component of this strategy through rigorous campaigns.

13.5.2.26 *Liquid Waste Management***:** Kerala develops a policy for liquid waste management at the city level that involves the 4Rs (Re-use, Reduce, Recycle, Recover). The chapter on Environment elaborates on this. Kamyotra and Bharadwaj (2011) discuss various wastewater technologies that municipalities can use[31]. For example, one may use treated sewage water for irrigation.

Investment requirement in the provision of utilities

13.5.2.27 The NCAER calculated the investment required over a period of 20 years in providing basic urban infrastructure. These estimates are based on the population projections made by it and a host of assumptions. It shows that the total investment requirement will be Rs. 5,843 crore (Rs 584,283 million) during the 12th Plan, which will almost triple to Rs. 17,750 crore (Rs 1,775,054 million) by the 15th Plan (Table 13.5). In terms of the share of GDP, it will increase from 2.1 per cent in the 12th Plan to 4.1 per cent by the 15th Plan. A major challenge is to meet this funding requirement and implement the programmes to achieve the targets.

[31] Kamyotra, J.S. and R.M. Bharadwaj. 2011. *Municipal Wastewater Management in India*. India Infrastructure Report 2011.

Table: 13.5. Investment Requirements for the Provision of Utilities over 2012−2030

	12th Plan (2012−17)		*13th Plan (2017−22)*		*14th Plan (2022−27)*		*15th Plan (2027−31)**	
	Estimated Cost 2017 in million Rs	***Estimated O&M 2017 in million Rs***	***Estimated Cost 2022 in million Rs***	***Estimated annual O&M 2022 in million Rs***	***Estimated Cost 2027 in million Rs***	***Estimated annual O&M 2022 in million Rs***	***Estimated Cost 2031 in million Rs***	***Estimated annual O&M 2031 in million Rs***
Water Supply	8,138.24	399.3	9,044.9	443.8	9,932.8	487.3	10,515.8	5,159.5
Sewerage	6,661.02	595.6	7,403.1	661.9	8,129.8	10,903.2	8,607.02	7,695.5
Solid Waste Management	2,931.40	1,330.2	733.02	332.6	804.97	5,479.1	852.2	3,867.1
Storm Water Drainage	32,271.72	484.1	8,069.8	121.04	8,861.9	1,993.8	9,382.1	1,407.2
Total	55,619.38	2,809.1	25,250.8	1,559.4	27,729.4	18,863.5	65,456.3	1,12,049.1
Avg. projected GSDP for the Plan period	1,54,22177		23,04,0303		3,43,68,998		4,99,89,110	
% to GSDP	2.01	0.1	0.91	0.06	1.00	0.68	2.36	4.05

Source: Computer by NCAER

Pillar 2: Change in values and perceptions

13.5.2.28 People's values and attitudes drive their behaviour. Hence, initiatives to promote quality of life need to focus on changing people's values and attitudes. For instance, successive governments of Kerala initiated several programmes for solid waste management, but they did not succeed perhaps because of the lack of public involvement; unless people are directly involved, urban development programmes are not successful.

13.5.2.29 Human practices are structured by[32]:

- Know-how and embodied habits
- Institutionalised knowledge and explicit rules
- Engagements
- Technologies

[32] Jensen, J.O., Christensen, T.H. and Gram-Hanssen, K.. 2011. Sustainable urban development – compact cities or consumer practices? Sustainable Urban Development Boligforsker Seminar 2011. http://vbn.aau.dk/files/56542117/Jensen_et_al._Sustainable_urban_development_Boligforskerseminar2011.pdf.

13.5.2.30 All these elements need to be addressed to change public practices, and governments can play an important role in changing behaviour and practices. Two examples are provided in Box 13.3.

Box 13.3: Change in values and perceptions through government intervention: Two case studies

Bicycle policy in Odense, Denmark: Odense is the third largest city in Denmark. For several years, the municipality has had a comprehensive bicycle policy with several initiatives to promote bicycling as a mean of transport within the city. From 1999 to 2002 the municipality conducted a project called "Odense – the national bike city of Denmark". The project included several improvements in the conditions for bicyclists, such as better parking facilities at public places, services such as free pump stations for inflating bicycle tyres and adjustments of traffic lights in order to create "green waves" for bicyclists instead of for cars. It also tried to improve the "image" of bicycling; through advertising and distribution of magazines, it promoted the idea that bicycling is stylish and closely related to healthiness. Thus, efforts were made to restructure people's habits by affecting all the factors that determine habits.

Use of seat belts in cars: In Delhi, the traffic police initiated a campaign to increase the use of car seat belts to 100 per cent. This was supported by advertising and heavy fines on defaulters. The programme has had a high success rate.

Source: Jensen, J.O., Christensen, T.H. and Gram-Hanssen, K. 2011. Sustainable urban development – compact cities or consumer practices? Sustainable Urban Development Boligforsker Seminar 2011. http://vbn.aau.dk/files/56542117/Jensen_et_al._Sustainable_urban_development_Boligforskerseminar2011.pdf

Pillar 3: Improved Urban Governance

13.5.2.31 Kerala is exemplary in its adoption of the 73rd Constitutional Amendment Act and devolution of power to local bodies. The chapter on Governance discusses this in more detail. However, there is space for improvement as the structural transition in Kerala intensifies over the next 20 years.

13.5.2.32 "Good Urban governance is the sum of the many ways individuals and institutions, public and private, plan and manage the common affairs of the city. It is a continuing process through which conflicting or diverse interests may be accommodated and co-operative action can be taken. It includes formal institutions as well as informal arrangements and the social capital of citizens. Urban governance is inextricably linked to the welfare of the citizenry. Good urban governance must enable women and men to access the benefits of urban citizenship. Good urban governance, based on the principle of urban citizenship, affirms that no man, woman or child can be denied access to the necessities of urban life, including adequate shelter, security of tenure, safe water, sanitation, a clean environment, health, education and nutrition, employment and public safety and mobility. Through good urban governance, citizens are provided with the

platform which will allow them to use their talents to the full to improve their social and economic conditions."[33]

13.5.2.33 The overarching goal is to build inclusive cities that encompass the following:

- Sustainability: Balanced social, economic and environmental priorities
- Subsidiarity: Local autonomy and accountability
- Equity
- Efficiency in service delivery
- Transparency and accountability
- Civic Engagement and Citizenship
- Security in terms of environment management, disaster preparedness and personal safety

13.5.2.34 The transition phase may required detailed training of the urban local bodies in technical and governance issues. Systems may be set in place to guide the ULBs.

13.5.2.35 Usage of ICT is essential to support good urban governance.

13.5.2.36 A special recommendation for Kerala is the following:

13.5.2.37 Expand the existing boundaries of Urban Local Bodies (ULBs) to include census towns: Governance in the existing and newly formed census towns could be strengthened by expanding the existing boundaries of municipal corporations to include census towns and other small towns depending on their proximity to urban areas. The regional spatial strategy is used to determine which towns would be better off being merged under the urban agglomeration and urban government, and which ones are better off under rural governance. This would ease the pressure on local governance in urban Kerala. An administrative change in the jurisdiction of Bangalore and adjoining ULBs took place in January 2007. Seven City Municipal Councils (CMCs), one Town Municipal Council (TMC) and 110 villages were merged with Bangalore Mahanagara Palike (BMP) to form the new Bruhat Bangalore Mahanagara Palika (BBMP) in the year 2007. Kerala is following this in Thiruvananthapuram and Kochi using two different models. Similar initiatives should be taken for the large UAs in Kerala to bring newly demarcated urban areas under the governance framework. However, diseconomies of scale may set in if the governance area becomes too large. Further, the trend of urban sprawl needs to be controlled and city sizes should be firmed up, because the costs of an urban sprawl are much too high.

[33] The source for this paragraph is: UN-Habitat. 2002. Global Campaign on Urban Governance. Concept Paper. The quotation has been cited in the above paper from the following: Good Urban Governance: A Normative Framework (HS/C/PC.1/CRP.6), 26 February2000, available at http://www.un-habitat.org.

Pillar 4: Envisioning Kochi as a global city by 2030

13.5.2.38 One proposal is to transform Kochi into a global city. This means the entry of Kochi in the AT Kearney's index of global cities (Box 13.4). Kochi is one of the fastest growing business centres in Kerala and is the right candidate for being the first smart city of India to appear in the global city index. Its main asset is its port. Although strictly not comparable, cities such as Hamburg in Germany (city-state) and Rotterdam in the Netherlands are port cities. After the fall of the Berlin Wall in 1989, Hamburg strategically re-invented itself as a crucial hub for Central Europe. Similarly, in Kochi the focus should be to integrate the city and the port. Port cities around the world such as Singapore, Hong Kong and Hamburg should be studied to see how they are continuously re-inventing themselves.

Box 13.4: Metrics to Measure a Global City, 2012

A.T. Kearney's Global Cities Index ranks metropolitan areas on 25 metrics across five dimensions:

1. *Business activity*. It is measured by the headquarters of major corporations, locations of top business service firms, the value of a city's capital markets, the number of international conferences and the flow of goods through ports and airports (30%).
2. *Human capital*. It evaluates a city's ability to attract talent based on the following measures: size of foreign-born population, quality of universities, number of international schools, international student population and number of residents with university degrees (30%).
3. *Information exchange.* This examines how well news and information circulate within and outside the city. The five metrics are level of censorship, broadband subscriber rate, accessibility to major TV news channels, Internet presence (capturing the robustness of results when searching for the city name in major languages) and number of international news bureaus & 10 major TV networks (weight 15%).
4. *Cultural experience.* This measures diverse attractions, including number of major sports events a city hosts, number of museums, performing arts venues, diverse culinary establishments, number of international travellers and number of sister-city relationships (weight 15%).
5. *Political engagement.* This reviews how a city influences global policy dialogue as measured by the number of embassies and consulates, major think tanks, international organisations, local institutions with international reach that reside in the city and the number of political conferences that a city hosts (weight 10%).

Source: AT Kearney. 2012. *2012 Global Cities Index and Emerging Cities Outlook.* http://www.atkearney.com/documents/10192/dfedfc4c-8a62-4162-90e5-2a3f14f0da3a.

13.6 Finance

13.6.1 Interventions to ensure sustainable urbanisation in the state within the next two decades calls for funding strategies. Some of these mechanisms are given below.

Mechanism 1: Improve the tax base of ULBs

13.6.2 Increasing the tax base of ULBs would allow local bodies to invest in capital works related to providing basic services in urban areas. This could be achieved by adopting the following measures:

1. Increase property tax rates to 3–4 per cent of state GDP and ensure 100 per cent cost recovery for municipal services: Property tax (PT) is the major source of own revenue. Currently, PT forms a small share of municipal income in India. In order to access world-class urban facilities, municipal bodies in Kerala should raise the PT to such an extent that it accounts for 3−4 per cent of the state GDP. The ULBs should also ensure 100 per cent cost recovery from user charges for municipal services. Although this is one of the mandatory reforms under the JNNURM, stricter compliance is required.
2. Eliminate all exemptions on property tax including state and central government properties.
3. Provide cross-subsidies for slum areas.
4. Impose registration taxes on motor vehicles based on vehicle characteristics and carbon dioxide emissions plus annual road taxes (Box 13.5).
5. Impose heavy congestion fees on private vehicles.
6. Parking fees can be a substantial source of revenue for municipalities.

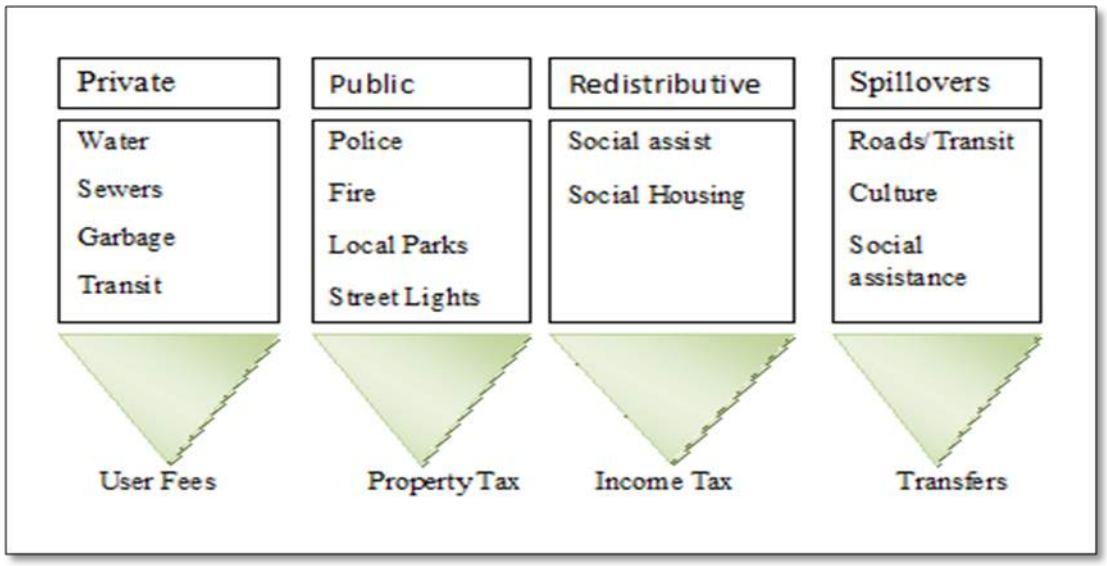
Box 13.5: Singapore Model

Car buyers in Singapore must pay for excise and registration duties of about 150 percent of the vehicle's market value, as well as bid for a limited number of government permits, called certificates of entitlement, that allow a car on the road for 10 years. A similar model can be implemented in Kerala with annual road taxes increasing over time.

Source: Singapore Ministry of Transport website.
http://app.mot.gov.sg/Land_Transport/Managing_Road_Use/Vehicle_Ownership.aspx

13.6.3 Figure 13.3 provides guidance on municipal finance and recommends the use of different financial tools for different services.

Figure 13.3: Different Tools for Different Services



Source: Slack, E. 2009. *Guide to Municipal Finance*. UN Habitat. Nairobi.

Mechanism 2: Introduce Pooled Financing Mechanism in small towns to ease their access to capital markets

13.6.4 In Tamil Nadu, a pooled financing mechanism was used to finance water supply in small towns to ease their access to capital markets. Such practices could be adopted in Kerala where small ULBs do not have the financial strength to access the bond market. The KURDFC could be used for this purpose under the PFDF, which the central government set up for this explicit purpose. This could also be used to develop infrastructure in all towns including census towns.

Mechanism 3: Set up an Urban Regulatory Authority

13.6.5 An Urban Regulatory Authority is necessary to ensure efficient private sector participation in water and power in municipal services, to maintain the quality of services and to make sure that the cost of services to the public is reasonable. This authority may be given statutory powers to enforce these objectives.

13.7 Rural Development

13.7.1 The Background

13.7.1.1 Rural development primarily means improvement in economic and societal conditions and the quality of life in the countryside in harmony with natural endowments and the landscape of the countryside, preserving its irreplaceable resources and culture. In this sense, it is a comprehensive and multidimensional concept that encompasses the development of agriculture and allied activities, traditional industries and crafts, socio-economic infrastructure, community services and facilities and, above all, human resources in rural areas in a socially and environmentally sustainable manner. It will, thus, draw on the perspective plans of the respective sectors.

13.7.1.2 Rural development will be an integral part of the Spatial Strategy because Kerala is a case of an urban–rural continuum.

> One cannot clearly distinguish a rural area from an urban area. All over Kerala, it is alike a large number of small and medium towns distributed in a village background. It is very difficult to demarcate the end or beginning of a town and a village. Here exists urban rural continuum (SURK, 2012).

13.7.1.3 In India, an ad hoc approach has been used for the development of rural areas. Prior to the Sixth Five-Year Plan, a programme-based approach was adopted. The First Plan initiated community development programmes, while the second Plan focused on co-operative farming. The Third Plan (1961−66) was the period of re-strengthening the Panchayati Raj System. Special Area Programmes were started for the development of backward areas in the Fourth Plan (1969−74). In the Fifth Plan (1974−79), the concept of a minimum needs programme was introduced to eradicate poverty in rural areas. The Sixth Plan, for the first time, emphasised the strengthening of the socio-economic infrastructure in rural areas, and initiatives were taken to alleviate disparities through the Integrated Rural Development Programme (IRDP). The subsequent Plans focused on infrastructure, skills, training and employment. Several schemes at the national level have been initiated.

13.7.1.4 The State Rural Development Department in Kerala was set up in 1987. Its primary role is to implement the centrally sponsored scheme and provide training to staff of the Rural Development Department. For this purpose, the State Institute of Rural Development (SIRD) has been set up as the apex training centre of the Rural Development Department in the state on par with the National Institute of Rural Development (NIRD) at the national level.

13.7.1.5 More than 50 per cent of the population in Kerala currently lives in rural areas, but over the next 20 years it will decline to 30 per cent. Therefore, it becomes even more important to develop rural areas to facilitate their transition. This requires a comprehensive Perspective Plan to develop rural areas.

13.7.2 Strategic Planning

13.7.2.1 Rural development programmes can make a vital contribution to the attractiveness of rural areas. They can also ensure that in a competitive, knowledge-based economy, a sustainable balance between urban and rural areas is maintained. The four pillars of rural development are:

- Competitiveness of agriculture and rural-based industries
- Diversification of non-farm income
- Improvement in quality of life
- Environment

Pillar 1: Competitiveness of agriculture and rural-based industries

13.7.2.2 Currently, the focus of planning has been to provide livelihoods. Under the new strategy, the focus will shift towards enhancing the locational advantages of rural areas and increasing their global competitiveness. As suggested in the respective chapters in the Perspective Plan, a range of measures will target human and physical capital in the agriculture, livestock, fisheries, food and forestry sectors (to promote knowledge transfer and innovation) and quality production. Local strengths and challenges should be identified. Most rural communities can be grouped into one of five categories, although several may fall into more than one category:

- *Villages adjacent to high-amenity recreational areas* such as national parks, national forests, and coastlines. They provide food, lodging and associated services. Increasingly popular places to live, work, and play, these communities often struggle with strains on infrastructure and the natural environment. Many of these communities also experience seasonal population cycles that can strain resources.
- *Resource-dependent villages* are often home to single industries, such as farming or mining, so their fortunes rise and fall with the market value of that resource. A key challenge facing resource-dependent communities is diversifying the economy while maintaining their rural quality of life and character
- *Transition villages* are located at the fringe of metropolitan areas and typically connected to them by state and interstate highways. Residents have access to economic

opportunities, jobs, and services. More affordable housing and access to metropolitan amenities have made many of these edge areas grow at a faster pace than their metropolitan areas as a whole. But precisely because they are such attractive places to settle, these villages often face pressure to continue to provide more housing and services to new residents. They eventually transform into urban areas

- *Traditional industry-based villages*: The economy of these villages or cluster of villages is based on traditional industries.
- *Second-home and retirement villages* might overlap with some of the above groups. These villages struggle to keep pace with new growth while maintaining the quality of life that drew residents in the first place.

13.7.2.3 The nature of the enterprise encouraged to locate in rural areas must be appropriate to those areas in economic, social and environment terms. Incentives can help direct commercial and industrial development to appropriate locations. For instance, emerging strategies that can help a traditional resource economy adapt to the changing global market and sustain it over the long term include more sustainable agriculture practices; production and distribution of renewable energy, such as wind, solar, biomass, methane from livestock, and geothermal energy; and green jobs in former rural manufacturing plants converted to produce, distribute, install and maintain green energy facilities and distribution networks. Similarly, the needs of development strategies of other types of villages can be identified and suitable strategies can be developed for their competitiveness.

Pillar 2: Diversification of non-farm income

13.7.2.4 Diversification is necessary for growth, employment and sustainable development in rural areas, because it contributes to a better territorial balance in both economic and social terms. The resources devoted to diversifying the rural economy should contribute to the overarching priority of the creating employment opportunities and conditions for growth. The range of measures available will, in particular, be used to promote capacity building, skills acquisition and organisation for local strategy development and also help ensure that rural areas remain attractive for future generations. Policies should be especially geared towards women and the elderly as we see that unemployment rates among women is quite high in Kerala. Key recommendations to improve the economy are[34]:

- Raise the economic activity and employment of the region by diversifying the economic base.

[34] Department of Environment and Rural Affairs website. Community Strategic Guidelines for Rural Development: Link With Proposed Key Actions. http://archive.defra.gov.uk/rural/documents/rdpe/axis3measfishes.pdf.

- Provide better infrastructure. Rural Kerala is extremely well developed and networked both in terms of roads and ICT technologies. However, there is always space for upgrading infrastructure and using green technologies. Water transport infrastructure can play a major role in the development of the Kerala economy. It can connect rural areas and attract more tourists by giving them a chance to experience the local culture.
- Invest in local cultural heritage. Even small towns and villages in developed countries have at least one museum to showcase their local culture, art and heritage. The diversity of the Kerala culture can be showcased. This may attract tourists and thereby generate employment and income for the local economy.
- Organic farms can be homestays and both provide organic food and act as attractions for tourists[35].
- Develop new comparative advantages, train local people in various vocations, develop capacity and promote entrepreneurship and innovation. This will tie up with various aspects of the rural economy.
- Develop the provision and innovative use of renewable energy sources. This can help create new outlets for agricultural and forestry products, enhance the provision of local services and diversify the rural economy.

Pillar 3: Improvement in quality of life

13.7.2.5 Smart planning is required for rural areas. Careful planning of rural areas and close co-operation between rural and urban planning authorities can help ensure that commercial development in rural areas strengthens the local economy while protecting the environment and the quality of rural life.

13.7.2.6 Development standards should be established in areas such as land use requirements, regulations for zoning, subdivision standards, landscaping and other development standards.

13.7.2.7 Areas for village centres should be designated, where needed. As mentioned in the land chapter, zoning is critical to save the ecologically fragile land. Like smart cities, smart villages will be pedestrian-friendly and connected to public transport networks[36].

13.7.2.8 Make it a requirement that infrastructure, such as roads, water and sewer service, and schools, have to be in place when new development is constructed.

[35] Dewalokam Kerala Home Stays are a good example of developing sustainable rural economies. http://www.dewalokam.com/Content/viewcontent.aspx?linkId=5

[36] Nelson. K. 2012. *Essential Smart Growth Fixes for Rural Planning, Zoning, and Development Codes*. United States Environment Protection Agency. http://www.epa.gov/smartgrowth/pdf/rural_essential_fixes_508_030612.pdf. February.

Develop plans, codes, and policies especially regarding the laying of utilities.

13.7.2.9 Community facilities such as networked libraries (using inter-library loan digitally) and parks are critical for a good quality of life. At the same time, commercial corridors, traditional industrial areas, agricultural service areas (often near railroads), and markets may be developed. A financial feasibility analysis identifying appropriate potential uses can help the development community understand the opportunities. Localities and business groups can map underused sites along major commercial corridors and evaluate their potential.

13.7.2.10 As mentioned in the land chapter, land use strategies should also be developed at the panchayat level.

Pillar 4: Improving the environment and the countryside

13.7.2.11 The priority areas are biodiversity and the preservation and development of high-value nature farming and forestry systems and traditional agricultural landscapes; water; and climate change. These environmental objectives should be integrated so that they can contribute to the preservation of biodiversity.

Pillar 5: Towards Smart Villages

13.7.2..12 The take-up and diffusion of ICT is essential in rural areas for diversification, as well as for local development, the provision of local services and the promotion of e-inclusion. Economies of scale can be achieved through village ICT initiatives that combine IT equipment, networking and e-skills training through community structures. Such initiatives can greatly facilitate IT take-up by local farms and rural businesses and the adoption of e-business and e-commerce. Full advantage needs to be taken of the possibilities afforded by the Internet and broadband communications, supported, for example, by regional programmes to overcome the disadvantages of location. Significant investment will be undertaken in major telecommunications, transport, energy and water infrastructure over the coming years. Considerable support needs to be given to developing connections with business or science parks.

13.7.2.13 *Rural call centres:* Indian services companies are opening business process outsourcing (BPO) operations in rural villages as a way to keep down costs while bridging the digital divide in the country. Andhra Pradesh and Karnataka have taken the lead. In Kerala, too, some initiatives have been reported; one such rural BPO centre has been set up in Kasaragod. Concerted efforts need to be made to promote these centres in rural areas in Kerala. This will help bridge the rural–urban divide in income.

13.7.2.14 *Promote social entrepreneurs:* Social enterprises need to be developed to provide skills and training to the rural population in ICT and absorb them into this sector. HARVA India is an example, which runs a project in Haryana to promote rural entrepreneurship and ICT training in rural areas in the state. Kerala must draw on these experiences.

Pillar 6: Infrastructure

13.7.2.15 Energy, water and waste management needs should strategised from the panchayat level.

13.7.3 Implementation

Building local capacity for a community-led local development strategy

13.7.3.1 Rural development in India is marked by a top-down approach and most programmes are centrally sponsored. Due to the flow of funding to rural development, there has been little incentive in India to notify census towns as urban areas. Further, there has been little progress in rural development due to the lack of people's involvement. One such programme is the centrally sponsored "Provision of Urban Amenities to Rural Areas (PURA)" programme (Box 13.6), which has been implemented in Kerala in Thirurangadi (Mallappuram) Panchayat.

Box 13.6: Provision of Urban Amenities to Rural Areas (PURA)

The Ministry of Rural Development (MoRD), Government of India launched the PURA scheme as a Central Sector scheme during the remaining period of the XI Plan. The scope of the scheme is to select private partners to develop livelihood opportunities, urban amenities and infrastructure facilities to prescribed service levels and to be responsible for maintenance of the same for a period of ten years in select Panchayats/cluster of Panchayats. Under the programme, private sector entities with experience in development and management of community-oriented infrastructure projects are selected through an open, competitive bidding process based on rigorous qualifications and evaluation criteria. The selected private partners would be required to provide amenities like water supply and sewerage, roads, drainage, solid waste management, street lighting and power distribution and undertake some economic and skill development activity as part of the PURA project. The private partners may also provide add-on revenue-earning facilities such as village-linked tourism, integrated rural hub, rural market, agri-common services centre and warehousing etc. in addition to the above mentioned amenities. While the PURA project spans several Panchayats in a cluster, the private partner would propose sub-projects with the PURA elements for each of the Panchayats.

The leveraging of public funds with private capital and management expertise for creation and maintenance of rural infrastructure is the essence of the PURA scheme, which is envisioned to act as the

catalyst not only for convergence between different infrastructure development schemes but also for the new model for the management of urbanisation of rural areas. There has been little evaluation of the programme, but it has not made a mark in terms of performance.

Source: Ministry of Rural Development, http://rural.nic.in/sites/downloads/pura/Modified_Preface.pdf

13.7.3.2 Rural development requires a shift from top-down planning approaches to bottom-up approaches, where the community is involved in identifying its own problems, conceptualising solutions to those problems and planning and implementing development programmes. It is necessary to encourage communities to work together as a coalition to gain an advantage in seeking central and state economic and community development funding.

13.7.3.3 Integrated approaches involving farmers, foresters and other rural actors can safeguard and enhance the local natural and cultural heritage, raise environmental awareness and invest in and promote specialty products, tourism and renewable resources and energy. Box 13.7 discusses local participation in South Korea.

Box 13.7: Local participation: The Case Study of South Korea

After it was devastated by the war, the government in South Korea started a movement called *Saemoul Undong*. Under the rural development plan, they had a village headman, the parallel of our *Gram Panchayat*, an executive committee and a village fund. Experts were deputed to local bodies to hold council meetings in order to prepare a village development plan according to priority. The priority could be roads, healthcare facilities, electricity, drinking water, irrigation, schools or any other. Then the money allocation issue was discussed and settled. After completion, project reports were scrutinised. Under *Saemoul Undong*, each village took up some projects in the first year, some others in the second, many more in the third and so on. In a systematic manner, the basic development needs of a rural area could be resolved within a short span. This experiment incentivised healthy competition among village communities: those with honest leaders had better achievements to their credit. This created a bottom-up approach for planning, reform and personal integrity. The whole idea is so simple and I believe India has plenty to learn from this experience.

Source: Sinha, Y. 2013. Governance Reforms Must Aim Big. Inclusion. 4(1). January−March.

13.8 The Reporting System

13.8.1 For strategic monitoring of urban and rural development strategies, a common set of indicators will be adopted across districts (Box 13.8). Baseline indicators defined at the start of the programme period will allow for assessment of the initial situation and form the basis for the development of the programme strategy.

Box 13.8: Indicators for Spatial Development

- Right to adequate housing: Durable structures, overcrowding, housing prices and rent-to-income, right to adequate housing, proportion of urban population living in slums
- Security of tenure: Secure tenure, authorised housing, eviction
- Equal access to credit, Housing Finance to basic services, Access to safe water, population with access to sanitation (%), connection to services, price of water, water consumption per person (litres per person per day), water system leakages (%), water quality policy, water sustainability policy
- Equal opportunities for a safe and healthy life: Under-5 mortality, significant improvement in the lives of slum dwellers, homicides, HIV prevalence, urban violence, gender violence, traffic accidents
- Gender equality in human settlements development: Literacy rate, school enrolment, women councillors, gender inclusion*
- Environment management: Population density (persons/km), green spaces per person (m/person), land use policy, planned settlements, green building policy, share of wastewater treated (%), share of waste collected and adequately disposed (%), waste generated per person (kg/person/year), sanitation policy, waste collection and disposal policy, waste re-cycling and re-use policy, energy and CO^2, CO^2 emissions per person, energy consumption per US$ GDP, clean energy policy, climate change action plan, daily nitrogen dioxide levels (ug/m3), daily sulphur dioxide levels (ug/m3), daily suspended particulate matter levels (ug/m3), clean air policy, local environment plans.
- Disasters and rebuilding settlements: Houses in hazardous locations, disaster prevention and mitigation instruments.
- Effective and environmentally-sound transportation systems: Travel time, public transport network covering trams, light rail, subway and BRT, urban mass transport policy, congestion reduction policy.
- Decentralise and strengthen local authorities: Local government revenue, voter participation, civic associations, citizen participation.

13.8.2 Evaluation activities will take place on an ongoing basis at the programme level—ex ante, mid-term and ex post—along with other evaluation activities considered useful for improving programme management and impact. The exchange of good practices and the sharing of evaluation results can contribute significantly to the effectiveness of the spatial strategy.

13.9 Conclusion

13.9.1 Areal re-classification of areas in Kerala has led to a massive increase in urbanisation between the last ten years 2001 and 2010. This urbanisation has been mainly driven by increase in census towns, which were previously panchayats. Other marked features of the urbanisation process of Kerala are the existence of rural-urban continuum, increase in urban agglomerations

and decrease in growth of the metro cities. Consequently, rise in urban sprawls has increased to pressures on land. The forecasts suggest that further urbanisation will take place over the next fifteen years. Rapid urbanisation poses daunting challenges due to insufficient investment in basic services such as water supply, sanitation, transport and power and civic administration, with the resulting environmental and social problems.

13.9.2 The strategy forward will be based on a holistic approach of developing a "Kerala State Spatial Strategy" within the framework of the Perspective Plan 2030. The State Spatial strategy will safeguard areas of state interest and provide guidelines aimed at maximising the efficiency of human settlements and other productive efforts and enhancing rural urban complementarities. The strategy will complement comparative advantages in economics and geography. This will mainstream environmental concerns. Mixed land zoning needs to be adopted in rural and urban space to protect the forests, wetlands and other ecologically fragile land. The 4R maxim – reduce, reuse, recycle and recover will be adopted in all areas.

13.9.3 Development of smart, compact, clean and green cities will be the focus of this strategy. Increasing the density within the cities in Kerala is important. Transit oriented development will be adopted with the emphasis on developed of pedestrian friendly and bicycle friendly roads. Provision of public mass transport is a necessary condition for green growth. Water and sanitation facilities and energy will be provided. Kochi is envisioned to become a global city by 2030. The cities are envisaged to be the hub of economic, social and cultural activities. Community spaces in the form of parks and public library system will enhance the quality of life of all. The better urban living is financed through measures of improving the revenue base of urban local bodies. Providing housing for the poor through various models is suggested to achieve the goal of inclusive growth in urban areas.

13.9.4 It is recommended that rural areas develop competitiveness in agriculture and rural areas and diversify non-farm income based on the spatial strategy. Smart, clean, green and compact villages will be developed. Better connectivity for the rural areas to be linked with the main hubs is recommended through better transport and ICT facilities.

A.13.1

Forecasts for Urban Requirements

A.13.1.1 Population Projections

SURK 2012 has attempted to make projections of the urban population for the state of Kerala. In the first case, the existing trend of urban population growth is assumed to continue. In the second case, the average growth rate of urban population is assumed to remain the same in the next two decades. In both cases, the level of urbanisation exceeds 90 per cent by 2031.

It is true that the state of Kerala has experienced wide fluctuations in the growth rate of the urban population over the past few decades. The average growth rates of the urban and rural population for the decades 1981−1991, 1991−2001 and 2001−2011 have been calculated. The average growth rate of urban population during 1981−2011 works out to 0.04 and the corresponding rural growth rate is (–) 0.006. The URGD (Urban-Rural Growth Differential) has been calculated by subtracting the rural growth rate from the urban growth rate. Based on this formula, the URGD for Kerala works out to 0.0458.

The UN methodology of population projection has been used to calculate the rural and urban population of Kerala for the years 2012−31.
The term URGD is used in this case.

URGD = Urban growth rate – Rural growth rate

$= r_U - r_{R,}$

The exponential model used by the Population Division of the UN (brought out in World Urbanisation Prospects) at regular intervals is as follows:

$$U_2/R_2 = (U_1/R_1)\, e^{t.URGD}$$

where U_1 and U_2 are urban and R_1 and R_2 are rural population, at time points t_1 and t_2, respectively.

Using the above formula,

For the year 2025, the share of urban population works out to 63.41.

For the year 2031, the share of urban population works out to 68.87.

The share of urban population as projected above is then applied to the projected total population calculated by the Registrar General, Census of India for the year 2025. The growth rate of total population of Kerala is expected to stabilise in the year 2025. Therefore, the growth rate of the year 2025–26 has been used to project the total population for the year 2031. Based on the respective R-U percentages, the population figures have been calculated for the years 2012–31 (Tables A.4.1 to A.4.3).

Table A.13.1. Estimation of Urban Population of Kerala (trend-based)

Census Year	*Total population*	*Growth rate (decadal) of total pop. (trend-based) (%)*	*Urban pop. Growth rate (trend-based) (%)*	*Urban population*	*% Urban*
1951	1,35,49,118			18,25,897	13.48
1961	1,68,86,394	24.63	3.84	25,26,473	14.96
1971	2,13,47,375	26.42	3.72	34,66,968	16.24
1981	2,54,53,680	19.24	3.7	47,51,249	18.67
1991	2,90,98,518	14.32	6.16	76,80,194	26.39
2001	3,18,41,374	9.43	0.76	82,66,925	25.96
2011	3,33,87,677	4.86	9.27	1,59,32,171	47.72
2021	3,46,87,677	3.89	6.05	2,64,47,403	76.24
2031	3,54,54,677	2.21	6.65	2,80,47,471	79.1

Table A.13.2: Estimation of Urban Population of Kerala assuming Constant Annual Growth Rate

Census Year	*Total population*	*Growth rate (decadal) of total pop. (trend-based) (%)*	*Urban pop. Growth rate (annual, 4.5%)*	*Urban population (%)*	*% Urban*
1951	1,35,49,118			18,25,897	13.48
1961	1,68,86,394	24.63	3.84	25,26,473	14.96
1971	2,13,47,375	26.42	3.72	34,66,968	16.24
1981	2,54,53,680	19.24	3.7	47,51,249	18.67
1991	2,90,98,518	14.32	6.16	76,80,194	26.39
2001	3,18,41,374	9.43	0.76	82,66,925	25.96
2011	3,33,87,677	4.86	9.27	1,59,32,171	47.72
2021	3,46,87,677	3.89	4.5	2,31,01,647	66.59
2031	3,54,54,677	2.0	4.5	2,41,41,221	68.09

Table A.13.3 Estimation of Urban Population of Kerala assuming Average Growth Rate of Three Decades using UN Methodology

Years	*CDS projection ('000)*	*Rural Population ('000)*	*Urban Population ('000)*	*Per cent Urban*
2011	33,388	17,456	15,932	47.78
2021	33,995	14,210	19,785	58.20
2031	32,459	10,106	22,353	68.87

Sources: Planning Commission, Government of India. 2008; *Kerala Development Report*, Academic Foundation; NCAER calculations

A.13.1.2 Investment Requirements for the Housing Sector in Kerala

Investment in housing has multiplier effects on the economic growth of the country. The building sector generates demand for building materials, expansion of the transport network and employment opportunities for skilled and unskilled workers. It is estimated that overall employment generation in economy on account of additional investment in the construction/ housing industry is eight times that of direct employment. In the Kerala scenario, the cost of the labour and material components in the construction cost of a building can be reasonably apportioned in the ratio 2:3.

"According to the general survey conducted in 2007, it was estimated that the projected demand was 10.84 lakhs housing units in the State. Based on this survey, the housing stock of the State was 69,85,419 units and the current stock is estimated at 75 lakh residential units. The projected demand for the new population up to the end of the 12th Plan period is 6.5 lakhs. Apart from this there is a need for reconstruction of 5.5 lakhs units of dilapidated houses. The State has to undertake the task of constructing 12 lakh housing units, of which around sixty percent is meant for the economically weaker sections of the society"[37]. By using an amount of Rs 2 lakh as the cost of construction of a residential unit, it is estimated that a total amount of Rs 15,000 crore is needed as investment in the housing sector for EWS and disadvantaged groups.

Despite continued efforts by the state government to provide adequate shelter to the economically weaker sections of society, the housing shortage still exists in the state. The TG–12, noted that the shortage of housing is mostly at the lower economic strata of population across urban India[38]. Further, households in *kutcha*[39] houses that represent the housing deprivation are

[37] Department of Housing. 2011. *Kerala State Housing Policy 2011*. Government of Kerala, Thiruvananthapuram, Kerala.

[38] The reference for this paragraph is: Ministry of Housing and Urban Poverty Alleviation and National Buildings Organisation. 2012. *Report of the Technical Group on Urban Housing Shortage (TG–12) 2012–17*. Government of

not distributed in the same proportion as total households. Economically backward states have a larger share of *kutcha* structures compared with their share of total households. Even though households residing in *kutcha* houses represent housing deprivation, it was thought prudent to incorporate BPL households as well in determining the criteria for distributing the total housing shortage among states. The TG-12 accordingly decided that the total estimated shortage should be distributed among states/UTs in proportion to their share of households living in *kutcha* houses and that of BPL households in the national total. It would have been desirable and more appropriate to exclude households that belong to both categories in order to avoid double counting. However, disaggregated data for this are not available. Further, the overlap factor is unlikely to differ across states and consequently the share of the total households would not be significantly altered. The TG-12 used the number of *kutcha* houses from the Census 2011 and state-wise BPL households from the Planning Commission, 2009–10 figures with equal weightages to distribute the total shortage across states. The average number of BPL households and *kutcha* households in Kerala is 2.7 lakh, which forms 2.9 per cent of total households in India. The total housing shortage predicted by TG–12 in Kerala was 0.54 million units.

Two estimates of investment in the housing sector have been arrived at. The investment required to meet the housing shortage of 0.54 million units in urban Kerala is Rs. 108,000 million at current prices for the Twelfth Plan period. This is based on the Kerala government's norms of Rs.200,000 per unit cost excluding the cost of providing infrastructure and services (sewer lines, water supply and electricity, etc.). As per the norms of the Ministry of Housing and Urban Poverty Alleviation, the unit cost at current prices is estimated at Rs. 2.75 lakh and the cost of infrastructure provision for servicing the land is Rs.1.25 per unit. Based on these figures, the investment required to meet the housing shortage of 0.54 million units in urban Kerala is Rs. 216,000 million at current prices for the Twelfth Plan period.

A.13.1.3 Investment requirements for Urban Services

Water supply

The investment requirements for water supply are calculated for both domestic customers and industrial customers. For domestic customers, investment requirements are calculated as the sum of the investment sub-sectors: (i) water production (includes source augmentation, treatment and transmission) (ii) distribution extension for 24x7 standards (distribution network, storage and metering) and (iii) distribution upgrading/replacements for 24x7 standards. For industrial customers, only production investments are calculated. O&M costs are estimated separately on

---

India. 22nd September.

[39] *Kutcha* refers to houses made of local products, such as bamboo and mud.

an annual basis for domestic customers. However, for industrial customers, only the production and O&M has been calculated.

India has one of the lowest standards of continuity of water supply. The recent results of the Government of India's sanitation rating, where water quality samples of only 39 out of 441 cities qualified on three basic water quality parameters, highlight the urgency of moving to a continuous water supply system. Data from a few pilot projects across the country suggests that for the current population 24x7 water supply can be designed with the current levels of per capita supplies of source water.

It is difficult to estimate how per capita consumption will respond to income growth and efficient pricing, given that most utilities do not charge their customers the full economic cost of service provision. While income growth may increase the demand for water, the introduction of efficient pricing may deter further increases in consumption. The Committee has assumed that non-revenue water constitutes 20 per cent of the total consumption. Accordingly, the per capita production norm works out to 168 lpcd (litres per capita per day) for all size classes of cities.

The estimation of per capita investment cost (PCIC) is based on project costs. It was not possible to rely solely on project data for the estimation of PCICs for 24x7 upgrading and distribution extension (24x7 standards), given the limited number of 24x7 pilots projects in urban India. Hence, a cost simulation was conducted to complement the project cost data analysis. The cost simulation is based on city-level data provided in the City Development Plans (CDPs) as well as inputs from water experts.

The spatial pattern of urbanisation is a key determinant of the unit cost of service provision. For example, it is more expensive on a per capita basis to provide piped water supply services to low-density and small urban settlements than to metropolitan cities. The PCIC shows a steady increase from Rs 3,517 for large metropolitan cities (Class IA cities; i.e., cities with population more than 5 million) to Rs 5,901 for towns (Class IV+, i.e., towns with population less than 20,000). Production PCIC varies from 30 per cent to 50 per cent of the total PCIC across city classes and tends to be greater in larger cities since the water sources are located further away from these cities. However, there are significant economies of scale in distribution costs as density of population is the main cost driver, with distribution PCIC for large metropolitan cities being Rs 2,030 and for towns Rs 4,619.3. Small cities and towns have lower densities and, therefore, higher per capita distribution costs than large cities.

For upgrading to a 24x7 water supply network, it is assumed that 80 per cent of the distribution network needs to be replaced. This would generally depend on the condition of the existing assets, including network architecture, knowledge of the location of pipes, and the types of pipes used. For example, in Hubli, 90 per cent of the distribution network was replaced, while in

Nagpur it was only 30 per cent. So, replacement will depend on the state of maintenance of the system.

Of the total water requirement, 20 per cent has been assumed for industrial purposes for cities with a population of more than 500,000. For other cities, industrial water has not been taken into account. While metering is generally kept out of investment calculations, as it is generally paid for by users, it has been included in this estimation exercise because a continuous water supply system requires meters to be in proper working condition, so that ULBs can monitor and charge for usage.

The high O&M cost for water supply (relative to the capital investment requirement) is due to the large base of existing assets. The main cost driver that explains variation in O&M cost across city size classes is the size/height of the required water head: a higher head implies higher power charges, which are estimated to account for about 40 per cent of the total O&M cost. Maintenance costs are estimated to account for only 10 per cent of the total O&M cost, while operations account for 90 per cent. Large cities tend to have higher unit O&M costs mainly because they tend to rely on more distant sources of water supply.

Sewerage

The assumptions used in preparing the estimates for investment in sewerage for the 20-year period, 2012–2031, as well as the associated O&M expenditure for existing and new assets are presented in tables A.13.4 to A.13.6 . The total capital expenditure requirement for sewerage is Rs 2.4 lakh crore and the O&M requirement is also Rs 2.4 lakh crore.

Appendix A.13.4: Service backlogs for Sewerage (per cent)

City Size Class	***Network***	***Treatment***
Class IA	53	53
Class IB	44	53
Class 1C	64	77
Class II	84	88
Class III	90	96
Class IV+	100	100

Source: High Powered Expert Committee Report and Recommendations, 2011
Jawahar Lal Nehru National Urban Renewal Mission

Table A.13.5: Underground sewerage PCIC Norms

City Size Class	*Network*	*Treatment*	*Total*
Class IA	2092	1268	3360
Class IB	2573	1268	3841
Class 1C	2338	1073	3841
Class II	3246	2070	5316
Class III	3637	2012	5649
Class IV+	4636	2012	6648

Source: High Powered Expert Committee Report and Recommendations, 2011 Jawahar Lal Nehru National Urban Renewal Mission

Table A.13.6: Per Capita Operations and Maintenance Cost for Sewerage

City Size Class	*PCOM per year*
Class IA	414
Class IB	373
Class 1C	290
Class II	290
Class III	207
Class IV+	145

Source: High Powered Expert Committee Report and Recommendations, 2011 Jawahar Lal Nehru National Urban Renewal Mission

The investment requirements are calculated as the sum of the investment costs for: (i) network and (ii) treatment (sewage pumping stations and sewage treatment plants). The investment requirements are calculated only for domestic customers. An underground sewerage system has been considered for all city size classes.

While the data gathered is not large enough to estimate investment requirements with sufficient accuracy for each city size class, significant trends and correlations emerge from such an analysis. Larger and more densely populated cities tend to have lower costs on a per capita basis for sewerage networks, with the PCIC increasing from Rs 3,360 in large metropolitan cities (Class IA cities, i.e., cities with population more than 5 million) to Rs 6,648 in towns (Class IV+, i.e., towns with population less than 20,000).

The average O&M cost for the network is estimated at Rs 3.3 per cu.m. and the O&M cost for treatment is estimated at Rs 5.4 per cu.m. on average. The total O&M cost for sewerage covering existing and new assets is lower than that of water supply because of the existing low

service coverage and lower unit cost of O&M. Industrial waste water collection and treatment have not been considered for the purpose of estimating investment requirements.

Solid waste management

The assumptions used in preparing the estimates for investment in solid waste management for the 20–year period, 2012–2031 as well as the associated O&M expenditure for existing and new assets are presented in the following section.

The investment requirements are calculated as the sum of: (i) Collection and Transport: trucks, containers, pushcarts, mechanical sweeping, and transfer stations, (ii) Processing: treatment plants, and (iii) Disposal: development of landfill sites. The assumptions underlying the estimation exercise for solid waste management are based on the Municipal Solid Waste (Management and Handling) Rules, 2000.

Over 60 per cent of the waste generated in India is biodegradable and, hence, suitable for composting. This is unlike the situation in western countries, which have a higher proportion of non-biodegradable waste. Given this scenario, the share of waste processed is assumed to be 80 per cent of the total waste generated and the share of waste disposal 20 per cent in the project's design year. Of the waste disposed, 50 per cent is direct landfill and 50 per cent is processed.

The higher PCIC in large cities is due to the higher per capita waste generated compared with other city classes. There are no significant economies of scale in processing. A uniform unit cost for O&M has been assumed for all city classes based on the assumption that large cities would adopt highly mechanised systems, while smaller cities would adopt comparatively more labour-intensive processes.

Storm water drains

The assumptions used in preparing the estimates for investment in storm water drains for the 20–year period, 2012–2031, as well as the associated O&M expenditure for existing and new assets are presented in the following sections.

The investment requirements are calculated as the sum of (i) Network and (ii) Outfall. Components for network and outfall include widening of drains and structures to prevent waste dumping, laying of pipeline with pipe support bridges/culverts, catch pits, manholes, outfall structures with gates and covers for the drain.

The PCIC trend for storm water drains follows that for urban roads because the same road densities and backlog have been considered to estimate storm water drain requirements. As with

the estimates for urban roads, the estimates for storm water drains are subject to the specific works to be undertaken, based on factors such as city topography, rainfall patterns and integration with road works.

Investment requirements for water supply

India has one of the lowest standards of continuity of water supply. The recent results of the Government of India's sanitation rating, where water quality samples of only 39 out of 441 cities qualified on three basic water quality parameters, highlight the urgency of moving to a continuous water supply system. Data from various pilot projects across the country suggest that for the current population, 24x7 water supply can be designed with the current levels of per capita supplies of source water (Karnataka, Punjab, Maharashtra).

It is difficult to estimate how per capita consumption will respond to income growth and efficient pricing, given that most utilities do not charge their customers the full economic cost of service provision. While income growth may increase the demand for water, the introduction of efficient pricing may deter further increase in consumption.

The High-Powered Expert Committee has assumed that non-revenue water constitutes 20 per cent of the total consumption. Accordingly, the per capita production norm works out to 168 lpcd for all size classes of cities.

While calculating the investment requirement figures for Kerala for the period 2011–31, capital costs have been calculated for households that were not covered by piped drinking water in 2011. For the rest of the population, O&M has been worked out on an annual basis for the entire population. For the subsequent years, Plan period-wise incremental population has been worked out to calculate the capital costs. O&M has been worked out on an annual basis for the entire population. Finally, the estimated investment expenditure, both capital and O&M, as a share of GDP has been calculated for every Plan period. These estimations have been worked out for all the services. If the population with no access to piped water is covered, then the share of expenditure in the GDP rises to 3.26 per cent for the 12th Plan. Inclusion of housing investment further increases the total investment requirements to 17.25 of the GDP. The state government should devise strategies to clear the backlog either in the 12th Plan or in a phased manner in the subsequent Plans.

Chapter 14

Sustainable Transport Strategy 2030

Kerala is completely dependent on road for passenger and freight transport which is imposing on natural resources. Single digit growth of roads accompanied by double digit growth in vehicles has created a challenging situation in Kerala. The goal is to build a sustainable transport network by developing an inter-modal transport network which will build in all the five options like road, rail and water. Inter-modal transit terminals will be built. Roads will be pedestrian and bike friendly to accompany the transit oriented development in urban cities. Decentralised transit network is suggested. Infrastructure is build so as to mainstream the concerns of gender (well-lit public transport, sub-ways etc.), senior citizens (use of escalators and elevators wherever possible) and physically challenged (low floor buses which open automatically such that wheelchairs can be wheeled in). Integrated transport network is the only solution for Kerala to preserve its unique environment along with creating a sustainable and inclusive transport network for its citizens.

14.1 Introduction

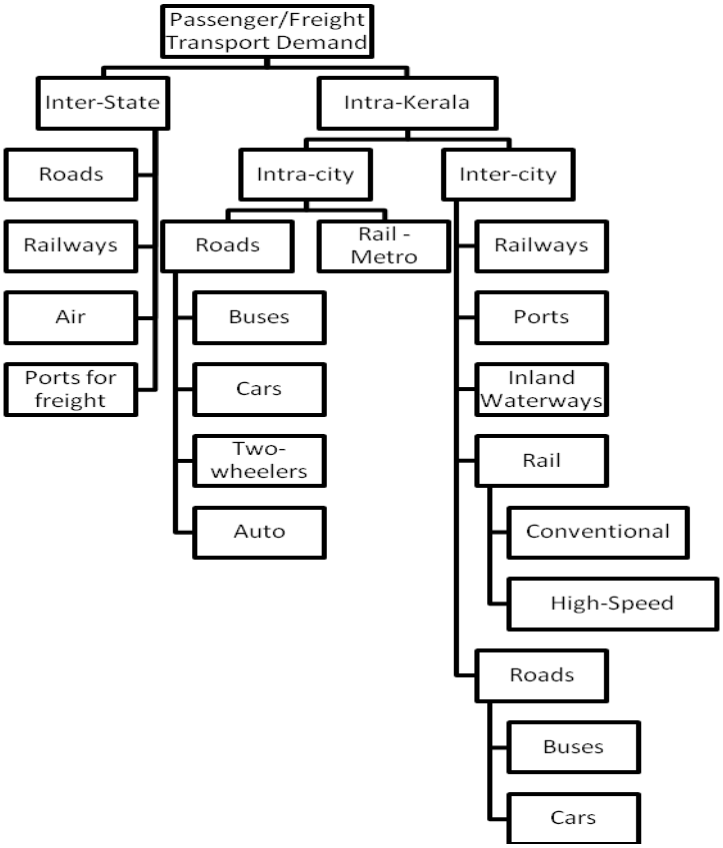
14.1.1 Transport infrastructure is tied to every sector of the economy. It is closely correlated with economic growth and reduction of poverty. Transport infrastructure is an input to economic growth. Simultaneously, demand for transport is a derived demand i.e. as income increases, demand for transport increases. However, infrastructure has a lock-in period of thirty years. Kerala is in a mode of economic transition and is visioning a knowledge economy. It has to plan ahead the complementary transport infrastructure which would help the state achieve its goals. In strategising for infrastructure in Kerala over the next twenty years, there are six things that have to be kept in perspective: geography, demographic changes over the next 20 years including population density and ageing, urbanisation, economy and future environmental challenges.

14.1.2 The uniqueness of Kerala's geography means that Kerala has five options for transport – roads, railways, airports, ports and inland waterways. Out of these, roads are the most popular for both passengers and freight traffic. Roads have the advantage of last mile connectivity. Further, as the Director of Ports, Dr Jacob explains, when India used to import wheat from abroad in the 1960s, it came in through the ports. As India grew self-sufficient in food grains and Kerala became dependent on wheat and rice from the rest of India, these domestic imports came in by the road, making it the most used transport option. Kerala has built a formidable road network connecting its villages. Despite such achievements, the road infrastructure has not kept

pace with the demand for road transport creating bottlenecks in moving freight and passengers; and furthermore with loss in lives due to accidents on roads, these together cause losses in GDP.

14.1.3 The way forward is to recognise that land is limited and given ecological concerns especially concerned with roads, one has to evaluate the most green and economically efficient way to move passengers and freight within Kerala and India. Kerala has to use all its five options efficiently and create an inter-modal transport system. Figure 14.1 illustrates the transport modes for passengers and freight travelling to and from Kerala and within Kerala.

Figure 14.1: Possible Modes of Transport



Source: Conceptualised by NCAER

14.2 Situation Analysis

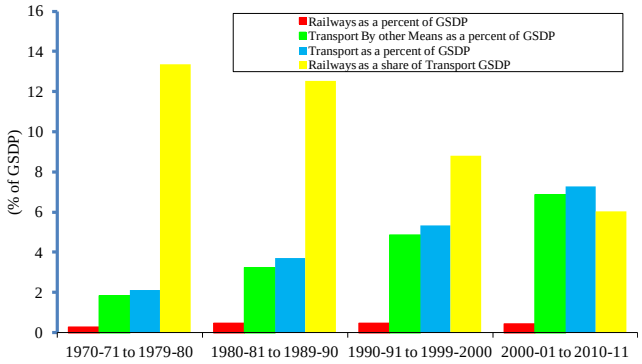
14.2.1 Direct Contribution of Transport to GSDP

14.2.1.1 Figure 14.2 shows that transport GSDP has increased its share in total GSDP of Kerala from 2.13 per cent in the 1970s to 7.29 per cent in the 2000s. Both railways and other

means of transport also show a larger share of GSDP over time. However, the patterns are completely different. While railways' share of GSDP after increasing from 0.29 per cent in the 1970s to 0.46 per cent in the 1980s has remained stagnant thereafter, other transport share has increased from 1.85 per cent in the 1970s to 6.85 per cent in the 2000s. The share of railways in total transport GSDP has shown a steady decline from 13.37 per cent in the 1970s to 6.04 per cent in the 2000s; with a dramatic decline between the 1980s (12.53%) and 1990s (8.8%).

14.2.1.2 Unfortunately, further breakdown of other transport data is not available at the state level. However, the data at the national level indicates that road transport service has the highest share of transport GDP. Road Transport formed 4.7 per cent of GDP in 2009−10. Railways formed 1.0 per cent of GDP and both air transport & water transport formed 0.2 per cent of GDP in 2009−10[1]. Further since 1999–2000, the growth has only taken place in road transport. Other modes have retained their shares of GDP while road transport has increased. Given national trends, one can infer that road transport dominates in Kerala too.

Figure 14.2: Transport as a share of GSDP has increased in Kerala, 1970−71 to 2010−11 (At Factor Cost by Industry of Origin in 2004–05 prices)



Note: 2010−11 data are quick estimates.
Source: Economics and Statistics Department, Government of Kerala

[1] Ministry of Road, Transport and Highways, Government of India. 2011. "Report of the Sub-Group on Policy Issues". http://morth.nic.in/writereaddata/linkimages/Policy%20Issues-9224727324.pdf. September. Accessed January 7, 2013.

14.2.2 Institutions

14.2.2.1 The Department of Transport is the nodal department in the Government of Kerala for transport related activities. The following line departments and organisations fall under this department. A point to note is that there is seemingly little coordination between the departments. The departments/organisations are:

- Motor Vehicles Department: Managing Motor Vehicles like issuing licenses, registrations etc.
- State Water Transport Department: Providing Water transport services
- Kerala State Road Transport Corporation: Providing Bus Transport
- Kerala Transport Development Finance Corporation
- Railways (Land Acquisition): Land Acquisition for setting up of Railway Coach Factory, Palakkad
- Airport Authority of India (Land Acquisition): Land Acquisition for Kannur, Thiruvananthapuram, and Calicut Airports
- Cochin Metro Rail Project (Land Acquisition): Acquiring Land

14.2.2.2 Each mode of transport has separate sets of institutions for construction of the infrastructure. Roads in Kerala consist of three broad categories – National Highways (NHs), State Highways (SHs) and Major District Roads (MDRs) and Village Roads. Appendix A.14.1 contains all the definitions related to roads. "The Central Government is responsible for the development and maintenance of the NHs. The development and maintenance works of the NHs are being implemented on an agency basis. The State Governments (State PWDs), Border Roads Organisation (BRO) and National Highways Authority of India (NHAI) implement the development and maintenance works on NHs"[2] [3]. The SHs and MDRs are managed by the Public Works Department (PWD) of Kerala. There are several wings under the PWD. They are:

- The Kerala Road Fund Board is a professional body that looks after the fund management affairs of the Kerala State Public Works Department. It primarily oversees and manages non-budgetary funds and deploys such funds to implement innovative roads and other related infrastructure. The Kerala Road Fund Board aims to bring in greater private sector participation into developmental activities.

---

[2] Ministry of Road Transport and Highways, Government of India. 2012. *Basic Roads Statistics 2008−09, 2009−10 and 2010−11*. New Delhi. August 6.

[3] The National Highways Authority of India was constituted by an act of Parliament, the National Highways Authority of India Act, 1988. It is responsible for the development, maintenance and management of National Highways entrusted to it and for matters connected or incidental thereto. The Authority was operationalised in Feb, 1995. http://www.nhai.org/.

- The Kerala Highway Research Institute is a research institute of the PWD connected with improving the quality of the roads.
- The Roads and Bridges Development Corporation (RBDCK) is a corporation established and fully owned by the Government of Kerala and has been incorporated as a limited company under the Companies Act 1956 on 23rd September 1999. RBDCK mainly deals with the properties and assets comprising movables and immovables including land, road projects, railway overbridge projects, toll collection rights and works under construction. RBDCK is a company under the Public Works Department of the Government of Kerala.
- The Kerala State Transport Project is a programme to modernise the state highways with external aid from the World Bank.

14.2.2.3 The village roads come under the local bodies with generous funding coming in from the Centre through schemes like the Pradhan Mantri Gram Sadak Yojana (PMGSY) and Jawahar Rozgar Yojana (JRY). There are two other types of roads-urban roads which are managed by the urban local bodies and project roads which are managed by the respective authorities like railway roads.

14.2.2.4 Railways come under the Ministry of Railways which is managed at the Centre. The major port, Kochi is also managed by the Centre. The construction of minor ports and airports are a state subject. The Department of Ports manages the minor ports. The Harbour Engineering Department is a separate specialised department as a service department for Fisheries and Ports. Last but not the least is the Kerala Coastal Shipping and Inland Navigation Corporation which overlooks shipping of both passengers and freight, does Research and Development (R&D) in the sector and is involved in the construction of boats, amongst other things.

14.2.2.5 The National Transportation Planning and Research Centre (NATPAC) is a R&D institution under the Department of Science, Technology and Environment, Government of Kerala. It undertakes research and consultancy works in the fields of traffic engineering and transportation planning, highway engineering, public transport system, alternate options for transport system, transport energy, inland water transport and tourism planning and rural roads. The activities of NATPAC range from surveying to preparation of techno-economic studies, feasibility analysis, detailed project reports for infrastructure development projects involving multi-modal system of transportation covering road, rail, water, ports/harbours and airports.

14.2.3 Roads and Road Transport

14.2.3.1 Roads are the dominant mode of transport in Kerala as they are in India[4]. By March, 2011, the total road length in Kerala was 2,01,220 km (this forms 5.3 per cent of India's road network), 517.8 km road length per 100 square km (the highest in the country, with West Bengal at distant second at 337.1km per 100 square km) and road length of 602.68 km per one lakh population . The corresponding all India numbers as of March, 2011 were 142.68 km road length per 100 square km and road length per one lakh population at 387.57km.

14.2.3.2 The National Highways (NH) and expressways together is considered the primary road network in the country which carries 40 per cent of all national traffic and connects each state to the rest of the country. The secondary road network in India consists of State Highways and Major District Roads. We assume that the primary and secondary road network of Kerala carry the same proportion of traffic – 40 per cent each.

National Highways

14.2.3.3 The total length of the NHs in Kerala is 1,457 km i.e. it forms 0.72 per cent of the total road network of Kerala[5]. There are eight NHs that run through the state: NH Nos. 47, 17, 49, 47A, 208, 212, 213 and 220. Although the length of the NHs has remained the same since 2007−08, there has been improvement in quality in terms of widening of the roads. The share of roads which are four lanes and above has gone up from 6.9 per cent in March, 2010 to 8.2 per cent in March, 2011[6]. The share of NHs which is intermediate or single lane is 18.3 per cent has remained the same and the share of NHs which are two-lanes have declined to 74.9 per cent in March, 2011 from 76.2 per cent in March, 2010. All NHs are surfaced.

State Highways and Major District Roads

14.2.3.4 The total length of the State highways is 4,341km as of March, 2011, whose length has also remained the same since March, 2009. The SHs are 100 per cent surfaced and 99.9 per cent with bitumen/concrete. Out of this, 2,119 km of roads is standard single lane and 2,222 km of roads is standard double lane. The total length of the PWD roads (MDRs) is 18,890

[4] The statistics on roads have been taken from various reports of the Basic Road Statistics that is published by the Ministry of Road Transport and Highways unless mentioned otherwise. The Central Government data are used to enable comparisons with the rest of the country and the statistics contain relatively more in-depth data on quality of infrastructure. Wherever possible and relevant, we have supplemented with state level data.

[5] The PWD website of Kerala shows longer length of National Highways at 1,542km, State Highways is 4,655 km and Major District Roads is 17,117 km. These numbers do not affect the main argument laid out in the paragraph that the quality of the road network in terms of width is dismal.

[6] Appendix A.14.1 contains the definitions of single lane, two-lane and four lanes.

km. Hundred per cent is surfaced with 2.4 per cent surfaced with water-bound macadam (WBM). Out of which 11,340 km of roads is standard single lane and 7,550km of roads is standard double lane. The secondary road network comprising of SH and PWD form 11.5 per cent of the total road network.

14.2.3.5 Therein lies the paradox of Kerala that 12.3 per cent of the road network carries 80 per cent of the traffic (assuming the national level traffic loads of the primary and secondary road network). And out of this, 55.4 per cent of the network is single lane.

Rural Roads

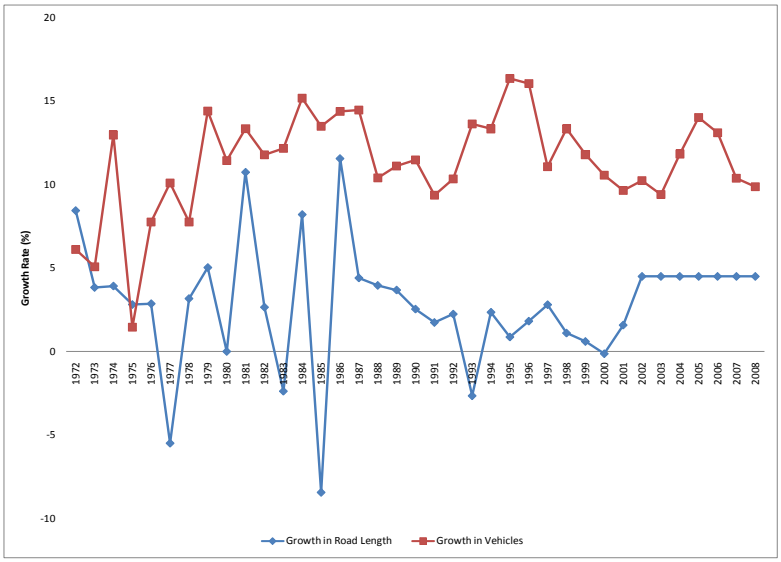
14.2.3.6 Kerala has been a pioneer building up the village road network. Kerala has 1.6 lakh km of rural roads as of March, 2011. It forms 77.1 per cent of the road network in Kerala. Out of the total rural road network only 46 per cent of the road is surfaced. One may argue that good rural road network has resulted in the urban sprawl as people live in villages with standard amenities and are still able to travel to work to the major cities. Urban sprawls typically feed into the car culture and Kerala is no different.

Road Transport

14.2.3.7 Kerala had 6,072 thousands of registered motor vehicles in March, 2011[7]. Between 2001 and 2011 it had experienced a compounded annual growth rate of 11.1 per cent in registered motor vehicles[8]. The number of vehicles per 1000 population for Kerala in March, 2011 was 182[9]. The number of vehicles per 1000 population was the highest in Ernakulaum (291.9) and lowest in Wayanad in 2010−11 (83.1)[10]. The number of vehicles per 1000 population in 2009 for India was 18, China, 47 and the USA 507[11]. In sum, the road network has not been able to keep up with the growth of vehicles (Figure 14.3) as the growth rate in motor vehicles (double digits) outpaced the growth in roads (single digits).

[7] Ministry of Road Transport and Highways, Government of India. 2012. Road Transport Year Book 2009−10 and 2010−11. July.
[8] Ibid.
[9] Ibid.
[10] State Planning Board. 2013. *Kerala Economic Review 2012*. Government of Kerala, Thiruvananthapuram.
[11] World Development Indicators, World Bank.

Figure 14.3: Growth Rate of Roads and Motor Vehicles, 1972−2008, (%)



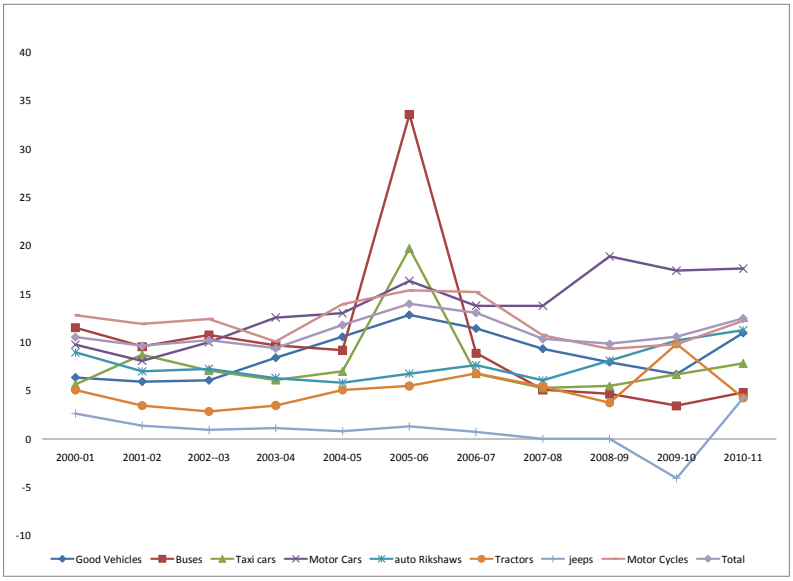
Source: State Planning Board. 2013. *Kerala Economic Review 2012*. Government of Kerala, Thiruvananthapuram

14.2.3.8 The data on registered motor vehicles show that motorcars have led the growth in total motor vehicles over the last five years (Figure 14.4). Further, when we decompose total motor vehicles for 2010−11, we find that motorcycles form 59.5 per cent of total vehicles, followed by motorcars (17.5%) and then auto rickshaws are 8.5 per cent. In sum, 85.5 per cent of total vehicles on the roads are private vehicles! Buses form only 2.7 per cent of total vehicles. The Kerala Economic Review 2012 shows that out of 46,620 stage carriers, Kerala State Road Transport Corporation (KSRTC) only owns 5,803 buses. The share of the KSRTC (public sector) was barely 11 per cent in 2010−11 as opposed to 89 per cent of the private sector. Furthermore, of the 5,803 public buses, 1,672 (28.8%) are aged 10 years and above. The fares charged by KSRTC range from 55 paise per km in ordinary and city buses, to 110 paise per km in High-tech buses[12].

14.2.3.9 The Census 2011 shows that 20.5 per cent of households own a bicycle, 24.1 per cent of all households own a two-wheeler and 10 per cent of households own a four wheeler. In case of four wheelers, Kerala is ranked behind Chandigarh, Goa, Delhi, Punjab and Haryana.

[12] State Planning Board. 2013. *Kerala Economic Review 2012*. Government of Kerala, Thiruvananthapuram

Figure 14.4: Motor Vehicles growing at the fastest speed amongst all Registered Motor Vehicles, 2000−01 to 2010−11



Source: State Planning Board. 2013. *Kerala Economic Review 2012*. Government of Kerala, Thiruvananthapuram

Road Accidents

14.2.3.10 This mismatch between the roads network and growth in motor vehicles translates to an increasing number of roads accidents in Kerala. The state is (104) is ranked second behind Goa (237.3) in terms of road accidents per one lakh population in 2012[13]. Kerala had the highest number of persons injured per lakh of population (120) in 2012, followed by Tamil Nadu (116) and Goa (115). On the numeric, for the number of accidents per 10,000 vehicles, Kerala is ranked fourth (58) behind Sikkim (105), Jammu & Kashmir (72) and Madhya Pradesh (67) in 2012. Kerala is ranked low if one examines the number of persons killed per 10,000 vehicles (6.8) in 2012. The severity of road accidents i.e. number of persons killed per 100 accidents has gone up from 10.8 in 2009 to 11.3 in 2010 and 11.8 in 2011 and 2012.

Current Policies

14.2.3.11 Given the above scenario, the state government is trying to expand the road network using Public-private partnerships schemes. The Kerala State Transport Project is being

[13] All the statistics in the paragraph are from the following:
Ministry of Road Transport and Highways, Government of India. 2013. *Road Accidents in India 2012*. New Delhi.

implemented with the aid of the World Bank to upgrade the secondary road network in four phases. The other objectives of the programme are to improve road maintenance planning and management practices; reduce road accidents and fatalities along project roads; strengthen planning, technical and management capacities of key road sector institutions; implement reforms in the road sector to bring greater private sector participation; and pilot an inland water transport (IWT) project for testing approaches to correct the current imbalance in the nodal share between roadways and IWT in the State.

14.2.3.12 The National Highways Development Project has also been involved in Kerala to expand the NH road network. Similar to the rest of the country, Kerala has also run into road blocks of land acquisition, which only adds to the woes of the road network.

14.2.3.13 The Kerala PWD is e-ready. Itoffer services to citizens – informing them of shortest routes in roads, e-tendering, status of the road SHTP etc. However, the website needs to be regularly updated and more data on roads needs to be collected. The Kerala Police (this needs to be connected with the PWD and Transport Department) is also planning to build a GIS based road safety management system.

14.2.3.14 Presently, Kerala is caught in a vicious cycle where the urban sprawl and lack of public transport adds to the demand for cars and thereby roads but people are not willing to supply the land implying that the citizens of Kerala are stuck in a bad equilibrium.

14.2.4 Railways

14.2.4.1 The Southern Railway zone, headquartered in Chennai, controls the overall rail transportation in Kerala. The railway divisions at Thiruvananthapuram, Palakkad and Madurai jointly carry out railway operations in Kerala. The current length of railway line in Kerala is 1,257 kilometres (km) and covers thirteen railway routes. The density of route length is only 27.02 km per 1000 square km of land area. The total number of trains originating from Kerala is 83. There are two hundred railway stations in Kerala and 47 passenger train services in Kerala. There is no rail connectivity in districts like Idukki and Wayanad. Kozhikode is the nearest railway station for the Wayanad district and Ernakulum is for Idukki

Stagnant Freight Traffic and Positive, albeit low Growth in Passenger Traffic

14.2.4.2 The share of goods traffic earnings of Kerala to the rest of the country between 2003–04 and 2010–11 is stagnant (Figure 14.5). However, the share of passenger traffic earnings of Kerala to the rest of India is showing an increase, albeit a slow one between 2003–04 and 2010–11 (Figure 14.5).

Figure 14.5: Stagnant Kerala Railways (% Share of all-India)

Sources: Indian Railways Annual Statistics, various issues and estimation by NCAER

Backward Linkages of the Railways Sector

14.2.4.3 Railway transportation is vital to the movement of both freight and passengers which is also an important industry to a national economy. Railway transportation is responsible for providing domestic freight and passenger services. The contribution of railway transportation service is estimated using Kerala-specific Input-Output (IO) table. There are two estimates. The first one was estimated by R.H. Dholakia in 1988, while the second one is the estimation done by Ramesh Kohli in 2010. The present exercise has used both the estimations for the purpose of observing (a) historical transition and (b) importance of the backward linkage of the railway transportation in different product categories.

14.2.4.4 The total backward linkage derived from Dholakia's IO estimation for 1988 and NCAER's Kerala IO is shown in Table 14.1. The estimation clearly shows a structural shift of coefficient and the importance of railway transportation services for the economy of Kerala. Firstly, the overall backward linkage of railway transportation has gone up from 1.85 to 1.91, which is a significant contribution. In 2010, Rs 100 investment in the railways would impact output by Rs. 191. Second, sectoral linkages too are shown to have undergone transition in which, other manufacturing, electricity, construction, mining along with trade and financial services have shown the strongest backward linkages.

Table 14.1: Backward Linkages of the Railway Sector

1988			*2010*		
Sectors	***Backward Linkage***	***Rank in terms of importance***	***Sectors***	***Backward Linkage***	***Rank in terms of importance***
Railway transport services	1.025	1	Railway transport services	1.002	1
Construction	0.157	2	Other manufacturing	0.321	2
Other services	0.096	3	Electricity	0.106	3
Petroleum products	0.083	4	Construction	0.088	4
Rail equipments	0.078	5	Mining	0.088	5
Crude petroleum & natural gas	0.062	6	POL, rubber, plastic	0.061	6
Mining	0.053	7	Trade	0.040	7
Electricity	0.051	8	Financial services	0.038	8
Other transport service	0.051	9	Chemicals	0.035	9
Iron & steel	0.041	10	Other transport service	0.025	10
Electrical machinery	0.032	11	Real estate and business services	0.020	11
Non-metallic mineral products	0.017	12	Non-metallic mineral products	0.013	12
Other chemicals	0.014	13	Medical and health	0.013	13
Other manufacturing	0.013	14	Wood and paper	0.010	14
Wood and paper	0.012	15	Electronics and communication equip	0.009	15
Total	1.852		Total	1.912	

Source: Appendix Table 4, Dholakia, Ravindra H and Bakul H Dholakia (1988), Working Paper, 747, IIM Ahmedabad, Calculation is done by NCAER Team.

Overburdened Railway Network of Kerala

14.2.4.5 Kerala's railway infrastructure seems to be overworked when one compares it to other developed and developing countries. For example, a country like Netherlands has double the total rail line of Kerala but carries less freight and passenger traffic (Table 14.2). The above results are not surprising especially if one reflects on the fact that the density route length of Kerala has remained the same for over a decade at 27.02 per thousand square kilometres. In contrast many states have seen increases in their density route length. Bihar, for example, has

gone up from 36.55 in 2000−01 to 37.33 per thousand square kilometres in 2008−09, Tripura from 4.29 to 14.39 during the same period, West Bengal from 41.92 to 43.83 and Chandigarh from 72.73 to a whopping 145.45!

Table 14.2: International Comparison of Railways, 2010

Country	***Railways, goods transported (million ton-km)***	***Railways, passengers carried (million passenger-km)***	***Rail lines (total route-km)***
Brazil	267,700	N.A.	29,817
China	2,451,185	791,158	66,239
Finland	9,760	3,959	5,919
Germany	105,794	78,582	33,708
India	600,548	903,465	63,974
Israel	1,062	1,986	1,034
Japan	20,432	244,235	20,035
Kerala	5,258.33[†]	19,365.2[†]	1,050[#]
Netherlands	4,331***	15,400	3,016
Norway	2,092**	2,674	4,114
Russia	2,011,308	139,028	85,292
South Korea	9,452	33,027	3,379
Sweden	11,500*	6,774	9,957
UK	12,512*	55,019	31,471
USA	2,468,738	9,518	228,513

Notes: * 2009, ** 2005, *** 2004, # 2008–09, † 2010–11.

Sources: World Development Indicators

http://www.ircep.gov.in/AboutUs.html

Ministry of Railways, Government of India.2010–11 and previous reports. Indian Railways Annual Statistical Statements 2010–11.

Current Policies

14.4.4.6 The current policies include the following:

- Conversion of the remaining metre-gauge to broad gauge which is expected to be completed and operational by 2014.
- The current policies in railway development are geared toward development of railway transport within cities in order to create more public transport.
    - First project is the development of the metro connectivity in Kochi/Ernakulam.

- The second and third projects consist of setting up of monorail projects in the other two major cities of Kerala - Thiruvananthapuram and Kozhikode.
- In addition there is talk of north-south high-speed rail connectivity in Kerala.
- Intra-state, essentially, people use the long distance passenger trains to travel from one city to the other than the Shatabdi.
- Lately the rail network within Kerala has seen some activity with the beginning of the Mainline Electrical Multiple Units (MEMU) train between Kollam and Ernakulam (started on March, 18, 2012) and Kollam-Thiruvananthapuram-Nagercoil (Tamil Nadu) line (on 2 December, 2012). Unfortunately, the timing of the latter MEMU does not suit either students or office-goers.

14.2.5 Airports

14.2.5.1 Kerala has thee international airports which are located in the cities of Kochi, Thiruvananthapuram and Kozhikode. The Kochi airport is a joint venture and the other two are operated by the AAI. There is also a military airport in Kochi. Two other international airports on the anvil are in Kannur and Aranmula.

14.2.5.2 Kerala has been a pioneer in airport development. It developed the Kochi airport on a PPP basis in the period 1994−1999, the first to do so in the history of civil aviation in India[14]. Kochi is the fourth largest airport in Southern India after Bengaluru, Chennai and Hyderabad in passenger and cargo traffic.

14.2.5.3 Internationally the three airports cater to the Middle-East and South-East Asia. Domestically, Kochi is the best connected to other cities in India and has direct flights to Delhi and Mumbai. The other two are connected to the rest of the cities via the major hubs like Mumbai, Bangalore, Chennai and Hyderabad. There is no direct flight between Thiruvananthapuram and Delhi. Kozhikode and Thiruvananthapuram are also directly connected to Coimbatore. Surprisingly, there are very few flights between Kozhikode and Thiruvananthapuram.

14.2.5.4 Table 14.3 shows the passenger and freight growth rate between 2004−05 and 2009−10 for the three airports. Except for 2008−09, the year of the financial crisis, all three show robust growth. Surprisingly, Kochi and Thiruvananthapuram show double-digit growth in freight even during 2008−09. Even during the current period, we see that both Thiruvananthapuram and Kochi each had more than a million passengers traffic in the period between April'12−October'13 If one compares the corresponding period of April'11−October'12, one sees that all the airports experienced negative growth in passenger

[14] Kochi airport website. http://cial.aero/.

traffic except Srinagar, Port Blair, Thiruvananthapuram and Kochi. The good news is that all the three airports have experienced positive growth in freight traffic as well between April 2012 and October 2013.

Table 14.3: Growth Rate of Airports, 2004−05 to 2009−10 (%)

	Passenger Traffic Growth Rate (%)			*Freight Growth Rate*		
	Kochi	***Thiruvananthapuram***	***Kozhikode***	***Kochi***	***Thiruvananthapuram***	***Kozhikode***
2004−05	19.8	8.2	43.1	38.9	−9.9	35.4
2005−06	18.2	14.0	2.4	−4.2	3.9	1.4
2006−07	35.9	−12.3	18.0	7.5	−3.7	7.8
2007−08	30.5	80.9	16.2	10.2	35.7	−18.4
2008−09	0.4	−7.0	27.5	23.8	−1.6	38.2
2009−10	15.0	17.0	11.0	30.4	3.9	35.5

Source: Directorate General of Civil Aviation

14.2.5.5 What explains the resilient air traffic growth of passengers in Kerala? The two possible factors are tourism and migrant population. Table 14.4 shows the correlation between tourists and passengers domestic, international and total for each airport and the corresponding district. The surprising result is the weak correlation between tourists and air passengers in Kozhikode.

14.2.5.6 The Centre for Development Studies has carried out Migration Surveys in 1998, 2003, 2008 and 2011. Using the last three years of data and international passengers data for the same years (Table 14.4), the correlation between migrants and international passengers is strong (0.95) for Kozhikode and negative for Ernakulam (−0.92). Zachariah and Rajan (2012) mention the northward shift of emigrants and this correlation is a reflection of that.

14.2.5.7 The correlations show that tourists and emigrants are linearly associated with passengers but each airport is being driven by different dynamics.

Table 14.4: Correlations, 2002−03 and 2009−10

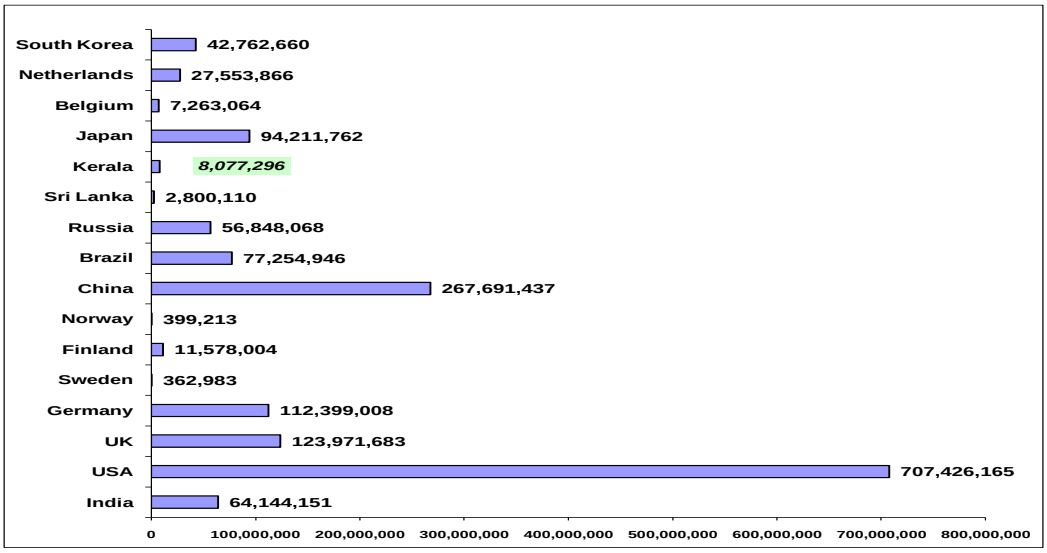
City	***Thiruvananthapuram***			***Kozhikode***			***Ernakulam***		
Type	***I***	***D***	***T***	***I***	***D***	***T***	***I***	***D***	***T***
Correlation Coefficient between passengers and tourists	0.89	0.71	0.91	0.60	0.51	0.89	0.85	0.84	0.88
Correlation Coefficient between passengers and foreign emigrants	0.79			0.95			−0.92		

Notes: I stands for International, D for domestic and T for total

Sources: Directorate General of Civil Aviation, Airports Authority of India, Kerala Tourism Statistics and Zachariah, K.C. and S.I. Rajan. 2012. "Inflexion in Kerala's Gulf Connection: Report on Kerala Migration Survey 2011". Centre for Development Studies Working Paper No. 250. September

14.2.5.8 Figure 14.6 shows that the number of air passengers carried in Kerala is higher than Belgium, a high-income country.

Figure 14.6: Air Transport, Passengers Carried (2010)



Sources: World Development Indicators, World Bank and Directorate General of Civil Aviation

Current Policies

14.2.5.9 Current Policies include developing two new international airports at Kannur and Aranmula. Aranmula is close to the Sabrimala shrine which attracts millions of devotees each year. This is going to be the first private Greenfield airport in the country. Unfortunately because of the poor condition of roads, it takes a long time for people to travel between Thiruvananthapuram and Sabrimala.

14.2.6 Ports

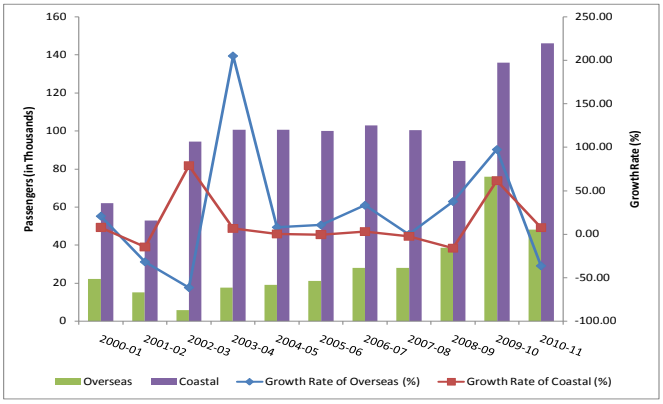
14.2.5.10 Kerala's spices had attracted people to its coast since the beginning of time, right from the time of the Greek philosophers. Thomas the Apostle was supposed to have come to Kerala in 52 AD. Jewish people escaping the wrath of the Romans also came to the Malabar Coast of Kerala. Vasco da Gama came in search of spices and landed in Kozhikode in 1498. Kerala has 590 km of coastline with 1 major port at Kochi and 17 minor ports.

14.2.5.11 Only four minor ports are operational[15]. These are considered as intermediate ports based on berthing, cargo handling and storage facilities available in them. Presently cargo operations take place only in Vizhinjam, Beypore, Azhikkal and Kollam ports. "Beypore is the second biggest port in Kerala after Kochi handling about 100,000 tonnes of cargo and 7,500 passengers per annum"[16]. In 2011−12, Beypore handled 95,323 Vizhinjam 6,162, Azhikkal 4,678.1 and Kollam 1,264 tons of cargo. The total cargo handled by the minor ports in 2011−12 was 107.4 thousand tonnes.

14.2.5.12 Kochi Port is the only major port in Kerala. It is spread over 827 hectares. It has a water frontage of 7.5 Km. The port has connectivity to the hinterland through NH 47, NH 17 and NH 49. Rail links to the Konkan and Southern Railway also give key rail access to its hinterland. An inland waterway connecting Kollam and Kottappuram on either side is being developed by the Inland Waterways Authority of India.

14.2.5.13 Figure 14.7 shows the coastal and overseas passengers handled by the Port over the last decade. The Coastal Shipping is driving the passenger traffic in the Kochi Port. The CAGR over the last ten years for Coastal and Overseas passengers has been a healthy 8.1 and 7.3 per cent, respectively.

Figure 14.7: Passengers Handled by Kochi Port, 2000−01 to 2010−11



Source: Ministry of Shipping

[15] The statistics in this paragraph are from the following reference.
Source: State Planning Board. 2013. *Kerala Economic Review 2012*. Government of Kerala, Thiruvananthapuram. Appendix 5.20 is used for the cargo carried in 2011−12.
[16] Deloitte Touche Tohmatsu India Private Limited. 2011. "Preparation of Strategy Road Map Cum Action Plan for Development of Coastal Shipping in Kerala". June.

14.2.5.14 Table 14.5 shows the cargo traffic handled by the Kochi port. The CAGR between 2000−01 and 2010−11 is 3.1 per cent[17]. The Kochi port accounted for 98 per cent of cargo traffic in Kerala in 2010−11. Cargo traffic is also decomposed in two parts – overseas and coastal. The Kochi port handles most of the overseas cargo traffic. Coastal cargo accounts for 37 per cent of the cargo traffic at the Kochi port. The commodity that is driving the cargo traffic at the Kochi port is Petroleum, Oil and Lubricants (POL) – the share amongst commodities imported is 80 per cent and share amongst commodities exported 66 per cent (2009−10). Of course spices continue to form a significant import (2%) and export (5%) of Kochi's port operations.

14.2.5.15 The cargo traffic handled by the minor ports also showed a CAGR of 2.8 per cent between 2000−01 and 2010−11. The minor ports handle 80 per cent of the coastal traffic. The two major imports at the other ports in 2008−09 were wheat (39%) and soda ash (40%). Coastal exports from the minor ports consisted of Cement (15%), Metal (30%) and Miscellaneous items (55%). Most of the cargo from Beypore port goes to Lakshadweep.

14.2.5.16 There is a very high correlation of 0.95 between GDP Industry and Total Cargo Traffic of Kerala (2000−01 and 2010−11).

Table 14.5: Cargo Traffic Handled at Kerala ports in '000 tonnes, 2000−01 and 2009−10

Year	*Cochin*	*Other Ports*	*Kerala*
2000−01	13,144	94	13,238
2001−02	12,059	127	12,186
2002−03	13,024	89	13,113
2003−04	13,572	58	13,630
2004−05	14,103	81	14,184
2005−06	13,888	135	14,023
2006−07	15,257	172	15,429
2007−08	15,810	104	15,914
2008−09	15,494	131	15,625
2009−10	17,429	119	17,548
2010−11	17,873	124	17,997

Source: Ministry of Shipping

[17] The statistics in this section have been taken from this report unless and until otherwise mentioned. Deloitte Touche Tohmatsu India Private Limited. 2011. "Preparation of Strategy Road Map Cum Action Plan for Development of Coastal Shipping in Kerala". June.

Table 14.6: Cargo Traffic Handled at Kerala Ports (in '000 tonnes)

Year	*Overseas*	*Coastal*	*Kerala*
2000−01	7,354	5,884	13,238
2001−02	7,032	5,154	12,186
2002−03	8,347	4,766	13,113
2003−04	9,830	3,800	13,630
2004−05	10,365	3,819	14,184
2005−06	9,842	4,181	14,023
2006−07	10,862	4,567	15,429
2007−08	10,670	5,244	15,914
2008−09	11,111	4,514	15,625
2009−10	11,898	5,650	17,548
2010−11	13,159	4,838	17,997

Source: Ministry of Shipping

14.2.7 Inland Waterways

14.2.7.1 Kerala has 1,548 km of navigable waters with 840 km of navigable rivers and 708 km of canals[18]. The West coast Canal from Kottappuram to Kollam with Udyogamandal and Champakara canals has been declared National Waterways No. 3 (NW3) in 1993. It is 205 km long.

14.2.7.2 Kerala had the highest number of inland water vessels in the country (9,060 in 2006−07). It grew from 4,202 in 2002−03[19]. Table 14.7 shows the cargo traffic handled by the three canals in NW 3. The CAGR between 2001−02 and 2011−12 is 2 per cent. The Udyogamandal Canal has shown the highest growth in cargo movement over the last ten years (CAGR: 9.2%). There is negative correlation between GDP Industry and cargo movement on NW 3.

[18] This section has been referred from the following report unless and until otherwise mentioned. Report of the Sub Group VIII (Inland Water Transport) of the Working Group on Ports and Shipping under National Transport Development Policy Committee (NTDPC). "Development of Inland Water Transport Sector by 2020 and 2030".
[19] Inland Water Transport, Ministry of Shipping.

Table 14.7: Cargo Movement in NW 3, 2001−02 and 2011−12 (lakh tonnes)

Year	*Champakkara Canal*	*Udyogamandal Canal*	*West Coast Canal*	*Total*
2001−02	3.06	3.44	5.15	11.65
2002−03	3.63	3.3	4.95	11.88
2003−04	4.04	4.24	5.34	13.62
2004−05	3.66	2.69	5.24	11.59
2005−06	4.58	2.44	4.53	11.55
2006−07	4.14	2.15	3.94	10.23
2007−08	2.15	1.2	3.43	6.78
2008−09	2.48	1.87	3.32	7.67
2009−10	1.87	2.4	2.56	6.83
2010−11	3.41	3.24	2.23	8.88
2011−12	2.92	8.67	1.85	13.44

Source: Inland Waterways Authority of India, Regional Office Kochi

14.2.7.3 The Kerala Shipping and Inland Navigation Corporation offers only cargo services. The State Water Transport offers passenger services. The state waterways network includes Kovalam to Kollam (74km) and Kottappuram (Kadungalloor) to Neeleswaram (349km), a total of 423 km[20]. This system has feeder canals with an aggregate length of 1,097 km. The State Government has set a minimum 14m width and 1.5m depth for state waterways. In addition, 5m overboard clearance is required. There are missing links on the state waterways which require land acquisition. The Beypore and Azhikkal ports have inland water connectivity. The Kollam port and the inland waterways are separated by 350m. An artificial link would require land acquisition.

14.2.8 Consumption of Petroleum Products

14.2.8.1 Table 14.8 shows the consumption of petroleum products. There has been a jump between 2006 and 2011 in the consumption of petroleum products. Aviation Turbine Fuel shows a huge jump, and can be explained by the activities of the three airports.

[20] Deloitte Touche Tohmatsu India Private Limited. 2011. "Preparation of Strategy Road Map Cum Action Plan for Development of Coastal Shipping in Kerala". June.

Table 14.8: Consumption of petroleum products (1000 tonnes)

	Aviation Turbine Fuel	*High Speed Diesel Oil*	*Light Diesel Oil*	*Naphtha*	*Furnace Oil & Low Sulphur Heavy Stock*	*Petrol*	*LPG*	*Superior Kerosene Oil*
2001	82	1,282	4	737	561	333	275	306
2006	136	1,334	3	244	316	447	456	227
2011	299	1,910	–	488	347	745	636	183

Source: Indian Petroleum and Natural Gas Statistics (2010–11) and previous issues. Ministry of Petroleum and Natural Gas, Economic Division, Government of India

14.2.8.2 There are ferry services in the following districts connecting the cities to the hinterlands: Alappuzha, Kottayam, Ernakulam and Kasaragod.

14.2.8.3 The analysis shows that Kerala is not using its potential fully in the case of inland waterways. Even the NCAER team visit to the NW3 shows unused capacity.

14.3 Projections

14.3.1 The projections are made separately for passengers and freight transport (given the physical infrastructure continues to grow at the same rate). The usual units of measurements for passengers and freight – passenger-million-km and freight-tonne-km are not available at the state level. Using assumptions from the national level, we have estimated passenger-million-km for roads, railways and airports. Then using Compounded Annual Growth Rate (CAGR), we have predicted 20 years in the future. The projections match the analysis and evidence above confirms the numbers. Plus a sensitivity analysis was done using several models. The results, unfortunately, do not change much. The projections are meant to highlight the challenges that Kerala will face if the state does not take corrective action.

14.3.2 For passenger traffic, we only use roads, railways and airports as the share of water transport is negligible. We make predictions for passenger traffic at the Kochi port in Table 14.9b. Table 14.9a shows that the roads sector dominates passenger traffic and over the next twenty years in a BAU scenario, will continue to increase its share. The share of railways will fall while the share of airports continues to remain at the same level.

Table 14.9a: Predictions Passenger Traffic, Roads, Railways and Airports

Year	*Passenger km in millions (PKM)*			*Share of Passenger km in millions (PKM)*		
	Roads PKM	*Railways PKM*	*Airports PKM*	*Roads PKM*	*Railways PKM*	*Airports PKM*
2011	932604	23369	1319	0.9742	0.0244	0.0014
2015	1356263	28790	2040	0.9778	0.0208	0.0015
2020	2165968	37367	3517	0.9815	0.0169	0.0016
2025	3459077	48500	6062	0.9845	0.0138	0.0017
2030	5524187	62949	10451	0.9869	0.0112	0.0019

Source: Computed by NCAER

Table 14.9b: Predictions of Kochi Port Passenger Traffic: Ports (in Thousands)

Year	*Overseas*	*Coastal*	*Total*
2011−12	53.0	154.2	158.3
2015−16	77.6	191.2	191.5
2020−21	124.8	250.1	242.8
2025−26	200.7	327.3	308.0
2030−31	322.99	428.3	390.6

Source: Computed by NCAER

14.3.3 Tables 14.10 a to show predictions for freight traffic in Kerala. Table 14.10a shows that roads dominate the freight traffic.

Table 14.10a: Predictions of Freight Traffic for Railways and Roads (million-tonne-km)

Year	*Railway*	*Roads (4 wheelers & above)*
2011−12	5,226	1,60,686
2015−16	5,097	2,14,996
2020−21	4,940	3,09,382
2025−26	4,788	4,45,204
2030−31	4,641	6,40,654

Source: Computed by NCAER

Table 14.10b: Predictions for Cargo Traffic in Kerala Ports (thousand tonnes)

Year	*Cochin*	*Other Ports*	*Kerala*
2011−12	18,430.81	127.48	18,558.29
2015−16	20,841.66	142.42	20,984.03
2020−21	24,303.42	163.57	24,466.84
2025−26	28,340.16	187.87	28,527.7
2030−31	33,047.4	215.78	33,262.55

Source: Computed by NCAER

Table 14.10c: Cargo Movement in NW-3 (in lakh tonnes)

Year	*Champakara Canal*	*Udyogamandal Canal*	*West Coast Canal*	*Total*
2011−12	2.92	8.67	1.85	13.44
2015−16	2.94	11.67	3.46	16.65
2020−21	2.97	16.93	7.55	21.76
2025−26	3.0	24.55	16.48	28.44
2030−31	3.02	35.6	35.98	37.16

Source: Computed by NCAER

14.4 Challenges

14.4.1 Kerala's challenges in the transport sector are summed up below:

- The road sector dominates the passenger and freight movement in Kerala even though there are other modes of transport in Kerala. Roads transport and air traffic movements match the traffic movements of developed countries.
- Unfortunately, in the case of roads, the physical capacity does not match the need, leading to traffic jams, high accident rates (which are one of the highest in the country). Road width of major road networks is woefully inadequate.
- Loss of time, property and lives ultimately cost us GDP growth.
- Land acquisition as an issue and is a huge challenge for Kerala especially given the limited land and high population density.
- Further private transport dominates public transport

14.4.2 The challenge for Kerala is manage land because for expanding the transport network, one needs that. Second is how to achieve a more balanced, efficient and sustainable usage of all its five transport options.

14.5 Strategic Way Forward

14.5.1 The strategic path forward has to be sustainable and should match the realities of geography, structural changes, urbanisation and urban development (of smart compact cities), ageing and economics. The desire is to achieve sustainable green infrastructure with little impact on the environment around us.

14.5.1 Vision

145.1.1 Green Sustainable and Safe Transport

14.5.2 Mission

14.5.2.1 The goal is to build a sustainable transport system i.e. "it has the capacity to support the mobility needs of people, freight and information in a manner that is the least damageable to the environment"[21]. It should achieve the 3Es – Social equity, Economic Efficiency and environmental sustainability[22].

14.5.3 Strategic Goals

14.5.3.1 The goal is to develop a regional, inter-state and international connectivity that caters to the economic and social aspirations of the people and also raise the state to the world arena of economy, education, health and tourism. Develop effective intra-city (city/town/UA level) integrated transport facilities that gives due importance for pedestrian facilities and non-motorised transport (including bicycles). Develop concerted strategies to increase the share of public transport and to reduce the number of private vehicles/ single passenger occupied vehicles on the roads.

14.5.3.2 Numerical indicators are suggested below to track the achievement towards these goals:

- Transport Shares
  - Share of road transport in Kerala in passengers-billion-km – 70%
  - Share of rail transport in Kerala in passenger-billion-km-25%
  - Share of water transport in Kerala in passenger-billion-km-4%

[21] Rodriguez, J. 2013. *The Geography of Transport Systems*. New York: Routledge, 416 pages. ISBN 978-0-415-82254-1. http://people.hofstra.edu/geotrans/index.html.
[22] Ibid.

- Share of air transport in Kerala in passenger-billion-km – 1%
- Share of road transport in Kerala in freight-ton-km – 60%
- Share of rail transport in Kerala in freight-ton-km-20%
- Share of water transport in Kerala in freight-ton-km-20%

- Sustainability
  - Measure of mass public transport within cities
  - Revamp public transportation system to increase its share from existing 33 per cent to total passenger traffic to 80 per cent by 2025.
  - Average Vehicle Occupancy: Average number of people in each vehicle/car: 5
- Safety
  - Number of Accidents per 10,000 vehicles:5

14.6 Strategic Framework

14.6.1 The key strategy for Kerala is to plan for an inter-modal transport system, an integrated transport system across the state. Rodriguez (2013) defines this as "the movements of passengers or freight from one mode of transport to another, commonly taking place at a terminal specifically designed for such a purpose"[23].

14.6.2 In the case of Kerala the transport strategy has to be synced with the regional spatial strategy which is dependent on building an efficient transport network. Trade and transport corridors are identified as important elements in this strategy. Smart green compact cities require strong infrastructure and sustainable transport systems. Further, a transit oriented development strategy as proposed in the urbanisation chapter requires that the corridors are seamlessly linked.

14.6.3 There are five pillars to this strategy. They are:

Pillar 1: Institutions
Pillar 2: Physical Infrastructure
Pillar 3: Economic Efficiency
Pillar 4: Social Equity
Pillar 5: Environmental Sustainability

[23] Rodriguez, J. 2013. *The Geography of Transport Systems*. New York: Routledge, 416 pages. ISBN 978-0-415-82254-1. http://people.hofstra.edu/geotrans/index.html.

Pillar 1: Institutions

Element 1: Establishment of new institutions and establish cooperation between the existing ones

Expert Transport Group

14.6.4 Establish an Expert Transport Group (ETG) functioning within the Transport Department of Kerala. The expert transport group will include transport and urban planners, representatives from various modes of transport, engineers, behavioural scientists and economists. Its responsibilities will be the following:

(1) Transport Plan for the next twenty years syncing with the regional spatial strategy and transit oriented development strategies mentioned in the Urban and Rural Spatial strategy chapters[24]
(2) Assess transport needs
(3) The Department of Transport shall every year release a 'Transport Monitor' giving the status of transport related matters and issues. This document would help planning for further actions.

Transport Regulatory Authority (TRA)

14.6.5 The Government may set up Transport Regulatory Authority for all the modes of transport. All transport operations shall be as per regulations and these shall be monitored. Modernisation of all public transport operations, use of GPS systems, ICT for public information systems etc. would become part of regulations.

Public Transit Authority

14.6.6 This authority will work under the aegis of the Department of Transport and will operate the transport network accordingly. It will also be subject to the regulations set by the TRA.

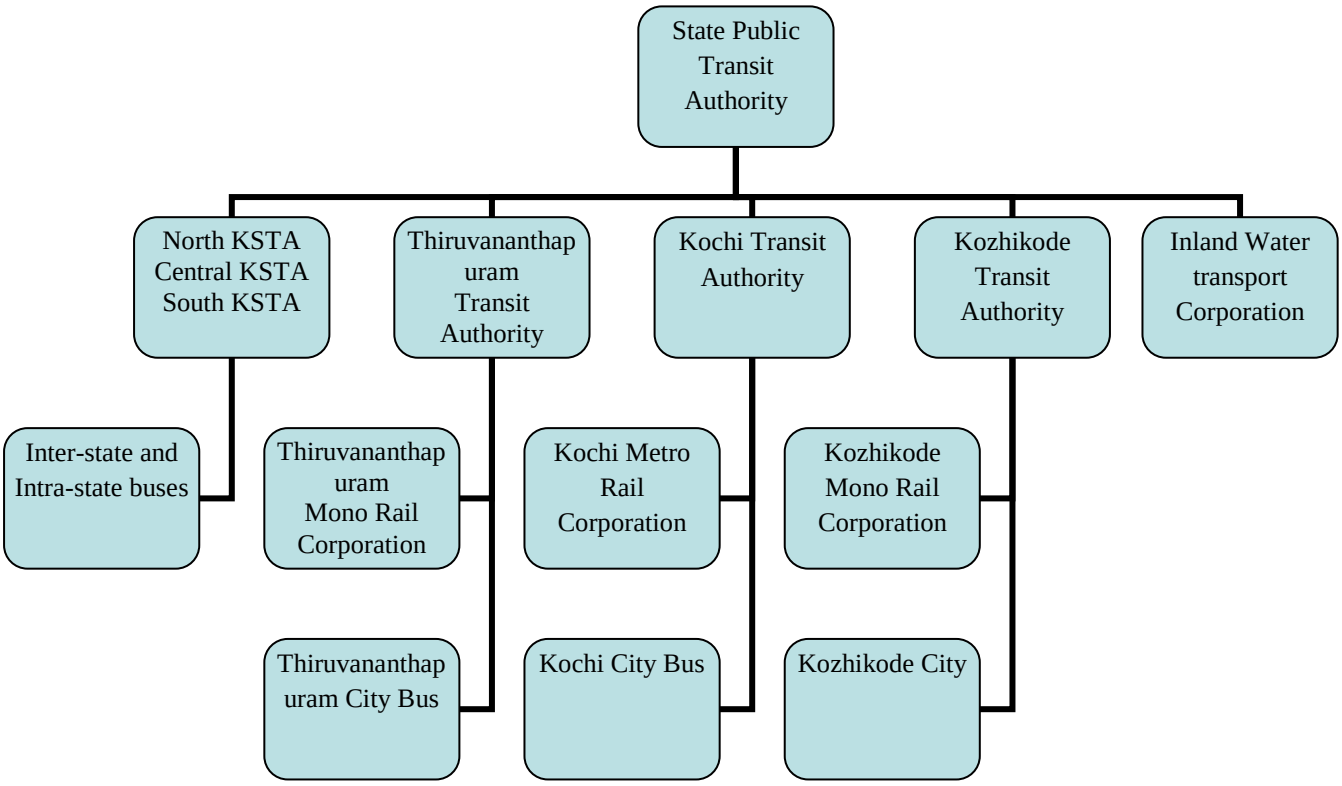
[24] Rodriguez (2013) clearly enunciates the difference between a transport plan and a policy. "*Transport policy* deals with the development of a set of constructs and propositions that are established to achieve particular objectives relating to social, economic and environmental development, and the functioning and performance of the transport system. *Transport planning* deals with the preparation and implementation of actions designed to address specific problems." The Kerala Perspective Plan 2030 is giving the transport policy. The plan will be implemented by the Expert Transport Group at the Department of Transport in Kerala.
Rodriguez, J. 2013. *The Geography of Transport Systems*. New York: Routledge, 416 pages.
ISBN 978-0-415-82254-1. http://people.hofstra.edu/geotrans/index.html..

14.6.7 A decentralised transport system is proposed in Figure 14.8.

14.6.8 The three urban agglomerations of Thiruvananthapuram, Kochi and Kozhikode will establish their own transit authorities to operate and manage all modes of public transport services in these three Urban Agglomerations (cities and their immediate peripheral areas)[25]. Public city bus networks may be placed directly under the Transit authorities. Water transport and rail transport may have their own independent organisations but working under the aegis of the transit authorities in the sense of matching schedules and tickets etc.

14.6.9 The Kerala State Road transport corporation (KSRTC) will be re-oriented from its present status. The KSRTC will be re-named Kerala State Transit Authority and relieved of its duties of running the bus network in the three urban agglomerations. It will be split into North, Central and South Zones and their management is separated with possibility to inter-relate them for route decisions and scheduling. Further they will work with other modes of transport to sync schedules.

Figure 14.8: State Public Transit Authority



Source: Conceptualised by NCAER

[25] Please look at the Metropolitan Transit Authority of New York for one example of the proposed system. http://new.mta.info/.

Motor Vehicles Department (MVD)

14.6.10 This organisation is already in the process of modernisation and restructuring and modernisation. System improvement and transparency mainly contribute to efficiency and to speedy delivery of services. Capacity building is another exercise, which has to be made a continuous program. An officer trained once has to undergo training again, if not on the same subject, but in newer areas.
A few recommended actions are:

(a) Modernisation and restructuring;
(b) Capacity Building – for officers of the Department separately and also jointly with Police Officers;
(c) Issue of Citizen's Charter;
(d) Transparency should be the key word of departmental functions;
(e) Licensing intermediate transport vehicles should be based carrying capacity of roads within an urban area / or in a rural region and the availability of parking stands;
(f) Close monitoring system shall be developed for taxis/autos, mini-vans and jeeps on hire.

Coordination between Physical Infrastructure Providers

14.6.11 The Public Works Department (PWD), Railways, Inland Transport Authority, Airports and Coastal shipping will coordinate to build transport infrastructure and operations and maintenance (O&M) on existing ones.

Element 2: Private Transport

14.6.12 Private Buses may continue to ply intra and inter-state buses. Within the urban agglomerations, they may be eased over time due to better availability of public transport. The TRA will regulate and the MVD will monitor the operations of the private bus systems on an annual basis. Intermediate transport has been mentioned before. It will also be subject to the regulations of the TRA licensing and monitoring will be carried out by the MVD.

Element 3*:* Stringent Road Driving Laws

14.6.13 Road driving laws need to be modified to standards adopted in European countries[26]. A carrot and stick policy may be used to reward and punish good driving. Of course,

[26] Please look at these websites for further reference and guidance.
a. European Commission on Road Safety: http://ec.europa.eu/transport/road_safety/index_en.htm.
b. Oregon Department of Motor Vehicles: http://www.odot.state.or.us/forms/dmv/37.pdf.

the KPP 2030 recognises that it may not be possible for the state to change all laws at the state level but this may be used to push the Central Government to adopt more stringent policies. Given the pervasive alcohol problem in Kerala, it is recommended that a zero tolerance policy is adopted.

Element 4: Adoption of ICT

14.6.14 Adoption of ICT is key to enable the inter-modal transport network. For example, intelligent transport systems, usage of GPS on public transport, smart licenses, using ICT in traffic lights system, informing public about traffic schedules will all be supported by usage of ICT. Usage of social media to converse with the public especially on road jams is extremely popular around the world and has met with success in Delhi.

14.6.15 UID linked driving records may be maintained and be made available to the public for a small fee to check on driving backgrounds of individuals.

14.6.16 Laws and infrastructure have to go hand-in-hand for a safe travel experience.

Pillar 2: Physical Infrastructure

Element 1: Provision of Physical Infrastructure

14.6.17 Physical infrastructure has to be designed to support an inter-modal transport network. The land chapter discusses many solutions for land acquisition.

Design

14.6.18 The design of the physical inter-modal transport network will be in sync with the spatial strategy. Box 13.2 discusses Singapore and Copenhagen's strategies of building transport network even ahead of urbanisation to fuel the growth in a particular manner. As has been mentioned before, location of the central bus station next to the main railway station in Thiruvananthapuram is a good design element for inter-modal transport. The Anand Vihar metro station in New Delhi Delhi is another example. The metro station, Bus Terminus and railway station are all located in the same transit area making it very easy for passengers to travel. City buses and metro link the new international airport to the city in New Delhi.

14.6.19 The exact designs will be part of the Transport Plan of the state. It may be a unified plan with further details left the urban agglomerations and urban local bodies.

Roads

14.6.20 Road widening and improvement is necessary for the state, since the importance of road transport would continue to dominate. When any road is widened, land for widening has to be taken equally from both sides. Road widening and improvement is an opportunity for geometric corrections. This possibility should be used. Roads and road intersections/junctions with bad geometrics cause accidents and results in traffic snarls.

14.6.21 Design standards of roads are crucial and have to be maintained and improved to international specifications.

- Primary road network should be well linked to the secondary road network, which in turn should be linked to the rural roads . Road construction, redevelopment, resurfacing etc. should be based on planned strategies and not on ad-hoc basis.
- Road designs may be done with 15 years traffic forecasts even with an inter-modal transport network. Advance planning should be done.
- Pedestrian friendly roads are critical even for highways.
- There is an increasing tendency to compromise on the width of right-of-way, carriage way, lane width and median width. Such scaling down of recommended standards may be damaging to the state. For instance, reducing the central median to 30 cm or 60 cm would make it difficult for vehicles to make 'U' turns, and when that happens the vehicles stand blocking a straight moving lane blocking the traffic or they reverse into the straight moving lane colliding with the vehicle behind. Compromises on road standards are at the cost of life and property.
- 'Four laning' or 'six laning' may not yield desired results if one lane on either side is used for parking of vehicles or for halting of buses as well as slow moving vehicles using speed track. The alternatives would be (a) provide bus bays off the carriage way wherever bus halts are proposed and should be strictly monitored, (b) provide off the carriage way (off- street) parking bays (make it on pay and park mode so that long duration parking of vehicles by nearby traders can be avoided and one has to pay to use the precious road space).
- Road Design is critical element of road design especially in a state like Kerala which has two monsoons.

14.6.22 National Highways and Expressways/Primary Road Network

- The National Highways link Kerala to the rest of the country and are the economic corridors of the highest order.

- Expansion of the road network not in terms of just quantity but quality is crucial. Roads need to be widened and riding surface quality improved as per prescribed standards to serve as fast movement corridors and to cater to freight movement.
- By-passes for cities will be built for local traffic.
- Subways or pedestrian flyovers at regular intervals will be critical for highways.
- Most of the container traffic, multi-axle trucks, oil tankers, national permit trucks, inter-state fast moving buses etc. move on the highways (NH and State Highways). These need lay-byes for driver relaxation, rest and for servicing. Lay-byes should be provided on the highways.

14.6.23 State Highways and Major District Roads/Secondary Road Network

The role of the Public Works Department is crucial.

(1) The PWD should prepare a strategy plan for road development in consultation with the overall plan of the ETG. Quality improvement in road construction shall be an important aspect, since this would save the state huge expenditure on road repairs and maintenance.
(2) The PWD road construction specifications may be improved to international specifications (ADB, World Bank etc.) and insisted upon for longer life of roads. It is the life cycle cost of the road that should be considered and not the initial cost of construction.
(3) Road maintenance protocol shall be issued.
(2) Inventory on all road bridges shall be prepared.
(3) Road signages are mandatory and should invariably be installed as necessary as lane marking.
(4) Good detailed road maps need to be prepared by the State PWD. Road and bridge inventories should be carried out and recorded. Such printed record of maps and inventories should be the base for additional construction, repairs, maintenance etc. This should be available for the academic institutions, researchers and the public.

All the above elements mentioned for NHs also holds for the secondary road network.

14.6.24 Local Roads

- Road inventory records and maintenance data should be made mandatory for the ULBs and Grama Panchayats.
- Hilly roads should be constructed with the specifications laid down at the central level.
- Rural roads should be widened and hundred per cent surfaced. Two-way traffic with pedestrian and bicycle friendly roads should be the minimum norms for designing the roads.

- Urban Roads
    - Transit-oriented development design of roads should be adopted by the urban agglomerations and bigger municipalities. All ULBs should be made to prepare perspective road network plan and road improvement plan for five years in consultation with the ETG. Based on the Perspective Plan for Road network, building lines should be declared and enforced. The permissive provision in the Municipality Act should be utilised. (In the absence of this building line declaration, buildings are constructed close to the existing road boundaries totally preventing any future widening of the roads)
    - City road planning should be related to Land Use Zoning. Land Use Zoning within a city / town should be such that inter-zone travels needs should be minimal.
    - Pedestrian and bicycle travels within the zone should be planned and encouraged (Box 13.3). This will make the crucial difference between people choosing to live in smart and compact cities. Even small roads, by-lanes will follow specifications set by the PWD and urban planners under the aegis of the ETG. This will have a tremendous impact on the quality of life of citizens.
    - Marking lanes and road signages are crucial in designing urban roads.
    - Designated, paid-parking places have to be in the design. Parking on-street during peak hours should be paid.
    - Roads should be designed as such that buses can be given right of way.
    - Good inter-modal interchange facilities (terminals/hubs) should be built so that one person travelling long distance by one mode of public transport can easily shift to another mode of travel /local transport at the same point.

Railways

14.6.25 The elongated shape of the state has made it easy to provide road transport. It is also a good fit for rail transport. Railway network offers a green transport option. Mass public rapid transport system connecting the North to the South is crucial. This particular mode needs to be encouraged for both passengers and freight traffic and holds the greatest potential to move both off roads. A perspective plan for railway development in Kerala needs to be built in consultation with the ETG.

14.6.26 Railway infrastructure design has to be built for passengers and freight.

14.6.27 <u>Passengers</u>

- Passenger rail network should include range of trains to facilitate travel both within cities and within the state;

- Within the cities – the metro and the monorail have been discussed. Further there can be more MEMU trains especially for the three main cities;

    - Very fast rail: High Speed Rail is being thought about from Thiruvananthapuram to Kasaragod;
    - Fast: Two Shatabdi trains also run along the North-South axis of Kerala. The Shatabdi should be extended to Kasaragod as well;
    - Slow: Slower trains which run along the length of Kerala and stop at all stations[27]. There is always the concern that Railways is a central subject. However Gujarat has got around this problem. Box 14.1 discusses one such example. The State can finance such a rail project and Non-resident Keralites may be asked to pitch in.

Box 14.1 : Kutch Railway Company Ltd.

The Ministry of Railways under National Rail Vikas Yojana has embarked upon strengthening rail connectivity to various ports. Recent developments in ports in Gandhidham area have established the need for an additional freight corridor to the northern hinterland. Accordingly, the Ministry of Railways decided to convert the existing meter gauge line between Gandhidham and Palanpur (301 km). After RVNL (a PSU under Ministry of Railways) came into being, this project was transferred to RVNL for execution. RVNL set up a Special Purpose Vehicle for gauge conversion of Gandhidham-Palanpur and the Kutch Railway Company (KRC) was formed with equity contribution from RVNL, Kandla Port Trust, Mundra Port & SEZ Ltd. and the Government of Gujarat to undertake the gauge conversion of Gandhidham-Palanpur meter gauge of 301km.

KRC was incorporated on 22nd January 2004 under the Companies Act, 1956. The Ministry of Railways had leased all the assets including land, buildings, bridges, etc. on the above line to KRC for a period of 32 years and authorized KRC to finance, construct, operate, maintain and manage the Palanpur - Gandhidham section.

Commercial operations on KRC section started w.e.f. 1st July 2006.

Source: http://www.kutchrail.org/

[27] The importance of the slow trains can be highlighted by the following comment from meetings with stakeholders in Kerala. "The rolling stock availability in Kerala leaves much to be desired. Many trains do not have enough bogies. The stations often witness fights between reserved passengers and railway staff since reserved sleeper class and A.C. Coach Passengers are asked to go in unreserved second class coaches. Moreover, the coaches are seen to be badly maintained or serviced and to be unsafe due to age. Accidents have happened because of these".

14.6.28 Freight

14.6.29 Building up the rail network for freight and connecting that with the shipping and inland water transport will help build the logistics industry in Kerala as proposed in the industry chapter.

- Rail Hubs with sufficient warehousing facilities;
- Efforts are on by railways to attract freight traffic. A new freight train 'Kairali Black' carrying bitumen was run recently to Falakata and New Guwahati Goods Shed from Kochi Refinery Ltd[28];
- Aggregate piecemeal traffic from various companies;
- Parcel movement is also being encouraged.

14.6.30 Railways stations need to be modernised and upgraded for both passengers and freights.

Airways

14.6.31 Five international airports given Kerala's geography is enough. The rest of the airports, if built, should all be domestic ones. Airports should be linked with the rail/bus network i.e. a person arrives in a city by air and can take the rail (metro/mono/light rail) to the city centre. This is very useful for tourists.

14.6.32 After feasibility studies, domestic airports may be built in the six identified knowledge hubs and district spokes. However, these airports should be small i.e. only planes with a capacity of 30 people should be able to land there. The maximum pollution occurs during take-off and landing. One should be very careful in what we wish for. However, the demand for land will be lower with these smaller sized airports. All the smaller airports should then be linked to the five international airports. Of course the airports should also be linked via bus/railways to the cities.

14.6.33 Helicopter services for hilly areas may be an added tourist attraction and also help reach emergency services.

Inland Shipping

14.6.34 India is far behind Germany and China in its usage of inland waterways. A detailed transport plan under the aegis of the ETG needs to be done to make it relevant. The

[28] Sundar, A. 2012. "Increased Customer Satisfaction and Earnings". Indian Railways. October.

waterways system should be built similarly to the highways system of national and state waterways.

14.6.35 Certain specific suggestions are:

- Build the required water transport infrastructure for NW III and commission the project as early as possible;
- NW III access should be developed for Kayamkulam and Kottayam towns with boat terminals in these towns';
- Develop the State waterway network and connect it to NW3;
- Initiate steps to extend NW III to Veli in Thiruvananthapuram rejuvenating, widening and improving the old canals. Build good water transport terminal at Veli backwaters linking it to the proposed Kochuveli transport hub – to facilitate easy inter-modal transfers and for city connection;
- Veli boat terminal could be linked to Veli – Kovalam water transport facility which can be planned along the existing Parvathy Puthenar (part of T.S. canal);
- The old AVM Canal can be rejuvenated at least up to the State border (this would greatly relieve the present road traffic problems along the Karamana – Parassala N.H.);
- Identify rivers flowing East – West which can be developed for water transport – perhaps linking them to backwaters – ensuring water flow throughout the year etc.;
- Along with development of water transport infrastructure, facilities should also be developed for inter-modal transfers – water transport to road transport and vice versa;
- Kochi city and Alappuzha town shall be prioritised for development of intra-city water transport with time targets assigning specific departmental responsibilities.
- The canals and rivers should be cleaned up and maintained

13.6.36 A note of caution is that inland water transport runs into conflict with fisher folk as faster boats disturb the fishing patterns, nets etc. A coordination mechanism or defined slow zones to preserve the fish or fixing particular path for the boats or fixing times for the boats so that all goals of faster transport and preserving the livelihood and eco-system are achieved. Any transport plan of Inland Water Transport will be done in consultation with the Department of Fisheries.

Coastal Shipping

13.6.37 The coastal shipping have made a detailed outline of their plans. They need to synced with the rest of the modes of transport under ETG for maximum benefit to the state.

- The State has only the Cochin Port to boast of, but the financial status of the Cochin Port Trust and the status of operations at the much hyped Vallarpadam Container Terminal show that much revamping is required to rejuvenate port operations at Kochi. The major constraint at Kochi is the shallow draft and the huge amounts spent annually on continuous dredging operations to keep the draft at 12 to 14 metres. The continuous heavy silt formation retards further developments. However, senior policy level interventions are required for the continued health of the Port.

- International Shipping route connecting Dubai, Colombo and Singapore is nowhere near any of the western side ports on India, not to speak of the eastern side ports. The big post Panamax ships that ply along the International Shipping Routes need a draft of more than 20 metres. It is in this context that the proposed Vizhinjam (Thiruvananthapuram) International Container Transshipment Terminal (ICTT) becomes relevant and important for the Country as a whole. At present cargo destined for India is transshipped at Dubai, Colombo or Singapore. The smaller ships into which international cargo is transshipped reach Indian ports, which means that we in India pay more for every kilogram of cargo brought through the existing ports in India. The proposed ICTT at Vizhinjam may save us this additional cost. However India and the State are still to realize the potential of Vizhinjam ICTT and its economic impact for the country.

- When Vizhinjam ICTT is commissioned the State may need to develop the other smaller ports along the Kerala coast to permit small ships to reach those destinations. There is good scope for development of Kollam, Kozhikode and Kannur ports. Coastal shipping becomes relevant in that context.

- Kerala is considered a major international tourism destination attracting tourists from all over the World to Kovalam, Varkala, Alappuzha, Kochi, Kannur and Kasargod along the coast and to Western Ghats and its forest attractions. Occasionally we receive tourist ships at Kochi and very rarely at Vizhinjam also, in spite of the fact that port and inland facilities for tourist traffic are not available there. There is need to develop tourist ship facilities at these destinations.

- Coastal shipping for passengers can be developed from Kovalam to Bekal with stops at the minor ports. This should have a positive impact on reviving the ports sector too. The ports sector can be inter-linked to the inland waterways. The ports, inland water sector should be well-integrated to the urban design of the cities. The cities can then have an added bonanza from using those areas as tourist attractions like Hamburg, Rotterdam etc.

13.6.38 Dredging costs for water transport have to be borne by the state.

Element 2: Financing

- The PPP model adopted by the state in developing various modes of infrastructure may continue;
- The Diaspora may be engaged through development of an Infrastructure Development Fund to finance the new transport network;
- Tolls on National Highways are a concern. Building bypasses for local traffic may address this concern;
- PPP models can be implemented for rural roads too. Many rural roads together are given to the concessionaire for attaining scale. Of course these roads are built on annuity schemes because traffic volumes will be low;
- Multi-modal logistic parks built on PPP mode may generate revenue;
- All intermodal hubs should be so developed that markets and commercial areas can develop around them. In South Korea, the metro stations are where people shop;
- Advertising revenue may be earned through billboards on the side of the bus, within the metro, mono, bus, in the transit terminals etc.
- Taxes may be used to finance infrastructure build up at the local level. We have recommended that municipalities impose congestion tax, vehicle tax etc. Congestion tax is a good concept except that public transport should be offered as an alternative. Right now private transport is the only alternative. Singapore has an elaborate and expensive tax system to discourage people from buying cars. However, it does offer an excellent public transport system. Therefore, the Singapore model can only be implemented after a good public transport system has been developed. A limited introduction of congestion taxes may help mobilise some finance.
- Pricing of mass public transport has to be reasonable. However, different pricing mechanisms may be tried out on a pilot basis. Dynamic pricing may be experimented with which is essentially charging different prices for different times of the day.

Pillar 3: Transport

14.6.39 Human beings work respond to incentives and not just financial ones. If they want to go from point A to point B, they will choose the option which is fastest. In Kerala's case, it is roads because it has the advantage of last mile connectivity. In order to change the behaviour and make people use mass transport, the system has to be made accessible to common citizens.

Element 1: Passengers

- Inter-modal transit stations have to be designed with options for superfast, fast, medium and slow buses, trains and ferries;
- The bus stand can be next to the ferries/train stations so that people can seamlessly move.

- Synched schedules and common tickets may convince people to switch from the road to other modes;
- Speed limits on roads[29];
- Buses will have the right of way in cities.

Intermediate Transport

13.6.40 The State recognises the fact that 'intermediate transport' consisting of taxis, three wheelers, mini-vans, jeeps etc. play an important sub-role in providing mainly local transport facilities for the people. However, their number and operations need to be strictly regulated and monitored. Permitting three wheelers (autos) more in number than the carrying capacity of a town/city not only result in increase in accident rate but also in chaotic traffic slowing down traffic.

13.6.41 Three wheelers should be limited to ply only for short distance travels. Government regulated private mini-bus/van and jeep services would be a welcome arrangement to serve mountainous regions /hilly tracts and interior areas having only narrow access roads. They could be run on 'seat hiring' basis as in KSRTC buses. Perhaps, with a view to reduce the number of 'single passenger occupied vehicles' from the roads in order to reduce traffic volume, it would be a possible target to limit the number of 'three wheelers' or else to eliminate them, provided good people friendly mass transport facilities are developed and made operational.

13.6.42 Water taxis may also be encouraged in coastal shipping and inland waters to provide public transport.

Vehicle Parking Facilities

13.6.43 The following facts need recognition to appreciate why vehicle parking facilities are required:

[29] Some accident studies in the Cherthala – Angamali stretch of the National Highway have shown that after widening the road to 4 lanes, accident rates have increased. Because of this the Police restrict the speed limit in the NH to 70 kmph. Highway widening to 4 lanes or 6 lanes should allow fast moving vehicles (60 mph or about 100 kmph is the speed on US Highways). Accidents happen when slow moving local traffic interferes with the long distance highway traffic. Often one can see local traffic crossing the highway unmindful of the fast movement of vehicles. It is necessary to construct local flyovers / underpasses across the highways for the crossing local traffic. It is also seen that local slow moving vehicles – autos, scooters and cycles - are driven across the traffic flow in 4-laned divided carriageway. It may be possible to construct alternative parallel roads or improve the existing roads for local traffic so that they do not have to come on to the highways. (This is done in the US where the old highways are retained and new freeways are made as access controlled roads.
Source: Comments from the State Planning Board.

(1) A parked vehicle on the carriageway obstructs the movement of vehicles, narrows the road space and become a cause for accidents
(2) Every square meter of space on the road cost the Government money. In a city/town area such land is very costly. With only great effort and overcoming many hurdles that Government or Local Government is able to acquire land required for widening /forming a road. Such road space should not be misused or held for a single person use. Further, shops, residences will have built in parking on some floors. Any opening of mall may only be allowed if they build in parking in some floors. Essentially multi-storied parking may be done but in a mixed use format.

14.6.44 With regard to city/town area, the Local Self Government Department (LSGD), Government of India has adopted and issued Urban Vehicle Parking Policy in 2010. This Policy speaks of the need for providing off street parking spaces and the options which can be explored by the Local Government for providing vehicle parking facilities. It is also advised there that such off-street parking spaces at the ground level or at multi-level can be provided with LSG funding or on PPP mode or by private investment and can be run on pay and park basis. The Policy also advises that even where on-street parking can be providing without intruding into the carriageway it should be on pay and park basis, so as to restrict the parking duration.

14.6.45 It is recommended that all the Municipal Corporations and the major Municipalities shall prepare Vehicle Parking Strategy Plans on the lines of the State Policy and draft action plans for implementation in a time bound manner. These Plans shall necessarily include designation of taxi and auto parking/waiting stands, in order to avoid the present tendency of arbitrarily locating them at road intersections, which not only obstructs drivers' vision but also becomes accident prone.

14.6.46 It is recommended that even of highways and other major district roads, parking vehicles on the carriageway should be prohibited. Wherever possible and when vacant land is available off the carriageway, such parking spaces may be provided.

14.6.47 Along highways, which are used for long distance travels, lay-byes may be provided for resting vehicles and crew.

Traffic Enforcement

14.6.48 The traditional concept of traffic management says about the '3 Es' – Engineering, Education and Enforcement**,** which is still valid. The education and enforcement parts are emphasized here. Necessarily these have to be preceded by Engineering (good roads, lane marking, road furniture etc and other transport infrastructure).

(a) Driving is a PRIVILEGE. DEFENSIVE DRIVING should be the mantra.

(b) Driver training, education and licensing – these are important, but is presently carried out in the traditional methods. Driver training has to be professional. The Department of Transport should issue 'training modules' and the private trainers has to adhere to that module. Many drivers (both private and professional) do not even the simple 'hand signals', often interesting to watch dramatic finger and hand movements of the drivers in the vehicles in the front. Road behavior and parking ethics is another missing element. Yet another recent observation is that majority of the drivers do not know 'lane-driving'. Most drivers cannot read 'road signs'. The worst offenders of these are perhaps the three wheeler drivers. Licensing of driver training schools and training of trainers (ToT) shall be carried out by the Motor vehicles department at regular intervals at different centres. The trainers should participate in these training programs in order to continue their licenses. Further, Kerala licensing norms for drivers should match international standards.

(c) Traffic Education through IEC means should be a continuous process. Even senior drivers perhaps do not know the basis rules/regulations. Road side hoardings, news paper notices, free brochures, education through electronic media etc are some of methods for continued driver education. Drivers of educational institution vehicles and professional drivers have to necessarily go through short duration training (on payment basis) once in five years to recapitulate what they have learned and to know about newer facts. A few of the oft seen mistakes are noted below:

- Lane driving: Slow moving vehicles and heavy vehicles have to go necessarily ride through the outer lane and the inner lane should be considered as an 'overtaking lane' or fast moving lane
- Round about: It is to be insisted that 'the vehicle which first entered the round about' or simply, the vehicle on the right has the right of way (preference). It is observed that in 'un-signalled' round-abouts vehicles squeeze through cutting the other vehicles
- No vehicle should be allowed to stop even for a while right inside a lane / carriageway. In case a driver wants to make enquiries or talk on the phone or for any other reason, he/she should stop the vehicle only off the carriageway and that too with proper 'left' signals.
- Overtaking and lane changing should be done only by using indicator lights
- Pedestrian traffic: Pedestrians shall walk on the right edge *(right side of the person)* of the road, if the road has no footpath on either side. In roads which have lane markings and raised footpaths this principle need not be insisted. However,

crossing the road shall only through marked crossings. Pedestrian crossings should be invariably marked on all roads.

- In signaled road intersections, if is often observed that stopping vehicles often violate the lane where one has to stand. A vehicle waiting on the left side suddenly turns to the right side road causing near accident situation and also stopping vehicle movement when the signal is on. This should be curbed.

(d) In spite of all engineering measures and driver education, enforcement has a positive effect in observance of road rules and traffic regulations. Enforcement should be carried out through vehicle inspectors/police who are trained in the task and show no partiality or bias. Except emergency vehicles everyone irrespective of one's status or position should be made to observe traffic rules. Every driving license should be based on mandatory 2 hour driver education (which could also be made on nominal payment basis to meet the training expenses).

(e) With changing infrastructure, all users of the new transport infrastructure need to be trained in using it i.e. using sub ways and pedestrian flyover. Behaviour needs to be inculcated.

(f) Community policing can be introduced to regulate traffic. Government will encourage creating a reserve of traffic wardens after giving necessary training to students, youth and other volunteers/social activists to regulate traffic at congested junctions during peak periods on voluntary/part time basis (NATPAC, 2011).

(g) All public transport vehicles should have GPS tracking system. Private transport vehicles can gradually be allowed to use GPS tracking system.

Element 2: Freight

14.6.49 A model can be created for freight logistics. Transport Hubs be created at Thiruvanthapuram, Kollam, Ernakulam and Trichur. Supporting warehouses can be built so that commodities may be aggregated for movement by trains or waterways.

14.6.50 Containers which can slide off from the boat to the train or bus should be encouraged. The NTDPC also suggests standardisation of waterways should be done to ensure depth and width which in turn enable in fixation of barge specification and configuration. The Deloitte study on ports is comprehensive where it talks about river-sea vessels being brought into use[30]. This is already being implemented in Kerala. The report also suggests building ship repair units in Kerala. The containers should also be intermodal.

[30] Deloitte Touche Tohmatsu India Private Limited. 2011. "Preparation of Strategy Road Map Cum Action Plan for Development of Coastal Shipping in Kerala". June.

14.6.51 The movement of bulk cargo including POL and mining goods should be completely transferred to waterways to move them. Here taxes and surcharges can be used to incentivize using water transport network. All cargo that is not time intensive also can be moved to the waterways.

Pillar 4: Environment

14.6.52 Mainstreaming environment in transport design is the key. As more people switch from private to mass transport, this will have a significant impact on the quality of air and on the quality of life.

Other action items include:

- Euro emission norms may be adopted;
- Incentives for clean fuel to be given;
- Regular Centralised Pollution check or at designated centres are all useful ways to control pollution
- Removal of old cars from roads

Pillar 5: Social Equity

14.6.53 Gender, aged and differently abled mainstreaming of the Kerala's transport network is necessary for social equity.

14.6.54 Stations especially railway and bus stations need to be designed for the aged, differently abled and for gender security. Well-lit stations equipped with lifts and escalators are a must in railway stations to address the needs of society. Subways or pedestrian flyovers should have elevators or escalators to ease movement.

14.6.55 Low floor buses are good for aged and differently abled and provide a superior quality road network to all. Low sized and low capacity mini buses can be introduced in rural low density routes[31].

14.6.56 The state transit agencies can offer:

- special services to the aged like taking them to the hospital if they have called for this service beforehand;

[31] National Transportation Planning and Research Centre. 2011. "Draft Transport Policy for Kerala: Discussion Paper". 31st March.

- special services for women especially if they are working after-hours for security. Tie-ups with ICT companies may bring in additional revenue to the transit authorities.

14.6.57 *Transport Economics* can be and should be encouraged in Economics degree courses. Also courses which cater to transport whether engineering or economics or inter-disciplinary should be encouraged at Universities.

14.7 Monitoring

14.7.1 Detailed transport surveys carried out on regular intervals will give information to the ETG on how people travel in Kerala. The following are the main transport statistics that may be monitored:

14.7.2 Table 14.11 shows the indicators that may be used to monitor the progress of Kerala's transport network towards a sustainable one.

Table 14.11: Indicators of Transports[32]

Type of Transport	Indicator	Metric
Road	Stock	Passenger Cars
		Goods Vehicles
	1st Registrations	Passenger Cars
		Goods Vehicles
	Performance	Passenger-million-kilometre
		Million-ton-kilometre
	Air Emissions	Carbon dioxide emissions
Rail	Performance	Passenger-million-kilometre
		Ton-million-kilometre
	Air Emissions	Carbon dioxide emissions
Inland Waterways	Performance	Ton-million-kilometre
	Air Emissions	Carbon dioxide emissions
Road Accidents		Injury Road Accidents
		Fatalities
		Injuries
		Fatalities per million inhabitants
		Injuries per million inhabitants

[32] United Nations Economic Commission for Europe website. http://www.unece.org/fileadmin/DAM/trans/main/wp6/publications/TryptiqueMainTransportIndicators_English.pdf.

14.8 Conclusions

14.8.1 The task is not easy. The challenges are myriad. However, challenges mean opportunities. Here Kerala can be a real game changer, be a leader and set an example for the rest of the states in setting up a sustainable transport network. Land is limited. It is not feasible to keep on expanding the road network. Kerala has to use all its resources efficiently. Therefore Kerala needs to look beyond roads and at other modes of transport. Further, good transport systems within cities/towns/areas/ should be publicly provided. Of course costs have to be regularly updated. This process will ensure that Kerala remains a green state.

APPENDIX A.14.1: TERMS and Definitions of Roads		
Sl. No.	**Terms**	**Definitions**
A. ROADS		
1.	Track	A path on the land much trodden by persons and animals.
2.	Cart Track	A land way for use by carts.
3.	Road	A way on land with a right of way for the public.
4.	Urban Road	A road within the limits of the area of Municipality, Military Cantonment, Port or Railway Authority.
5.	Project Road	A road within the limits of the area of a development project of a public authority for the exploitation of resources such as forest, irrigation, electricity, coal, sugarcane, steel, etc.
B. HIGHWAY CLASSES BY FUNCTION		
1.	Expressways	Expressways offer superior highway facility with higher specifications. It provides for more lanes, better surface, divided carriageway, controlled access grade separations at cross-roads and fencing etc. Expressways permits only fast moving vehicles and are meant to carry through traffic. The Expressway may be owned by the Central Government or State Government depending upon whether the route is a National Highway or a State Road.
2.	National Highways	The arterial roads of the country for inter-state movements of goods and passengers. They traverse the length and width of the country connecting the National and State capitals, major ports and rail junctions and link up with border roads and foreign highways.
3.	State Highways	The arterial roads in a State for inter-district movements. They traverse the length and width of a state connecting the state capital, district headquarters and important towns and cities and link up with the National Highways and adjacent State Highways.
4.	District Roads	The branch roads of the State and National Highways to serve as the main roads for intra-district movements. They traverse the length and breadth of a district to connect the area of production and marketing in the district to one another and to the National Highways.
5.	Village Roads	These roads serve as the feeder roads as well as the roads for inter village movements. They pass through rural areas connecting the village to one another and to the nearest road of higher category viz. District Roads, State Highways, National Highways, etc.

C. HIGHWAY CLASSES BY WIDTH		
Sl. No.	**Terms**	**Definitions**
1.	Below Standard Single Lane(BSSL)	Surfaced roads having clear carriageway width of below 3.75 M.
2.	Standard Single Lane (SSL)	Surfaced roads having clear carriageway width between 3.75 M and below 7.0 M.
3.	Standard Double Lane (SDL)	Surfaced roads having clear carriageway width between 7.0 M and below 10.5 M.
4.	Standard Multi Lane (SML)	Surfaced roads having clear carriageway width of 10.5 M and above.
D. ROAD SURFACE		
1.	Bitumen or Tar Macadam	A type of construction in which the fragments of coarse aggregate are bound together by bitumen applied either premix or grouting method.
2.	Bitumen Concrete Surfacing	A type of construction in which coarse and fine mineral aggregates are mixed with bitumen and laid not to the desired thickness.
3.	Black Top Surface	The surface of roads made with bitumen as a binder.
4.	Brick Paving	A paving composed of bricks laid in regular courses.
5.	Cement Bound Macadam	A surface in which a matrix of a cement sand mixture is interposed between two layers of road metal spread on the road and the whole mass watered and consolidated so that the matter works into the interstices of the road metal to produce a compact mass.
6.	Cement Concrete	A surface obtained by placing and consolidating cement concrete to required thickness.
7.	Earth Road	A road with the carriageway composed of natural soil.
8.	Gravel Road	A road with the carriageway composed of a consolidated layer of gravel.
9.	Water Bound Macadam	A type of surfacing in which stone fragments are first inter locked by rolling and then bound with smaller stone gravel etc. which enforced into the intersection by brimming, watering and rolling.
10.	Motorable	(i) For Plain Areas: Surfaced or unsurfaced road of minimum 3.0 M Carriageway width is motorable. (ii) For Hilly Areas: Surfaced or unsurfaced road of minimum 3.0 M Carriageway width having no horizontal curve of radii less than 14 M and grade not steeper than 7% is motorable. A bridle path is non motorable.

Source: Ministry of Road Transport and Highways, Government of India. 2012. *Basic Roads Statistics 2008−09, 2009−10 and 2010−11*. New Delhi. August 6.

Chapter 15

Energy 2030

Kerala has done extremely well in providing electricity to majority of the households, lowering down transmission and distribution losses and using the cleanest source of traditional energy, hydel power. However, there is a demand-supply gap. The challenge in this sector is to provide quality power to all at affordable rates. Supply has to be increased but the move should be towards using larger proportions of renewable energy over time.

15.1 Background

15.1.1 Efficient, reliable and competitively priced energy supply is a prerequisite for accelerating economic growth and human development. Energy is an important sector of the economy that creates jobs and value by extracting, transforming and distributing energy goods and services throughout the economy. During the past decade, the energy industry accounted for about 2 per cent of GDP in Kerala. Further, it directly contributes to increasing productivity and improving quality of life and reducing poverty. Likewise, a lack of access to reliable energy is a severe impediment to the process of economic growth and sustainable social development. For any developing country, therefore the strategy for energy development is an integral part of the overall economic strategy. Energy has different forms. This chapter focuses on electrical energy (power sector).

15.2 Energy reforms in Kerala

15.2.1 The waves of power sector reforms that have swept the world and the rest of India, have also affected Kerala's power sector. Until 2001, these reforms were moderate. Government initiated some steps to change the work culture in Kerala State Electricity Board (KSEB) to eliminate the inefficiency inherent in it. Besides, the Kerala State Power and Infrastructure Finance Corporation was set up for funding the power sector and other infrastructure projects. In August 2001, Kerala signed a memorandum of understanding (MoU) with the Union power ministry, expressing its willingness to undertake power sector reforms. As per the MoU, the KSEB was to be run on commercial lines and was also to securitise all its dues to the central public sector undertakings (CPSUs). The MoU required the state government to 'desegregate' the KSEB to make it accountable in respect of its functions of generation, transmission and distribution; accordingly, the KSEB was divided into three 'independent profit centres' having separate administrative set up and accounts in April 2002. The State Electricity Regulatory Commission, with 3 members, was also set up in November 2002.

15.2.2 Currently, under the Ministry of Power of Kerala, there are five line departments which manage the power sector in Kerala.

- **Kerala State Electricity Board (KSEB):** The KSEB, constituted by the Government of Kerala, by order dated 7.3.1957, under the Electricity (Supply) Act, 1948 is in the business of Generation, Transmission and Distribution of electricity[1].
- **Kerala State Power and Infrastructure Finance Corporation (KSPIFC):** KSIPFC is a Government Company promoted jointly by the Government of Kerala and KSEB to provide financial assistance for the development of the Power sector and other Infrastructure projects in the State of Kerala[2].
- **Kerala State Electricity Regulatory Commission (KSERC)[3]:** The KSERC determines the tariff for generation, supply, transmission and wheeling of electricity, wholesale, bulk or retail, as the case may be, within the State and regulates electricity purchase and procurement processes.
- **Energy Management Centre, Kerala[4]:** The Energy Management Centre-Kerala is an autonomous body under the Department of Power, Government of Kerala, devoted to the improvement of energy efficiency in the State, promotion of energy conservation, Small Hydro Power and encourages development of technologies related to energy through research, training, demonstration programmes and awareness creation.
- **Agency for Non-conventional Energy and Rural Technology (ANERT)[5]:** ANERT is an autonomous organisation established during 1986, now functioning under the Power Department. The objective of the Agency is to promote non conventional energy in the state. Its current policies to implement renewable energy include:
    - Kerala Renewable Energy Policy 2002
    - Wind Energy Policy 2004 including amendments in 2007 and 2008
    - Renewable Purchase Obligation and Renewable Energy Certificates

- **Chief Electrical Inspectorate**[6]: The main function of the Department is to ensure safety of all electrical installations as per the provisions of section 53 of the Electricity Act 2003.

---

[1] Kerala State Electricity Board website. www.kseb.in.

[2] Kerala Government Portal.
http://www.kerala.gov.in/docs/pdf/kspifc.pdf.

[3] Kerala State Electricity and Regulatory Commission website. http://www.erckerala.org/commission.aspx.

[4] Energy Management Centre website. http://www.keralaenergy.gov.in/pdf/Organisation_function.pdf.

[5] Agency for Non-conventional Energy and Rural Technology website. http://anert.gov.in/index.php/citichart.

[6] Kerala Government Portal. http://www.kerala.gov.in/docs/pdf/cei.pdf.

15.2.3 As of March, 2011, Kerala is one of the six states in India that has a state electricity board. It is the only one among the four southern states.[7] Kerala has two companies in the private sector in generation and one in distribution. That is the lowest compared to three other Southern states: Andhra Pradesh (13), Karnataka (5) and Tamil Nadu (7).

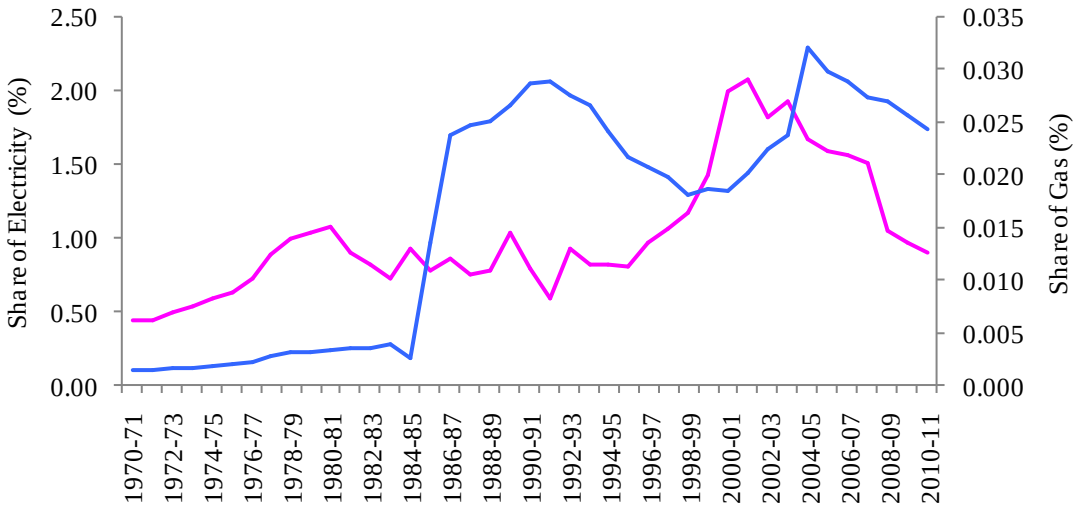
15.2.4 There is a growing realisation that the future of the State's economy is mainly dependent on power and hence the co-operation of all sections of society is necessary to achieve these goals. On one hand, attitudes towards privatisation/corporatisation of distribution of electricity need to change and on the other hand, environmentalists need to cooperate.

15.3 Situation analysis

15.3.1 Direct contribution of gas and electricity to GSDP

15.3.1.1 Both Electricity and Gas Service as a percent of GSDP show increases over the last forty years (Figure 15.1). The share of electricity has risen rapidly in the 2000s from around 0.95 per cent during 1990−2000 to 1.55 per cent during 2000−2011.

Figure 15.1: Share of Electricity and Gas as a percent of GSDP in Kerala (%), 1970−71 to 2010−11 (At Factor Cost by Industry of Origin in 2004–05 prices)



Note: 2010−11 data are quick estimates.
Source: Economics and Statistics Department, Government of Kerala

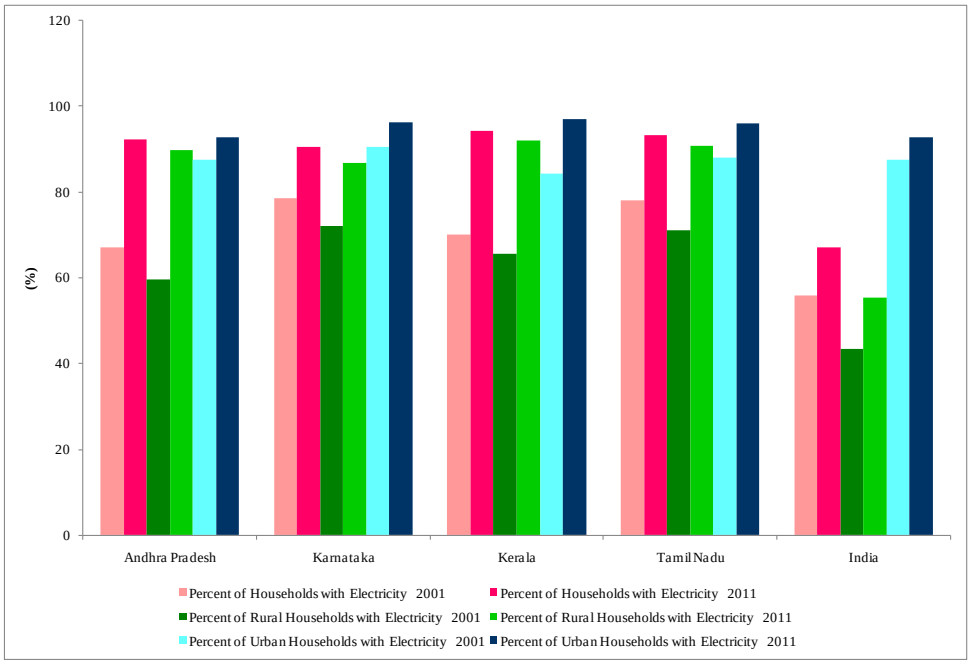
[7] Central Electricity Authority (CEA), Ministry of Power, Government of India. 2012. *All India Electricity Statistics: General Review*. July.

15.3.2 Electricity Consumption Patterns

Improvement in Access to electricity

15.3.2.1 Kerala has shown tremendous improvement in providing access to electricity. The percentage of households that use electricity as their primary source of lighting has gone up from 70.2 per cent in 2001 to 94.4 per cent in 2011 in Kerala. The corresponding number for all-India in 2011 was 67.3 per cent (Figure 15.2)[8]. Overall Kerala is ranked tenth amongst the 35 states and Union territories (UTs). Compared to the BRIC countries (Brazil, Russia, India and China), India is the worst with only 66 per cent of people with access to electricity[9].

Figure 15.2: Percentage of Total, Rural and Urban Households using Electricity as their Primary Source of Lighting, 2001 and 2011



Source: Census of India website: Office of the Registrar General and Census Commissioner of India. 2011

[8] The Annual Status of Education Report (ASER) 2012 survey is undertaken in all rural districts of India. The survey is designed to be a household survey. Within each district, 30 villages are randomly chosen and in each village, 20 households are randomly picked for a total of 600 households per district. The ASER 2012 reports that 97.2 per cent of households had electricity and 95.5 per cent of households interviewed had electricity on the day of the interview which indicates that the quality matches quantity in delivery of electricity in rural areas. The corresponding numbers for India are 74.5 per cent and 65.7 per cent, respectively.
ASER. 2013. *Annual Status of Education Report (Rural) 2012*. ASER Centre, New Delhi.

[9] One can interpret from the above numbers that Kerala's per capita access to electricity would be close to those of Brazil.

Low per capita consumption

15.3.2.2 The per-capita consumption of electricity in Kerala is **567 kWh** (kilowatt hour) as per the latest survey (2011–12). Latest available data till 2010–11 shows that India's per capita electricity consumption was **818.75 kWh** per capita[10]. Per-capita consumption of electricity shows growth above 9 per cent in 2010−11 and 2011−12 (Table 15.1).

Table 15.1: Consumption of Electricity in Kerala, 2007−08 to 2011−12

Year	*Total Consumption of Electricity (MU)*	*Growth Rate (%)*	*Per-capita consumption of electricity (kWh)*	*Growth Rate (%)*
2007−08	12,050		477	
2008−09	12,414	3.0	490	2.7
2009−10	13,971	12.5	474	-3.3
2010−11	14,548	4.1	519	9.5
2011−12	15,981	9.9	567	9.2

Source: State Planning Board. 2013. *Kerala Economic Review 2012*. Government of Kerala, Thiruvananthapuram

15.3.2.3 International comparisons show that India's per capita electricity consumption is lower than its peers (Table 15.2). One may interpret from this that Kerala's consumption is much lower than the national average and below the less developed and BRIC countries.

Table 15.2: Per capita Electricity Consumption (kWh per capita), 2009

Indicators	*India*	*USA*	*United Kingdom*	*Brazil*	*Russia*	*Mexico*	*China*	*Euro Area*
Electric power consumption (kWh per capita)	818.75*	12,914	5,692	2,206	6,133	1,943	2,631	6,589

Note: * this is 2010−11 data

[10] The CEA (2012) also shows that energy consumed per thousand population in Kerala is 4,36,555 kWh, which is the smallest among the four southern states. Energy consumed per square kilometer is 3,87,238 kWh, which is higher than Andhra Pradesh (2,62,879 (kWh) and Karnataka (2,25,395 kWh) but lower than Tamil Nadu (5,26,240 kWh).
Central Electricity Authority (CEA), Ministry of Power, Government of India. 2012. *All India Electricity Statistics: General Review 2012* (Containing data for the year 2010−11). July.

Source: World Development Indicators, World Bank

Patterns of energy consumption dominated by domestic consumers

15.3.2.4 Domestic customers are the largest consumers of power in Kerala. As expected for an economy with a large service sector, and not a very significant heavy manufacturing base, domestic and commercial electricity consumption is larger than industrial consumption (Table 15.3). Heavy industrial demand is actually declining in the state. Interestingly, agricultural consumption is becoming smaller from an already small base. This probably reflects the largely urban nature of the state, as also the fact that a significant proportion of agricultural activity is in the form of commercial plantations.

Table 15.3: Electricity consumption patterns in Kerala (MU)

	Domestic	***Commercial***	***Industrial LT***	***Industrial HT & EHT***	***Public Lighting***	***Agricultural***	***Others***
2001	4,675	828	648	3,136	181	350	501
2006	4,668	1,601	874	2,366	208	199	990

Source: Central Electricity Authority (CEA), Ministry of Power, Government of India. 2012 and previous reports. *All India Electricity Statistics: General Review*. July.

Low energy intensity

15.3.2.5 Agricultural and industrial energy intensity have declined in the state, which is not surprising given their shares in GSDP have gone down over time (Table 15.4). Public lighting retains its share. The domestic electrical energy intensity has declined. However, the commercial sector energy intensity shows an increasing trend.

Table 15.4: Energy Intensity in Kerala by Sector, 2001–2011 (Mwh per Rs lakh)

Year	***Domestic***	***Commercial***	***Industrial LT***	***Industrial ET and EHT***	***Public Lightning***	***Agricultural***	***Others***
2001	0.51	0.09	0.07	0.34	0.02	0.04	0.05
2006	0.34	0.12	0.06	0.17	0.02	0.01	0.07

Source: NCAER

13.3.2.6 Table 15.5 shows that India's energy intensity (Energy use (kg of oil equivalent) per $1,000 GDP (constant 2005 PPP)) is lower than Russia and China but higher than the

developed countries. Using the 2006–07 current GSDP numbers of Kerala, the Indian conversion rate and the total energy consumption of Kerala (includes electrical energy and consumption of petroleum products), we derive the corresponding energy intensity of Kerala. It was 35.96 in 2006. The corresponding number for India was 206 in 2006. Kerala energy intensity is really low in comparison to the rest of the world.

Table 15.5: Energy consumption in selected countries 2009−10

Indicators	***India***	***USA***	***UK***	***Brazil***	***Russia***	***Mexico***	***China***	***Euro Area***
Energy use (kg of oil equivalent) per $1,000 GDP (constant 2005 PPP)	199	171	99	131	335	131	273	121
GDP per unit of energy use (constant 2005 PPP $ per kg of oil equivalent)	5	6	10	8	3	8	4	8
GDP per unit of energy use (PPP $ per kg of oil equivalent)	6	6	11	8	4	9	4	10

Source: World Development Indicators, World Bank

15.3.3 Electricity Capacity and Generation

Low Growth in Generation capacity

15.3.3.1 Kerala has seen very low growth (average annual growth of 1.5%) in installed electricity generation capacity in the last five years. Its regional neighbours have been growing at a faster rate (Figure 15.3).

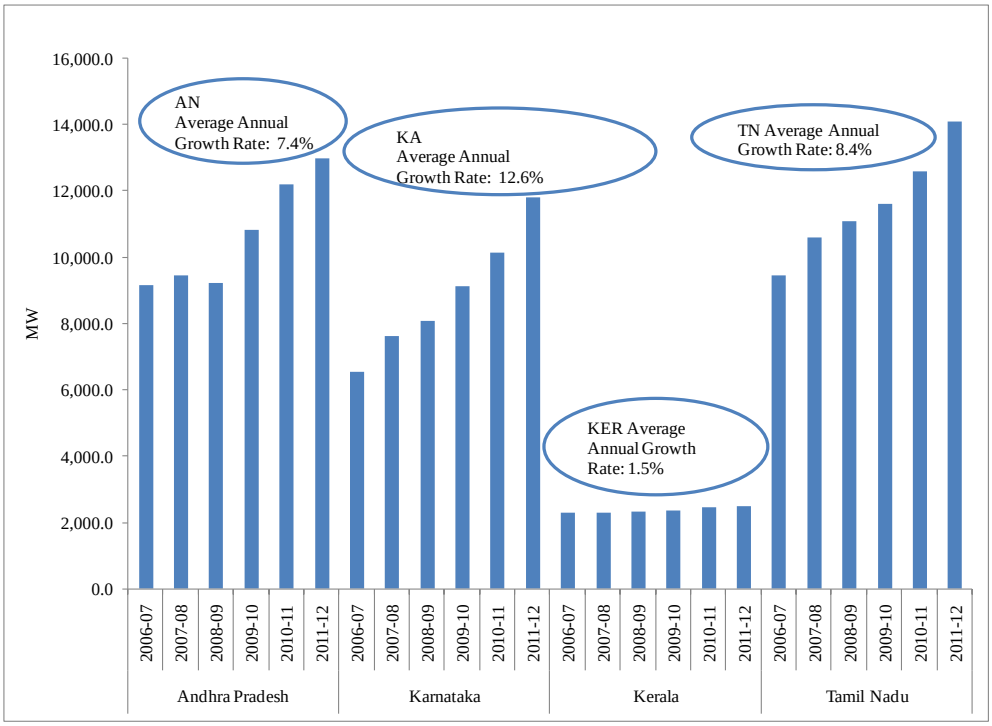
15.3.3.2 The Economic Review 2012 explains that to meet the additional generation requirement of about1,000 MW for the state during the 11thFive Year Plan Period, the KSEB had proposed to add about 610.50 MW of new hydel capacity generation during Eleventh Plan period but achieved only 210.54 MW (34 percent of target) at the end of the plan[11]. The main reason attributed to this shortfall is forest and environment clearance related issues including land acquisition.

15.3.3.3 A note of caution: The data published by the State Planning Board of Kerala in their Economic Review slight differ in magnitude to the published statistics of the Central Electricity Authority (CEA).Overall, trends of both sources are similar. Therefore, when only looking at Kerala, data from the Economic Review have been used. However, when for purposes

[11] Planning Board. 2013. *Kerala Economic Review 2012*. Government of Kerala, Thiruvananthapuram.

of comparison with other states, this report uses data from the Central Electricity Authority. The discrepancies in the data set do not affect the analysis because overall the conclusion remains the same.

Figure 15.3: Installed Electricity Generation Capacity, 2006−07 to 2011−12 (MW)



Note: MW stands for Megawatts

Sources: Central Electricity Authority. Southern Regional Power Committee. Annual Report 2011−12. Bengaluru and Central Electricity Authority. Southern Regional Power Committee. Annual Report 2010−11. Bengaluru

15.3.3.4 Table 15.6 shows the power system of Kerala. Including the installed capacity of the state from central sources i.e. its share in joint and central sector utilities (35.4%) boosts the capacity of Kerala significantly (Table 15.7). The percentage ownership of the generation capacity in Kerala are: Central (35.4%), State (59.5%) and Private (5.1%).

15.3.3.5 In contrast, the other southern states' reliance on Central sources is relatively low (Andhra Pradesh is 19.2 per cent, Karnataka, 11.2 per cent and Tamil Nadu, 19.8 per cent). The states own percentage shares in generation capacity are quite high: Andhra Pradesh (56.2%), Karnataka (54.3%) and Tamil Nadu (32.6%). Tamil Nadu (47.6%) has the highest percentage share of the private sector followed by Karnataka (33.8%) and Andhra Pradesh (24.5%).

Table 15.6a: Installed Electricity Generation Capacity, 2006−07 to 2011−12 (MW)

Year	*2007−08*	*2008−09*	*2009−10*	*2010−11*	*2011−12*
Installed Electricity Generation Capacity (MW)	2,662.24	2,694.75	2,746.19	2,857.59	2,872.79
Maximum Demand (System)-MW	2,745	2,765	2,998	3,119	3,348
Generation per annum-(KSEB Own)-MU	8,703.60	6,494.50	7,240.40	7,412.60	8,350.70
Import per annum- MU	8,074.60	9,628.98	10,199.96	10,512.30	11,270.70
Export per annum-MU	1,346.80	463.33	53.9	130.24	201.1
Energy Sales within state per annum-MU	12,049.90	12,414.30	13,971.10	14,547.90	15,980.50

Notes: MU stands for million units

Source: State Planning Board. 2013. *Kerala Economic Review 2012*. Government of Kerala, Thiruvananthapuram

Table 15.7: Installed Capacity in Kerala, March 2012 (MW)

Ownership Sector	*Modewise-Break up*				*Nuclear*	*Hydro (Renewable)*	*RES* (MNRE)*	*Grand Total*
	Thermal							
	Coal	*Gas*	*Diesel*	*Total*				
State	0.0	0.0	234.6	234.6	0.0	1,881.5	162.66	2,278.8
Private	0.0	174	21.84	195.84	0.0	0.0	0.03	195.9
Central	897.92	359.58	0.0	1,257.5	95.6	0.0	0.0	1,353.1
Total	897.92	533.58	256.44	1,687.9	95.6	1,881.5	162.69	3,827.7

Notes: *Renewable Energy Sources (RES) includes SHP, BG, BP, U&I, and Wind Energy
SHP=Small Hydro Project, BG=Biomass Gasifier, BP=Biomass Power,
U&I=Urban & Industrial Waste Power, RES=Renewable Energy Sources
MNRE=Ministry of New and Renewable Energy
MW stands for Megawatts; MU stands for Million Units
Source: Central Electricity Authority. 2012. Monthly Sector Reports.
http://www.cea.nic.in/reports/monthly/executive_rep/apr12/27-33.pdf. April.

Hydel energy dominates electricity generation

15.3.3.6 Majority of Kerala's own installed capacity comes from hydel power (82.6%). Table 15.7 shows that 53.4 per cent of the total installed capacity of Kerala (which includes shares from central and joint utilities) comes from renewable energy sources (hydel and others).

Internationally, Kerala is similar to Brazil in structure (Table 15.8). However, Kerala own installed capacity in hydroelectric power is not sufficient to meet the demands of the state.

Table 15.8: Patterns of Electricity Production by Source (% of total), 2009

Country/State	*Coal*	*Hydroelectric*	*Gas and oil*	*Nuclear*	*Renewable sources, excl. hydroelectric*
USA	45	7	24	20	4
United Kingdom	29	1	45	19	5
Brazil	2	84	6	3	5
Russia	17	18	49	17	0
Mexico	11	10	71	4	4
China	79	17	1	2	1
Euro Area	21.6	10.2	27.0	30.8	9.1
India	68.2	11.5	14.1	2.1	4.2

Notes: 1. The international data are in kwh and the shares have been calculated from those.
Source: World Development Indicators, World Bank

13.3.3.7 Analogous to the generation capacity, a vast majority of electricity generation in the state is hydel (Table 15.9)[12]. The associated plant load factors (plf), including auxiliary consumption, varies over time. Hydel generation, clearly, depends on the monsoon performance every year. The state relies on thermal generation, generally more expensive, in years that the hydel generation is lower due to poor monsoons.

Table 15.8: Electricity generation in Kerala (MU)

	Hydel	*Plf*	*Thermal*	*Plf*	*Others*	*plf*
2001	6,198	39%	2,867	53%	3	15%
2006	7,537	46%	790	12%	2	11%
2011	7,130	40%	1,627	23%	65	22%

Source: Central Electricity Authority

[12] Using the Economic Review 2012 data, one finds that the share of hydel power in the total available power went down from 49.4 per cent in 2007−08 to 39.4 per cent in 2009−10 and then increased to around 44 per cent for both 2010−11 and 2011−12.

15.3.3.8 Using the Economic Review 2012 data, one finds that the share of hydel power in the total available power went down from 49.4 per cent in 2007−08 to 39.4 per cent in 2009−10 and then increased to around 44 per cent for both 2010−11 and 2011−12 (Table 15.9).

Table 15.9: Details of Surplus/Deficit Power, 2007−08 to 2011−12

S.No.	***Particulars***	***Internal Generation (MU)***				
		2007−08	***2008−09***	***2009−10***	***2010−11***	***2011−12***
1.	Hydel Generation	8,327.5	5,839.28	6,466.3	7,095.7	8.058.01
2.	KSEB- Thermal Generation	374.14	653.54	592.3	315.4	290.7
3.	Wind	1.96	1.68	1.8	1.5	2.03
4.	Total Internal Generation	8,703.6	6,494.5	7,240.4	7,412.6	8,350.7
5	Less Auxiliary Consumption	55.9	54.1	50.8	55.1	60.9
6.	Power Purchase from CGSs	7,828.1	7,869.5	7,286.5	7.245.3	8,289.99
7.	Power Purchase from IPPs	388.4	979.6	1,926.03	1,393.31	715.66
8	Total Energy Availability	16,864.02	15,289.7	16,402.1	15,996.1	17,925.5
9.	Energy Requirement	15,065.2	15,293.5	16,978.04	17,227.8	18,946.3
10.	Surplus/Deficit	1,799.1	−3.8	−575.9	−1,341.7	−1,650.8

Notes: CGS: Central Generating Stations; IPPs: Independent Power Producers

Source: State Planning Board. 2013. *Kerala Economic Review 2012*. Government of Kerala, Thiruvananthapuram

13.3.3.9 It is often recognised that increasing capacity with an overwhelming reliance on hydel is a challenge given the delays in land acquisition and environmental impacts. There are now attempts at diversifying electricity sources by installing petcoke and gas based generation by building import infrastructure for these fuels in Kerala. It is important to note, however, that there is a guidance against gas based generation on account of the expectation of higher LNG prices, the likely increase in the price of domestic gas, and the increased demand for natural gas from high value industrial processes.

Relatively less transmission and distribution loss

13.3.3.10 The transmission and distribution (T&D) losses of Kerala (19.9% in 2008–09) are lower than the India average. In 2011–12, this had further come down to 15.7 per cent. However, the T&D losses of India (24%) are much larger than the rest of the other countries. Table 15.10 shows that Kerala is similar to Brazil in terms of T&D losses and their losses are significantly higher than countries like China, Euro Area, United Kingdom and the USA.

Table 15.10: Electric Power Transmission and Distribution Losses in Selected Countries in 2011−12 (% of output)

Indicators	*India*	*Kerala*	*USA*	*United Kingdom*	*Brazil*	*Russia*	*Mexico*	*China*	*Euro Area*
Electric power transmission and distribution losses (% of output)	24	**15.7**	6	7	17	11	16	5	5.13

Source: World Bank Indicators

Deficit in electricity

13.3.3.11 Table 15.9 shows that the gap between requirement and availability is increasing over time[13]. This situation is likely to persist in the absence of significant accretion to the electricity generation infrastructure.

13.3.3.12 Despite the State's power quota from the central pool increasing from 900 MW to 1,267.64 MW, the state suffered a shortfall in 2011−12. The Economic Review 2012 states that "the poor yield from hydel reservoirs, high cost for thermal power and increased demand for power created a situation of Negative Surplus Power during 2011−12. The negative situation occurred mainly due to the drastic reduction in the purchase of power from Independent Power Producers (IPPS) and decline in thermal power generation. At the same time although the total requirement increased to 18,946.29 MU in 2011−12 from 17,337.79 MU (9.3 percent growth) in

[13] The CEA statistics show that there was a 5 per cent deficit in 2011−12 in meeting peak demand in Kerala. Still that was the lowest compared to other states – Andhra Pradesh, 6.34 per cent, Karnataka, 7.3 per cent and Tamil Nadu, 11.02 per cent.
Central Electricity Authority (CEA), Ministry of Power, Government of India. 2012 and previous reports. *All India Electricity Statistics: General Review*. July.

the previous year against the power availability of 17,295.54 MU resulted in a negative surplus of 1650.75 MU. "[14]

13.3.3.13 Overall, the vagaries of monsoon and increased demand for power means that Kerala has to strategise a path forward which is economically efficient, socially equitable and environmentally sustainable. Krishnakumar, Rao and Gopakumar (2009) have analysed rainfall in Kerala between 1871 and 2005[15]. The authors find significant decrease in rainfall in June and July with increasing trend in January, February and April. Post-monsoon rainfall has also increased.

Low availability of clean fuel for cooking

13.3.3.14 This is also a key energy security concern as per the Kerala State Planning Board (2010). The Census 2011 shows that 61.9 per cent of households in Kerala use firewood for cooking. This number is significantly larger than the percentage of households using LPG for cooking, which is at 35.8 per cent.

15.3.4 Average tariff

15.3.4.1 Table 15.11 shows consumer category-wise average tariff. It shows that the state charges the lowest price for irrigation and dewatering but has the highest rate for the commercial sector. In 2011−12 prices went further down for irrigation and de-watering. This implies a high degree of reliance on cross subsidies to achieve financial viability[16]. However, high tariffs may have a negative impact on commercial activity. Given its macroeconomic consequences, its long term sustainability is suspect.

Table 15.11: Average Realisation Rate from Tariff, 2007−08 to 2011−12

S.No.	*Consumer Category*	*Average Tariff in (Paise/Unit)*				
		2007−08	*2008−09*	*2009−10*	*2010−11*	*2011−12*
1.	Domestic	172.1	191.71	191.46	198.32	201.54
2.	Commercial	668.2	743.65	702.39	722.86	745.97
3.	Public Lighting	190.15	200.31	191.64	211.82	217.01

[14] Planning Board. 2013. *Kerala Economic Review 2012*. Government of Kerala, Thiruvananthapuram.
[15] Krishnakumar, K.N., Rao, G.H.S.L.V. P. and C.S. Gopakumar. 2009. "Rainfall trends in twentieth century over Kerala, India". *Atmospheric Environment*. 43. 1940-1944.
[16] Planning Commission data from 2011−12 data show that all states are subsidizing the domestic and irrigation sectors.

S.No.	Consumer Category	Average Tariff in (Paise/Unit)				
		2007−08	2008−09	2009−10	2010−11	2011−12
4.	Irrigation & Dewatering	105.45	135.35	109.9	115.11	110.3
5.	Industry (LT)	414.75	459.81	426.41	437.17	421.87
6.	Industry (HT & EHT)	401.24	479.77	414.47	424.58	418.02
7.	Railway Traction	359.04	475.84	397.87	412.16	399.25
8.	Bulk Supply	286.65	455.72	347.05	364.77	388.3
	Average	312.64	358.97	335.06	347.78	345.88
9.	Sale to NVVN to PTC	966.36	947.03	1,259.31	0.00	0.00
10.	Inter-State	397.67	0	851.5	1,207.34	1,144.00
11.	Sale through Power Exchange	0.00	0.00	715.96	1,071.85	1,075.78
12.	Overall Average	350.81	380.14	338.03	354.24	347.39

Note: LT stands for Low Tension, HT stands for High Tension and EHT stands for Extra High Tension

Source: State Planning Board. 2013. *Kerala Economic Review 2012*. Government of Kerala, Thiruvananthapuram

15.3.5 Renewable Energy Sources

15.3.5.1 Kerala continues to lag behind the rest of the southern states in renewable energy generation. Other states have seen double digit growth in this sector. The percentage share of renewable energy excluding hydroelectric from the total of central, state and private installed capacity shows that Tamil Nadu has the highest share (41.7%) followed by Karnataka (23.8%), Andhra Pradesh (5.5%) and Kerala at 4.25 per cent.

15.3..5.2 Some salient points on Kerala's RES as of 31st March, 2012[17]:

[17] Central Statistical Office, Ministry of Statistics and Programme Implementation, Government of India. 2013. *Energy Statistics 2013*. New Delhi. March.

- As of March, 2012, Kerala had 35.1 MW of wind power which was grid interactive;
- Installed capacity of grid interactive renewable power – 149.67 MW of Small Hydro Power (SHP), 0.84 MW of Solar Power;
- Off-grid/Decentralised Renewable Energy Systems/Devices include:
    - Number of bio-gas plants: 133,887
    - Number of Water Pumping Wind Mills: 79
    - Number of Solar Photovoltaic Pumps (SPV): 810
    - Solar Photovoltaic
        - Street Lighting System (No.): 1,735
        - Home Lighting Systems (No.):32,327
        - Solar Lantern (No.):54,367
        - Power Plants (kilo watt peak):57.7
        - Aerogen Hybrid System: 8 KW
        - Solar Cooker: 0.03 MW
        - Remote Village Electrified Hamlets: 607

15.4. Projections

15.4.1 Electricity Demand Projections (MU)

15.4.1.1 In the case of electricity demand, the electricity intensity for each consumer category has been projected until 2031 as a linear time trend (Table 15.12A) assuming the current patterns of electricity consumption continue.

Table 15.12A: Base line Electricity Demand Projections (MU)

Year	*Domestic*	*Commercial*	*Industrial LT*	*Industrial HT &EHT*	*Public Lighting*	*Agricultural*	*Others*
2011	8,440	1,897	1,230	2,697	273	179	1,265
2016	13,002	2,742	1,745	1,889	367	472	2101
2021	19,897	3,937	2,455	902	485	700	3,434
2026	28,826	5,351	3,264	1,268	597	983	5,274
2031	42,318	7,368	4,387	1,807	732	1,402	8,155
Arc elasticity of Demand	1.05	0.94	0.90		0.75	1.00	1.14

Source: NCAER

15.4.1.2 As the declining demand of heavy industry and agriculture revealed from the consumption patterns until now, these sectors eventually die out in their current form. This has

an uncertain implication for the financial performance of the sector. On one hand, cheap and subsidized sales are no longer required, and on the other, the highest value electricity sales also are competed out, probably to neighbouring states. Notably, in the Perspective Plan scenario, the demand for energy will be higher due to sustained growth in both agriculture and industry (Table 15.12B).

Table 15.12 B: Preferred Electricity Demand Projections (MU)

Year	*Domestic*	*Commercial*	*Industrial LT*	*Industrial HT &EHT*	*Public Lighting*	*Agricultural*	*Others*
2011	8,440	1,897	1,230	2,697	273	179	1,265
2016	12,529	2,642	1,681	1,820	354	455	2,024
2021	19,398	3,839	2,393	880	472	682	3,348
2026	29,221	5,425	3,308	1,285	605	997	5,346
2031	42,979	7,483	4,455	1,835	743	1,424	8,282
Arc elasticity of Demand	1.08	0.95	0.90		0.73	1.02	1.18

Source: NCAER

As an alternative to the NCAER projections, the 18th Power Survey demand projections are shown in Table 15.12C.

Table 15.12C: 18th Electric Power Survey Forecast (MU)

Year	*Domestic*	*Commercial and Miscellaneous*	*Industrial LT*	*Industrial HT &EHT*	*Public Lighting*	*Agricultural (Irrigation)*	*Others*
2011−12	7,616	3,033	1,247	3,075	346	285	609
2016−17	10,472	4,893	1,802	3,702	422	341	778
2021−22	13,725	7,270	2,320	4,474	504	376	1,095

Source: Central Electricity Authority. 2011. *Report on 18th Electric Power Survey of India*. New Delhi, December

15.4.2 Generation projections under baseline (MU)

15.4.2.1 The proposed accretions to the electricity supply infrastructure are listed below (Table 15.13).

Table 15.13: Planned addition to Thermal Electricity Generation Capacity *(MW)*

	Expected capacity in MW	***Expected year of commissioning***
Petcoke	500	2017−18
Brahmapuram (Gas)	1,026	2017−23
RGCCPP Expansion (Gas)	1,950	2018−25
Petronet (Gas)	1,200	2018−25
Cheemeni (Gas)	1,200	2021−27

Source: Kerala State Electricity Board

14.4.2.2 Based on the additions to generation capacity listed above, and the PLFs listed below, the generation of electricity possible from each fuel is listed in Table 15.14. PLF assumptions have been made based on the past trends for the aggregate generation capacity in the state, and the potential for improvements.

Table 15.14: Generation projections under baseline and preferred (MU)

Year	***Hydel***	***plf***	***Thermal***	***Plf***	***Others***	***plf (assuming largely gas)***	***Generation***	***Demand***		***Deficit***	
								Baseline	***Preferred***	***Baseline***	***Preferred***
2011	7,130	40%	1,627	23%	65	22%	8,822	15,981	15,981	−7,160	−7160
2016	9,615	51%	1,867	27%	77	26%	11,559	20,754	21,505	−9,195	−9945
2021	10,354	51%	1,867	27%	3,273	70%	15,494	27,436	31,012	−11,942	−15,518
2026	10,496	51%	1,867	27%	28,880	70%	41244	40,160	46,188	1,084	−4945
2031	10,496	51%	1,867	27%	36,238	70%	48,602	58,445	67,202	−9,843	−18,600

Source: NCAER

14.4.2.3 Comparing this generation with the projected level of demand, it is observed that significant electricity deficits will exist until the large gas based generation comes on stream. Unless more capacity is added after 2026, deficit will emerge in 2031 once again.

14.4.2.4 One strategy here would be more active exploitation of non-conventional energy options. The current estimated potential for renewable energy in the state is shown in Table 15.15. The Solar Power potential is from ANERT's estimation from their draft Solar Policy.

Table 15.15 Non-Conventional Electricity Generation Potential as of 2012 (Mw)

Solar Power	*Wind power*	*Small hydro power*	*Biomass power*	*Waste to Energy*
1500	790	704	1044	36

Source: NCAER

14.4.2.5 We assume that 50 per cent of the potential is met by 2021 and 100 per cent of the potential by 2030 in an alternative scenario that we call the renewable energy scenario. A PLF of 20 per cent is assumed in this case (Table 15.16).

Table 15.16: Renewable energy scenario (MU)

Year	*Renewable*	*plf (renewable)*	*Surplus/Deficit*	
			Baseline	*Preferred*
2016	2,120	20%	−9,195	−9,945
2021	3,483	20%	−9,821	−13,397
2026	5,257	20%	4,567	−1,462
2031	7,369	20%	−4,586	−13,343

Source: NCAER

15.4.3 Energy Efficiency Measures

15.4.3.1 Demand management measures will also help in reducing the energy deficit as well. The Working Group of the XII Five Year Plan documents measures that would save approximately 5 per cent of the total generation during the plan period. Assuming Kerala achieves savings of 20 per cent in the longer period going on to 2030, the deficit levels would be lower. This is referred to as the energy efficiency scenario If one combines the two scenarios of renewable energy and energy efficiency, Table 15.16 shows the projected electricity surplus/deficit. Table 15.17 shows continued deficit in the base case, albeit lower if one compares this to the projections made earlier. However, comparing the baseline to the preferred scenario (Table 15.17), the energy deficits are higher till 2026 and the surplus lower. This is because of increased growth in Kerala resulting in increased demand of electricity.

Table 15.17: Energy Efficiency and Renewable Energy Scenario

Year	*Electricity surplus/deficit in Energy Efficiency case (MU)*	
	Baseline	***Preferred***
2016	−7,638	−8,333
2021	−6,621	−9,779
2026	10,926	5,852
2031	7,103	97

Source: NCAER

15.4.3.2 Even with optimistic scenarios, the energy deficiency does not go away till 2025. This has serious ramifications for Kerala's energy scenario. This will worsen in the perspective plan scenario when energy demand will increase with sustained increase in productive sectors. Kerala will have to add to its energy generation capacity on a continuous basis.

15.4.3.3 Qualifiers: The total demand as per the 18th Electric Power Survey (18th EPS) in 2016−17 is 22,410 MU and 2021−22 is 29,765 MU. The supply side remains smaller even after including renewable energy. The magnitude of the electricity energy deficit decreases but the deficit remains. The last but not the least qualifier is boosting the supply from central sources as we have already seen that it supplies a significant share of power in Kerala. From the CEA statistics, we know that 897.2MW is going to come from coal and 359.58 MW from gas. Assuming 91.88 per cent PLF (from the Andhra Pradesh CEA statistics) for coal and 51 per cent for gas, the total MU from the central sector is estimated to be 8,680. Making that this remains the same and there is no increase, this is added to the state's generation. The energy deficit disappears around 2020−21 using the total supply including the central sector and demand projections from the 18th EPS[18].

15.4.3.4 The Kerala Perspective Plan 2030 plans to build a Knowledge Hub with energy and health sectors as growth drivers. In addition, the KPP 2030 is advocating for mass transport which runs on power. Metro and monorail are already in the process of getting implemented. In this scenario, energy is going to crucial. The next section is about recommendations to boost

[18] The NCAER methodology and the EPS projections are significantly different. While criticisms may be labeled against the former on various assumptions lik the PLF for hydel power, incorrect demand of HT &EHT power, these are indicative. And forecasting is an uncertain science. All three forecasts are presented for completeness. The main story is that Kerala does face shortages in energy and they are especially acute in case of a bad monsoon. The strategy forward should be of augmenting energy and preferable renewable energy.

energy supplies in such a way that energy deficit does not hold back Kerala's growth movements. Further, the KPP 2030 mainstreams environment.

15.5. Strategies/Way Forward

Vision

15.5.1 *Economically affordable and environmentally clean power to all.*

Mission

1. To use innovative approaches to promote energy production and increase the self sufficiency ratio in energy production.
2. Develop innovative methodologies and techniques and devise programmes for efficient energy management.
3. To identify barriers to improving energy efficiency and propose appropriate remedial approaches including policy measures and financial incentives.
4. To carry out, support and/or promote research studies on energy management.
5. To promote energy consultants in the state to advise the various sectors on energy conservation methods.

Targets

- Exploit the full potential of hydro-electric generation,
- Assess and capture the full potential of non-hydro renewable energy,
- Reduce the transmission and distribution losses in the electricity sector to 9 per cent from the current 15.7 per cent,
- Improve energy conservation by 20 per cent from energy use,
- 100 per cent electrified households with 24*7 availability of electricity,

15.5..2 Kerala has done extremely well in providing electricity to majority of the households, lowering down transmission and distribution losses and using the cleanest source of traditional energy, hydel power. However, there is a demand-supply gap. The challenge in this sector is to provide quality power to all at affordable rates. The above analysis shows that over the long term Kerala will have to increase its generation of electricity. Given uncertain weather patterns affecting the monsoon and uncertainty caused by climate change, one may expect that Kerala cannot rely on hydel energy alone. Given that the price of traditional and non-renewable energy is going up, to provide energy at affordable rates, while keeping KSEB afloat is a challenge. Supply has to be increased but the move should be towards using larger proportions of renewable energy over time. These changes have to be made with changes in governance.

15.5.3 The strategic framework has been divided in four sub-areas – Institutional changes, capacity generation, increase in the production of renewable energy and demand management and conservation. The actions are given below:

Pillar 1: Institutional changes

Coordination between agencies

- **Coordination Committee**: Close coordination between the five line departments is required. It may be explored if they can form a coordination committee for integrated action.

- **Capacity Building**: There is a need to build capacity in energy related disciplines and inter-disciplinary capacity in this area (Box A.15.1).

- **Environment Mainstreaming**: Close coordination is required to examine costs and benefits of power projects. This should not only be in terms of economic costs but environmental costs too. Environmental costs have to be brought into the mainstream.

Environment of Experimentation and Innovation

15.5.4 A cell devoted to document the technological changes relating to energy around the world is a must for the policymakers in Kerala to keep abreast of what is happening around the world and what can be adapted both on the demand and supply side in Kerala. Both supply and demand side management techniques need to be experimented. An environment should be created in the state so that technological inventions in the energy industry can take place in Kerala itself. A free flowing environment is the need of the hour where there is continuous exchange of ideas and innovation as there is no room for complacency.

15.5.5 On the demand management, KSEB and Energy Management Centre (EMC) have started a school program to educate children about conserving energy. Further, the various agencies can educate their citizens through the Resident Welfare Organisation (RWAs) on conserving energy. If the Kerala citizens place importance on their environment, then they will have to concentrate more on renewable energy.

Transformation to Smart Grids

15.5.6 Smart Grid is the confluence of Information, Communications & Electrical/ Digital technologies. Smart Grid, apart from facilitating real time monitoring and control of

power systems will help in the reduction of Aggregate Technical & Commercial (AT&C) loss, peak load management/ demand response, integration of renewable energy, power quality management, outage management etc. Smart Grid will act as a backbone infrastructure to enable new business models like smart city, electric vehicles, and smart communities apart from more resilient and efficient energy system and tariff structures. The evolution of smart grids has been triggered by the increasing complexity and management of power systems; increasing penetration level from renewable sources; growing demand and service-quality at reasonable price expectations in terms of system reliability; and efficiency and security in addition to environmental energy sustainability issues. Such grids will be able to coordinate the needs and capabilities of all generators, grid operators, distribution utilities, end users and electricity market stakeholders in such a way that it can optimise asset utilization, resource optimisation, control and operation as well as reduction in losses. In the process, smart grids minimise costs, AT&C losses, improve energy efficiency and environmental impacts while maintaining system reliability with improved quality and customers participation in the energy efficiency measures. Technologies in the field of Monitoring & Measurements, Communication, Control & automation, Advanced meters, IT infrastructure, Energy Storage, renewable energy generation etc. have a prominent role towards successful development of the Smart Grid[19].

15.5.7 Kerala is piloting smart grid technology among its low tension industrial category consumers.

15.5.8 Grid interactive system may also be adopted and especially useful for solar powered systems[20].

15.5.9 Implement the Central Scheme, Re-structured Accelerated Power Development and Reforms Programme (APDRP) for all the eligible cities. Projects under the scheme are taken up in two Parts. Part-A includes the projects for establishment of baseline data and IT applications for energy accounting/auditing & IT based consumer service centres. Part-B includes regular distribution strengthening projects.

Pillar 2: Augmentation of Supply and Supply Side Management

Increase hydel power capacity

[19] PowerGrid website.
[20] Cerasuolom, M. 2013. Grid-Tied Vs. Grid-Interactive Photovoltaic Arrays. *Solar Industry*. http://www.solarindustrymag.com/e107_plugins/content/content.php?content.12007. 1(1). Feburary 14. http://www.solarindustrymag.com/e107_plugins/content/content.php?content.12007

15.5.10 The importance of hydel power cannot be overemphasized in Kerala given that it is the cheapest power source for it. It is the backbone for Kerala's energy.

15.5.11 Hydro power plants can dramatically change the rivers' biodiversity. This requires economically viable and environmentally sustainable solutions. In many countries these solutions are being worked out. (Box 15.1). International collaborations may be a step in the right direction.

Box 15.1 Hydro-electrical plants

As nuclear power production is phased out in several countries in the wake of the accident at the Fukushima nuclear power plants, renewable energy is expected pick up much of the slack in Europe. Switzerland expects a 10 per cent increase in its hydropower capacity by 2050 by expanding its existing hydropower installations and authorizing the construction of hundreds of new mini-hydropower plants, leaving few river courses untouched. It is planning to install 800 power projects of less than 10 MW capacity each. This may affect the bio-diversity of the river system in the country. To limit the environmental impact, measures have been put in place to ensure that rivers never dry out. But the problem is that these measures kill the natural bio-diversity of the river. The challenge is the conciliation of river management from an ecological and an economic point of view. The country has adopted a dynamic redistribution policy performs to meet the challenge.

Source: http://phys.org/news/2013-04-hydropower-capacity-straining-environment.html#jCp

15.5.12 Along with Hydro Power, there is a need to emphasise on Small Hydro Power and the Small Hydro Power Policy of 2012 is a first step in this direction[21].

- It is applicable to projects with installed capacity up to 25 MW.
- This Policy sets a goal of commissioning 150 MW additional capacity from Small Hydro Power Projects (SHPs) by 2017 through private participation.
- Private developers will develop the project on Build-Operate-Transfer (BOT) basis for 30 years when they will transfer it back to the government.
- The ANERT has already identified thirteen districts and the SHPs will be managed at the local level. This should be implemented in fast track mode.
- Disadvantage of SHP is similar to hydel power. It is dependent on the monsoon.

15.5.13 Detailed studies will be done starting from the Gram Panchayat level about the economically feasible hydro energy in that area that can be harnessed.

Thermal-Coal

[21] Ministry of Power, Government of Kerala. 2012. http://www.kerala.gov.in/docs/pdf/3942_12.pdf.

15.5.14 Kerala can get energy from thermal-coal sources like the Cheemeni in Kasaragod district. If one imports coal through the ports, this will have a positive impact on the revival of the ports sector too. The trade-off is the green-house gas emissions from coal. Perhaps, the state can think of ways to minimize net emissions. Again incorporating socio-econo-ecological cost benefit analysis are useful method to examine one's choices.

Renewable energy other than hydel[22]

15.5.15 Kerala needs to have an amalgam of energy choices so that it has a back-up plan in case one does not work out. Hydel energy is good but in case of a bad monsoon year like 2012−13, there should be a back-up plan. Plus the impact of the drought in 2012−13 will have repercussions for the next four to five years. All options for renewable energy need to be explored.

15.5.16 The Power Grid Corporation of India Ltd. 2012 report for envisaged renewable capacity does not identify Kerala as one of the renewable energy rich states[23]. However, Kerala still needs to explore its options or have tie-ups with other states. Further encouraging private participation in the RES sector will have a multiplier impact on the economy encourage science and innovation, entrepreneurship, energy and environment.

15.5.17 Wind Energy: Offshore wind energy is not viable for Kerala because of the presence of the Western Ghats and the depth of the sea coast off Kerala. Evidence in the literature however shows that Kerala has a wind power potential of 1,171 MW. The ANERT has identified 17 locations in Kerala with a capacity of nearly 600 MW. The particular places where wind energy may benefit Kerala are Idukki and Palakkad, the grasslands of Kerala.

15.5.18 Solar Energy**:** Solar energy is especially useful for buildings, traffic light in the day time. Parking meters on roads can also be powered by solar energy. Storage is however a problem.

[22] Two options of Tidal Energy and Pumped Hydro Storage are not mentioned because they are considered commercially unviable for Kerala. Tidal energy plant is not advisable for Kerala due to geographic limitations. The Pumped Hydro Storage is relevant only if the generating station is near the primary reservoir and the turbine is not running continuously due to limitation of available water shortage. This process is deemed as inefficient and uneconomical especially when one considers the power losses in pump, turbine, penstock, alternator etc. involved in the operation, which amounts to more than 50 per cent.

[23] Power Grid Corporation of India Ltd. 2012. "Transmission Plan for Envisaged Renewable Capacity, A Report, Vol. 1". July. Accessed January 1, 2013.

- The ANERT has a Draft Solar Policy 2013 which would bring all the initiatives all in one place.
- Both Solar Photovoltaic Programme (SPP) and Solar Thermal Programme (STP)[24] are implemented by ANERT. Under the SPP, ANERT has distributed Solar PV devices like solar lantern, solar home lighting systems, solar street lighting systems, solar TV power pack, solar water pumping systems (deep & shallow well), solar fencing energisers, solar vaccine refrigerator, solar fishermen pack, SPV demo kits for schools, PV insect light traps, PV rubber tapper's light, PV modules of 3,570 and 90W etc.
- The Solar Thermal Energy Programme of ANERT is aimed at supplementing thermal energy requirements at various temperatures for different applications like cooking, water heating, Industrial process heating, crop drying, space heating, water desalination, etc. by harnessing solar energy and converting it into heat using various solar thermal devices and systems.
- Kerala's Solar Rooftop Power Plants scheme for 2012–13 was launched on 1st September 2012. The programme summary is:

  - ❖ Power plants (solar array) shall be of 1 kWp capacity
  - ❖ Only off-grid power plants are covered under this programme
  - ❖ State subsidy of Rs.39,000 per system
  - ❖ Central Government subsidy of Rs.81,000 or 30 per cent of the cost of power plant (whichever is less) expected
  - ❖ Applicants should be willing to meet the remaining expense of around Rs.1 lakh
  - ❖ 10,000 such systems totaling 10 MW solar PV capacity
  - ❖ Installation of systems fully meeting Govt. of India specification and guidelines through empanelled vendors
- Float-mounted solar panels (Flotovoltaics) in the water bodies of Kerala may be installed but with care.
- Other ways of harnessing solar energy include putting solar panels over railway lines.
- Heliatek company has developed the ability where tinted windows may be used to harvest solar energy (Box 15.2).

[24] www.anert.gov.in.

Box 15.2: Harvesting Solar Energy from Windows

Heliatek, which is based in Dresden, Germany, has modified techniques used to make touchscreens to create a translucent solar cell that can be used as a tinted window.
Heliatek's new transparent solar panels are very similar in design to OLED displays. Both rely on a thin layer of organic molecules deposited on a flexible backing. The idea of printing organic solar cells like this isn't new, but past cells printed in this manner tended to have very short lifespans. Heliatek is getting around that problem by using shorter chains of molecules, known as oligomers, instead of more fragile polymers. The result is a panel with a usable life more like that of conventional silicon solar cells.

Source:http://www.extremetech.com/extreme/126449-german-firm-develops-tinted-windows-that-generate-electricity.

15.5.19 Biogas**:** Kerala's waste management problem can be converted into an asset for Kerala. The average person generates about 4.5 pounds of waste per day. It can be reused to generate clean, renewable power. There are three main pathways for conversion of organic waste material to energy – thermochemical, biochemical and physicochemical.

- Thermochemical conversion, characterized by higher temperature and conversion rates, is best suited for lower moisture feedstock and is generally less selective for products. The bio-chemical conversion processes, which include anaerobic digestion and fermentation, are preferred for wastes having high percentage of organic biodegradable (putrescible) matter and high moisture content. There has been an increasing focus on plasma-assisted gasification applied to the treatment of municipal solid waste (MSW). It may be a new way to increase Waste-to-Energy (WTE) worldwide. However, its benefits are not proven and there have been on-going studies on this technology,
- Anaerobic digestion can be used to recover both nutrients and energy contained in organic wastes such as animal manure. Solid wastes such as coconut shell, husk, coir pith, rice husk, firewood, coffee husk, and other industrial wastes can be converted into producer gas by gassification route as per the ANERT website. This produces gas that can be used for heating and generating electricity. During this year, ANERT has installed a 2.5 lakhs kCal (Kilocalories) capacity coconut shell based gassifier at Thiruvampady, Calicut for drying copra with MNRE assistance and beneficiary share. The floundering Coir Industry can be linked to this. It can have beneficial impact for the women employed in the Coir Industry. Rice Husk Power in Bihar is a good example of bio gasification. Rice is the main crop of Bihar. Electricity derived from Rice Husk Power is supplied to only those villages that have demand of 15 kW and fall within the radius of 3 kilometres from the proposed Husk Power Systems (HPS) plant. HPS trains local

villagers of the village in which the power plant is to be established. The duration of the training is two months and covers the operation and maintenance of the power plant. Thus, a job platform has been created for unemployed literate/neo-literate villagers. 'Pay-for-Use' service approach is being followed by HPS for raising revenue and supplying electricity. The HPS business model is attractive and successful in the rural areas because of its low cost. About 300 kg of rice husk is required as raw material to produce 40 kilowatt of energy, which is sufficient to supply energy to 500 households for 6−12 hours per day. Raw material (waste rice husk) is purchased at Rs. 1 per kg from rice mills. Generally, electricity is supplied to domestic and commercial consumers for a fixed 6 − 8 hours in a day. Charge rates are Rs 80/month to light up two 15 watt flourescent lamps (CFL's) and one mobile charging station. Low cost pre-paid meters have been installed that can efficiently regulate the flow of low-watt electricity and reduce electricity theft to less than 5 per cent.

- The physico-chemical technology involves various processes to improve physical and chemical properties of solid waste. The combustible fraction of the waste is converted into high-energy fuel pellets which may be used in steam generation. Fuel pellets have several distinct advantages over coal and wood because it is cleaner, free from incombustibles, has lower ash and moisture contents, is of uniform size, cost-effective, and eco-friendly. A range of bio-based chemicals**:** These chemicals can be sold to a wide variety of end use markets. Wood chips are an option. Given Kerala's rich forest resources, this may be used as a potential source for energy.

15.5.20 Energy from plastic waste: Waste plastics are becoming a major stream in solid waste. After food waste and paper waste, plastic waste is the third major constitute at municipal and industrial waste in cities. This increase has turned into a major challenge for local authorities, responsible for solid waste management and sanitation. Plastic waste recycling can provide an opportunity to collect and dispose of plastic waste in the most environmental friendly way and it can be converted into energy. Some of the developed countries have already established commercial level energy conversion recovery from waste plastics. Kerala can learn from these experiences and technologies available to them. It will require assessment and selection of environmentally sound technologies (EST) suitable for local conditions. Some international agencies such as the United Nations Environment Programme (UNEP) have started integrated programmes on such technologies which can help the policy makers in exploring these possibilities. More importantly, these technologies can be identified, transferred and adapted to local conditions.

15.5.21 Hybrid energy**:** Hybrid energy systems especially for hilly areas can be explored. According to a study, in a farming village in the Western Ghats of Kerala, a community of 120 families,with a population of 600 gets its electricity from a community based diesel generator that supplies power to about 35 per cent of the population. The generator set operates six hours a

day during peak hours. Individuals have their own independent diesel units for typical household applications. With that set-up approximately 40 per cent of the population is deprived of electricity. This study observes that a micro-hydro/wind hybrid energy system is the optimal combination for the rural community. This will provide 24-hours electricity supply to every household in the village at a unit cost of Rs 6.5/ kWh. Another study finds a hybrid energy system useful for remote villages in Uttarakhand. This is an avenue that may be explored in Kerala for the remote villages. Most important of all these modeling methods need to be evaluated for Kerala. Most of these exercises are theoretical. Nonetheless, they provide guidance to practical approaches.

Encourage captive power

15.5.22 Captive Power Mechanisms can be encouraged for large industries in Kerala through public private power mechanisms. Again here it should be explored whether a percentage of this can come from renewable energy sources. Nevertheless, given the low level of HT (high tension) consumption in the state, the amount of electricity displaced by captive power would be limited. In addition, this segment of consumers pay the highest tariff amongst all consumers – with this segment moving towards captive generation, the ability of KSEB to cross subsidise would be even more limited. Ernakulam with its massive natural resources should definitely explore this idea of its own utility. Kerala State Industrial Development Corporation (KSIDC) is starting with the first stage of preparing feasibility reports for captive power projects in three of its industrial areas in Valiyavelicham, Kannur; Kinalur, Kozhikode and Cherthala, Alappuzha.

Pillar 3: Demand-side Management

15.5.23 *Pricing strategies*

- While load-shedding is one mechanism for ensuring that consumers pay the price for electricity and are not subsidized, it is not effective due to the widespread use of invertors and generators.
- Price may be a more effective mechanism in moderating demand. Other pricing options can be examined for domestic consumers since they are the largest group that consume electricity in Kerala. As pointed out earlier, Kerala charges the lowest price amongst the Southern states for this category of consumers
- There should be exploration of what the consumer is willing to pay for 24/7 electricity. This will also encourage research in the area of electricity and power and increase the knowledge base.
- The forty per cent of consumers who totally consume 0–40 units can get a subsidized rate. All other consumers should pay according to a well-designed slab system.

- A Greenpower fund can be created by imposing a cess of electricity charges. Alternatively, they can also be tied to the Kerala Energy Conservation Fund. This fund may then be used to explore renewable energy sources or conservation of energy. Even while the government makes this compulsory, there may be a provision for voluntary contributions which may might make the consumers more conscious.
- Energy supply in plantations may not be subsidised as it is a commercial entity.
- Industry and Commercial
    - Pricing mechanisms have to be developed for industrial and commercial users with additional incentives for development and usage of renewable energy.

Energy Efficiency Strategies

15.5.24 In this particular arena Kerala should strive to be a leader especially in the buildings sector and set an example for not only other states in India but also for the rest of the world. The energy efficiency strategies adopted in various sectors are:

15.5.25 Lighting**:** The Bureau of Energy Efficiency has a program called the Bachat Lamp Yojana (BLY). Under this scheme, quality long life Compact Fluorescent Lamp (CFL) have been distributed to grid connected residential households in exchange for an incandescent lamp and Rs 15. At the all India level there are no mandatory requirements to adopt CFL. Kerala may be the first state to make it mandatory especially for residences which occupy a certain minimum level of energy. It is also necessary to educate the citizenry about this. This will reduce GHG emissions.

15.5.26 Buildings

- It is imperative that the buildings are constructed in a more sensible manner than is currently being done. The Energy Conservation Building Code (ECBC) was launched in 2007 and the status update from BEE shows that Kerala has done little in this direction. Gujarat has taken major initiatives. Kerala needs to follow it.
- The EMC audited 22 government buildings that were identified to be part of the Investment Grade Energy Audit (IGEA) under the nationwide programme of the Bureau of Energy Efficiency, MoP, Government of India. The Energy Audits were conducted during the period 2008−09. The major savings identified were in lighting, air conditioning and electrical distribution systems. Several measures such as retrofitting with T5 lamps, replacement of incandescent lamps, retrofitting with electronic regulators, providing variable, frequency drives, power factor improvement etc were identified. The total savings to be achieved in all these 22 buildings are nearly 18 per cent of the present energy consumption and a pay back

of less than 1.5 years is envisaged for the energy saving project investment[25]. Clearly energy audits should be conducted regularly on all buildings and its recommendations strictly implemented even in government buildings or the departments or private offices will pay fines. Awards should be used to reward departments/offices/buildings that implement these codes either in the form of tax credits or public recognition which will induce competition for these practices to be absorbed.

- EMC Recommendations
    - New Buildings
        - Implementation of Energy Conservation Building Code
        - All new buildings should be net zero energy buildings
    - Old Buildings
    - 2015
        - 25 per cent of all buildings to be energy star rated
        - 50 per cent of energy needs of 25 per cent residential buildings to be met from renewable energy
        - 2018
        - 5 per cent of all buildings to be net zero energy buildings
        - 2020
        - 50 per cent energy intensity reduction of buildings
        - 25 per cent of all buildings to be net zero energy buildings
        - 50 per cent of the Government Buildings will be carbon neutral buildings

- Green Buildings: Making a green building is an integrated design process. "For example, interrelationships between the building site, site features, the path of the sun, and the location and orientation of the building and elements such as windows and external shading devices have a significant impact on the quality and effectiveness of natural day lighting. Similarly, roofing and walling have a significant impact of the absorption of electricity and resource use. These elements also affect direct solar loads and overall energy performance for the life of the building. Without considering these issues early in the design process, the design is not fully optimised and the result is likely to be a very inefficient building. There are five elements of a green building project:
    - Sustainable Site Design
    - Water Quality and Conservation
    - Energy and Environment
    - Indoor Environmental Quality, and
    - Minimizing the use of non-renewable construction materials

[25] Energy Management Centre, Department of Power, Government of Kerala. 2010. "Investment Grade Energy Audit in Government Buildings in Kerala". http://www.keralaenergy.gov.in.

- India follows the LEED (Leadership in Energy and Environment Design) assessment system. The EMC may develop a Green Building code which then will be implemented in Kerala as soon as possible. The code should be reviewed every three years. Green Building code will be implemented in both domestic and commercial buildings especially since construction is a driver of the Kerala's economy and buildings do consume a lot of electricity. Plus given the vision of a Knowledge Intensive economy, all new buildings must be required to follow Green Building codes, even industrial estates, schools, colleges, hospitals, hotels, airports and railway stations. All new housing complexes or houses above a certain area should attempt to use renewable energy. The net zero emissions of carbon should be the ultimate benchmark that must be followed. Several SEZs, industrial parks, and technology parks are already based on green buildings.

15.5.27 Appliances: These are selected for labeling by the BEE. It is compulsory to label frost free refrigerators, TFL, AC and transformation distributors. The appliances where labeling is voluntary includes direct cool refrigerators, general purpose industrial motors, moonset pumps, openwell pump sets, submersible pump sets, ceiling fans, domestic gas stoves, stationary storage type water heaters, colour televisions and washing machines. Clearly labeling should be made compulsory for all appliances and consumers should be encouraged to buy these appliances. Some service tax can be reduced if they buy energy labeled products with higher deduction given to higher stars.

- Agriculture: The energy audit of all pumps will be carried out and then farmers will get BEE Star labeled pumps and motors free of cost.
- Municipalities: Motion sensitive street lighting systems can bring down energy costs in an increasingly urbanized set up. Box 15.3 shows successful energy management of street lighting in Maharashtra. Solar LED street lights may make a lot of sense for Kerala. The BEE has done a comprehensive study on street lights where they show how street light poles can be mounted, dimming systems, operations and maintenance etc. which can be implemented in Kerala.
- The BEE has discussed energy efficiency in Small and Medium enterprises. They are given subsidies to improve energy efficiency. It lists energy saving equipment which would introduce savings in energy.
- Further, one can introduce energy saving techniques in practices. In Kerala tourism is a major sector contributing to GDP and the state has a large hospitality sector. Kerala can adopt energy saving practices in the tourism sector while extending hospitality. Kerala has adopted "Responsible Tourism" but more needs to be done. For instance, rationalising the use of ACs in hotels and guest houses which are not five star; and conservation of water and energy by offering laundry and cleaning services only on demand.

- Energy intensity also needs to be brought down to 1 by the end of the year.
- Integrated inter-modal transport system is needed to bring down demand for energy of petrol and diesel.

Box 15.3: Street lighting in Maharashtra

Case Studies

Akola Municipal Corporation, India: T5 Lamps Yield Payback of Less than One Year

In Akola Municipal Corporation (AMC), an Urban Local Body in the state of Maharashtra, more than 11,500 conventional street lights (standard fluorescent, mercury vapor, and sodium vapor) were replaced with efficient, T5 fluorescent tube lamps. The project, which was implemented using an energy savings performance contracting approach, has resulted in energy savings of 2.1 million kWh per year – a 56% reduction in the ULB's energy use for street lighting. These energy savings have resulted in cost savings of about INR 6.4 million per year, and the project paid for itself in only 11 months. The project's success has already led to the implementation of similar projects in Maharashtra and Madhya Pradesh. (ESMAP 2009)

Source:http://beeindia.in/schemes/documents/ecbc/eco3/DSM/Energy%20Efficient%20Street%20Lighting%20Guidelines.pdf.

Pillar 4: Development of new energy based industries and consulting firms

15.5.28 There lies a huge opportunity in Kerala to promote green energy related industries and services. The global air pollution control equipment market in the energy and power industry will see tremendous growth once the utility and oil and gas industries comply with new environmental regulations, which have become more stringent (and will in the future become even more so) than ever due to environmental concerns. There is an urgent need for evolving and implementing industrial energy conservation policy in Kerala.

15.6 Monitoring

15.6.1 Kerala should develop a detailed database for monitoring progress in the electrical energy sector. The recommended list of indicators adapted from the European Commission is given.

- Energy statistics - main indicators[26]

[26] http://epp.eurostat.ec.europa.eu/portal/page/portal/energy/data/database.

    - Market share of the largest generator in the electricity market
    - Energy intensity of the economy
    - Electricity generated from renewable sources - annual data
    - Primary energy consumption savings in % - annual data
    - Primary energy consumption - annual data
    - Supply of electricity - monthly data
- Energy statistics - quantities, annual and monthly data
    - Energy statistics - supply, transformation, consumption
        - Supply, transformation, consumption - all products - annual and monthly data
        - Supply, transformation, consumption - solid fuels - annual and monthly data
        - Supply, transformation, consumption - oil - annual and monthly data
        - Supply, transformation, consumption - gas - annual and monthly data
        - Supply, transformation, consumption - electricity - annual and monthly data
        - Supply, transformation, consumption - renewables and wastes (total, solar heat, biomass, wastes) - annual and monthly data
        - Supply, transformation, consumption - renewables (hydro, wind, photovoltaic) - annual and monthly data
        - Supply, transformation, consumption - renewables (biofuels) – annual and monthly data
- Energy statistics – infrastructure
    - Infrastructure - electricity - annual data
- Energy statistics - imports (by state or origin)
    - Imports (by state of origin) - all products - annual and monthly data
    - Imports (by state of origin) - solid fuels - annual and monthly data
    - Imports (by state of origin) - oil –annual and monthly data
    - Imports (by state of origin) - gas - annual and monthly data
    - Imports (by state of origin) - electricity - annual and monthly data
- Energy statistics - exports (by country of destination)
    - Exports (by state of destination) - electricity - annual data
- Energy statistics - gas and electricity prices
    - Gas - domestic consumers - bi-annual prices
    - Gas - industrial consumers - bi-annual prices
    - Electricity - domestic consumers - bi-annual prices
    - Electricity - industrial consumers - bi-annual prices

15.7 Conclusions

15.7.1 Kerala has achieved tremendous outcomes in providing electricity to majority of households. However, the 2012 monsoon has exposed the vulnerabilities of Kerala. Kerala is an energy deficient state and will remain so till 2025 if BAU is to be believed under the best optimistic supply side scenario. Kerala will have to expand the electricity generation capacity on

a continuous basis. Further, it needs to develop a portfolio of energy options for the supply side. It is necessary to increase the share of non-hydro renewable energy as much as economically feasible while developing hydel electrical generation as well. There is need for both continuous research on the technology and marketing side. Pricing schemes should be experimented. Further, buildings, street lighting, hospitals, industries should be examined with the lens of energy conservation. Where possible, captive power sources can be set up with renewable energy which then perhaps can be linked to the grid. Innovation is the key in a dynamic environment to ensure energy security.

Box A.15.1: Examples of Capacity Development

Box 4: Examples of Degrees in Energy Management, Germany and USA

The Science, Innovation and Technology Policy along with the dynamic education sector will merge to ensure an environment where technological inventions in the energy industry happen in Kerala itself. This will further set Kerala as an energy education hub which will attract students from all over the country and the world to learn from (Box A.15.1 shows an example of a M.S. degree in Global Energy Management in the University of Colorado, Denver).

Global Energy Management MS, University of Colorado, Denver, USA

The master of science in global energy management (GEM) prepares individuals for leadership careers in the energy industry. This degree is particularly appropriate for individuals seeking to advance their existing careers in the energy field. Prior work experience within the field is preferred, but not required. The program consists of two components: the core curriculum and the more advanced and specialized elective courses. The MS GEM program requires the completion of the following core classes as well as four elective courses from the selection listed below.

Required Courses

- GEMM 6000 - 21st Century Global Energy Issues and Realities.
- GEMM 6100 - Global Energy Economics and Geography.
- GEMM 6200 - Environmental, Regulatory, Legal & Political Environment in the Energy Industry.
- GEMM 6300 - Renewable and Alternative Energy: Opportunities & Challenges.
- GEMM 6400 - Leadership and Decision Making in the Global Energy Environment.
- GEMM 6500 - Energy Accounting in Global Markets. Semester Hours: 3
- GEMM 6600 - Financial Management and Hedging in the Global Energy Markets.
- GEMM 6410 - People Management in the Global Energy Environment.

Elective Courses: Choose four of the following courses.

- GEMM 6210 - Land Management and Energy Contracts.
- GEMM 6430 - Organizational Behavior in the Energy Industry.
- GEMM 6450 - Strategic Management of the Energy Industry.
- GEMM 6460 - Integrated Information Management for Energy Firms.
- GEMM 6470 - Energy Marketing.
- GEMM 6610 - Advanced Financial Management in the Energy Industry.
- GEMM 6620 - Energy Asset Management.
- GEMM 6630 - Production and Supply Chain Management for the Energy Industry.

M.Sc. Renewable Energy Management (REM), Albert-Ludwigs-Universität Freiburg, Germany

The M.Sc. REM programme is designed to close the strategic gap between the technical aspects of renewable energy and the vision of sustainable development.

The course is not composed deductively from existing university structures and study programmes, but inductively from analysis of the potential, international employment market and the qualifications it requires. Providing pivotal management skills for practical business purposes, the REM programme offers application oriented specializations in four different fields of renewable energy: solar energy, geothermal energy, biomass or energy efficiency.

Graduates will have the ability to plan projects and facilities for the utilization of renewable energy and to implement them while taking account of economic, political and societal concerns. Thus the curriculum is designed to enable unique career prospects in the vocational fields of planning, engineering, consultancy and investment of renewable energy.

Faculties and Partners

The M.Sc. REM programme is organized in cooperation with the Faculty of Forest and Environmental Sciences. Six other Faculties of Freiburg University and four excellent external partners are involved. The partners include Forest Research Institute Baden-Württemberg, Fraunhofer Institute for Solar Energy Systems, Offenburg University of Applied Sciences, Öko-Institut e.V. (Institute for Applied Ecology) and Endowed Chair of Wind Energy (SWE).

Sources: http://catalog.ucdenver.edu/preview_program.php?catoid=1&poid=850&returnto=59 and http://www.zee-uni-freiburg.de/index.php?id=37

CHAPTER 16

WATER SUSTAINABILITY: RECOVER, RECYCLE AND REUSE

*Water is a precious resource and it has to be treated as such. Water and sanitation go hand in hand. The challenge in Kerala is mainly the management of water and waste management. The strategy should be one of sustainable integrated management of water in all areas. Water needs to be conserved and valued. Recovering, recycling and re-using of water is the sustainable way out. New technologies will be adopted both on the supply and demand side for using water in a conservative fashion. Pricing and water metering may be used to monitor water usage. Micro irrigation schemes are recommended for Kerala. Plus water availability 24*7 is a key hallmark of smart, compact and global cities. Existing rural water schemes may be extended to supply water in the rural areas. Scaling up of infrastructure would be expensive and may be financed through financing from the Diaspora.*

16.1 Background

16.1.1 The water situation in Kerala is marked by contrasts. On the one hand, Kerala has plenty of rivers, lakes, ponds and brackish water and receives two monsoons, but on the other hand, it is a water-stressed state with water availability per capita being lower than that of Rajasthan.

16.1.2 Kerala has 44 rivers, all of which originate in the Western Ghats. None of them are major rivers and only four are classified as medium rivers. All these rivers are rain-fed (unlike rivers in North India that originate in the glaciers), which means that Kerala is heavily dependent on the monsoon. Fortunately, Kerala receives two monsoons—one from the southwest and the other from the northeast distributed between June and December—except in the northern districts of Kannur and Kasaragod where the rainfall is dominantly uni-modal. Two-third of the rainfall occurs during the southwest monsoon from June to September. However, the water availability per capita ratio in Kerala is one of the lowest in the country and has been declining over time.

16.1.3 Part of the problem is the geography of the state. A distinctive feature of the rivers flowing across Kerala is their short length and the difference in elevation between the high and low lands, which causes the rapid flow of water that is then quickly discharged into the Lakshadweep Sea[1]. Therefore, the state has not been able to utilise the river water sources to a major extent. The major portion of the run-off through the rivers takes place during the monsoon seasons. This high intensity rainfall that occurs during a short span of time leads to soil and water erosion, along with occasional catastrophes such as landslides in the hills and

[1] ENVIS Centre: Kerala State of Environment and Related Issues website. http://www.kerenvis.nic.in/.

floods in low-lying land. Loss of forest cover, indiscriminate removal of sand from river beds, clay mining from valley floors and soil erosion in the highlands are some factors that have caused serious threats to surface water availability. It does not help that waste management problems have also led to water pollution, both surface and underground.

16.1.4 Although Kerala has low groundwater potential because of its geography, most of its domestic and agricultural needs are met only by groundwater. Kerala has the highest density of wells in India,[2] which has caused the water tables to fall.

16.1.5 The monsoons re-charge the groundwater, but their uncertainty affects water availability in Kerala especially during summer. The poor monsoon in 2012 brought out issues of water security. There was 19 per cent deficiency between March and May 2012, 24 per cent deficiency from the long period average in the southwest monsoon and 35 per cent deficiency in the northeast monsoon in 2012[3]. Kerala was declared drought-hit in 2012[4].

16.1.6 The goal for Kerala over the next 20 years is to be secure in water. Kerala should be able to supply treatable drinking water to all its population and provide sanitation facilities, while agriculture and industry should also get their fair share of water. All this should be achieved while maintaining the delicate ecological balance between development and environment. Water management and conservation are the key elements. The United Nations Water has defined water security to be the following:

> "The capacity of a population to safeguard sustainable access to adequate quantities of and acceptable quality water for sustaining livelihoods, human well-being, and socio-economic development, for ensuring protection against water-borne pollution and water-related disasters, and for preserving ecosystems in a climate of peace and political stability."
>
> UN Water website:
> http://www.unwater.org/UNW_ABWS_launch.html

16.2. Institutions

16.2.1 The Department of Water Resources is the nodal department in the state to manage water. The departments and organisations concerned with managing the water sector in the state and some of the institutional mechanisms are:

- Centre for Water Resource Development and Management: This is an autonomous body for the research and development needs of water management in Kerala.

[2] Planning Commission, Government of India. 2008. *Kerala Development Report*. www.planningcommission.nic.in.
[3] State Planning Board. 2013. *Kerala Economic Review 2012*. Government of Kerala, Thiruvananthapuram.
[4] Chief Minister's website. http://www.keralacm.gov.in/index.php/homenewtopnew/34-frontslider/1294-kerala-declared-drought-hit.

- Kerala Water Authority: It was established on April 1, 1984 as an autonomous body of the Government of Kerala by converting the Public Health Engineering Department. It manages the development and regulation of water supply and wastewater collection and disposal in the state of Kerala.

- Citizen's Charter. - Citizen's Charter is a document which represents a systematic effort to focus on the commitment towards the conservation of Water.

- Jalanidhi: Kerala rural water supply and sanitation agency.

- Department of Irrigation: Comment Area Development Authority (CADA) looks after major and medium irrigation projects in Kerala and areas beyond the catchment area.

- Groundwater Department: Handles the development of groundwater.

- Coastal Shipping and Inland Navigation: Looks after inland water transport.

16.2.2 The Kerala Irrigation and Water Conservation Act (2003) consolidates and amends laws relating to the construction of irrigation works, conservation and distribution of water for irrigation and levy of betterment contribution and water cess on lands benefited by irrigation works. It provides for the involvement of farmers in managing the water utilisation system[5].

16.2.3 The Kerala Ground Water (Control and Regulation) Act, 2002 provides for the conservation of groundwater and for the regulation and control of its extraction and use in the state of Kerala[6].

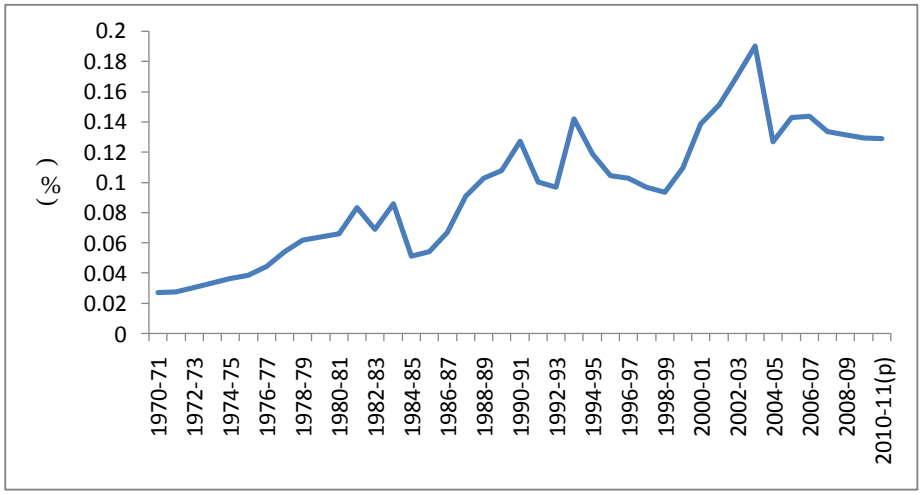
16.3 Situation Analysis

16.3.1 Direct Contribution of Water to GSDP

16.3.1.1 The share of water supply GSDP as a ratio to GSDP has increased over the past 40 years (Figure 16.1). It went up from 0.02 per cent of GSDP in 1970−71 to 0.13 per cent in 2010−11, with the peak in 2003−04 at 0.18 per cent.

[5] India Water Portal. http://www.indiawaterportal.org/articles/kerala-irrigation-and-water-conservation-act-2003.
[6] Environmental Law Alliance Worldwide website. http://www.elaw.org/node/1702.

Figure 16.1: Share of Water Supply GSDP as a percent of GSDP in Kerala (%), 1970−71 to 2010−11 (at factor cost by industry of origin in 2004–05 prices)



Note: 2010−11 data are quick estimates.
Source: Economics and Statistics Department, Government of Kerala.

16.3.2 Water Resources in Kerala (Supply)

16.3.2.1 Estimates of the water availability in Kerala have been prepared by several agencies and often do not converge. As per the estimates of the state Public Works Department (1974), all 44 rivers together yield 77. 9 billion cubic meters (bcm) of water, of which about 70.2 bcm is available in the state, with a total utilisable water yield of 42.7 bcm. The rest of the water is lost as run-off. Table 16.1 provides the water scenario in Kerala and a comparison with the all-India level.

Table 16.1: Water resources of Kerala as compared to India

Parameters	***Kerala***	***India***
Geographical area (square km)	38,864	32,87,732
Population 2001 Census (million)	33.39	1210.19
Total rainfall and snowfall (bcm, 2003)	88.45	4057.35
Surface and replenishable ground water (bcm)	70.17	1,869
Water that can be put to beneficial use (bcm)	42.67	1,122
Of which: surface flow (bcm)	34.77	690
Replenishable ground flow (bcm)	7.90	432
% total water that can be put to beneficial use	60.82	60.03
Per capita annual availability of utilisable water (m^3)	1,248	927

Source: Lathika, M. (2010) Water Management for Irrigation in Kerala, *Economic and Political Weekly*, July 24, Vol XLV (30):73−80, modified by the author.

16.3.2.2 Although the per capita annual availability of water appears to be higher for the state, there are apprehensions that these estimates are higher than the actual availability. This is because about 10 per cent of the total precipitation is stored in reservoirs and about 7,900 million cubic meter is used for groundwater recharge, thereby reducing the surface run-off to 41.0 bcm. Also, in order to sustain the rivers and the ecosystems, the water flow should be at least 40 per cent. After accounting for all these, the utilisable surface water is reduced to about 24.5 cubic metres per year. An equally disquieting fact is the decline in per capita water availability over the years (Table 16.2).

Table 16.2: Trends in per capita availability in Kerala

Year	*Population (crore)*	*Per capita water availability (litre/day)*			
		Rain	*Surface water*	*Groundwater*	*Total*
1901	0.64	49,609	6,556	3,095	59,260
1911	0.71	44,718	5,909	2,790	53,417
1921	0.78	40,705	5,379	2,539	48,623
1931	0.95	33,421	4,416	2,085	39,922
1941	1.10	28,863	3,814	1,801	34,478
1951	1.35	23,518	3,108	1,467	28,093
1961	1.69	18,786	2,482	1,172	22,440
1971	2.13	14,906	1,969	930	17,805
1981	2.45	12,500	1,672	780	14,952
1991	2.95	10,762	1,422	672	12,856
2001	3.36	9,450	1,022	590	11,062

Source: Devi, I. P. 2012. Micro-irrigation: Economics and outreach in Kerala. In K. Palanisami, S. Raman and K. Mohan (Eds.), *Micro- Irrigation: Economics and Outreach*. Delhi: Macmillan.

16.3.2.3 It is worth noting that the entire water supply—surface water, utilisable ground water and storage in reservoirs— in any given year depends solely on rainfall. The seasonal and spatial variation in rainfall is high. Although the highest incidence of rainfall occurs in north Kerala, the effective rainfall amenable for storage is higher in the southern parts, due to more even distribution. This highlights the importance of water storage structures for the state. Another issue that has not attracted the attention it deserves is the need for proper drainage systems. Given the undulating topography, intense rainfall and high rate of run-off, several localities in the low-lying regions accumulate water, which necessitates a system for proper drainage.

16.3.2.1 Rainfall

Changing Rainfall Patterns

16.3.2.1.1 The main source of water in Kerala is rainfall, which has undergone a change. In 18 years, Kerala suffered a deficit in 14 years (Table 16.3). As noted in the Energy chapter,

Krishnakumar, Rao and Gopakumar (2009) analysed rainfall in Kerala between 1871 and 2005[7]. They found a significant decrease in rainfall in June and July with an increasing trend in January, February and April. Post-monsoon rainfall has also increased.

Table 16.3: Percent Departure of Rainfall from Normal in Kerala, 1990 to 2008 (%)

Year	*Annual*	*South-West Monsoon*	*North-East Monsoon*
1990	−28	−25	−4
1991	−39	18	−21
1992	−37	15	35
1993	−8	−12	32
1994	11	15	13
1995	−6	−6	−22
1996	−13	−8	2
1997	3	6	31
1998	0	2	30
1999	−8	−25	23
2000	−21	−18	−27
2001	−6	−13	0
2002	−14	−33	32
2003	−14	−24	5
2004	−3	−19	12
2005	0	−2	2
2006	−2	−7	22
2007	20	27	−5
2008	−20	−22	−11

Source: State Planning Board via indiastat.com

Seasonal Variation in Rainfall

16.3.2.1.2 Latika (2010) analysed the average seasonal rainfall for the state as well as for India over 135 years; she found that the rainfall is characterised by higher variability during all the seasons and at the aggregate level compared to that noted for the all−India level.

Table 16.4: Rainfall in Kerala and its distribution across seasons (mm)

Season	*Seasonal rainfall*		*Monthly rainfall*	
	Kerala	*India*	*Kerala*	*India*
Kharif	2,168	901	434	181
Rabi	491	132	123	33
Others	164	54	55	18
Total	2,822	1,088	236	91

Source: Lathika, M. 2010. Water management for irrigation in Kerala, *Economic and Political Weekly*, July 24, Vol XLV (30):73−80, modified by the author.

[7] Krishnakumar, K.N., Rao, G.H.S.L.V. P. and C.S. Gopakumar. 2009. Rainfall trends in twentieth century over Kerala, India. *Atmospheric Environment*, 43, 1940−44.

Spatial Variation in Rainfall in Kerala

16.3.2.1.3 The rainfall pattern in Kerala also has a spatial dimension that is characterised by large inter−district variation. "The Western Ghats region of Wayanad district receives rainfall higher than the State average (about 3,588 mm), whereas it is 2,329 only in Palakkad district. The regions such as Attapaddy in Palakkad district receive rainfall less than 1,000 mm"[8]. A gradual decline of rainfall is noted in the state, and is more pronounced in the northern districts.

Retention Capacity

16.3.2.1.4 Although rainfall is high in Kerala, water cannot be conserved effectively due to the poor retention capacity of the soil (notably of the dominant laterite and red soils), relatively high surface slope and high degree of land degradation. The thick forest cover and vegetation that characterised the state had facilitated relatively high percolation of rainwater, but the situation is rapidly changing due to large−scale encroachment of the forest lands, destruction of forests, reclamation of natural ecosystem buffers such as ponds, wetlands and paddy fields and changes in the cropping pattern. The conversion of vast stretches of cultivated land for non−agricultural purposes such as dwellings and roads and the increasing imperviousness of the soil because of the construction of concrete courtyards, pavements, etc. exacerbate the problem.

16.3.2.2 Surface water

Rivers, Private Water Resources and Reservoirs Dominate Supply of Water

16.3.2.2.1 In Kerala, the surface water consists of freshwater as well as brackish water, which is a mixture of freshwater and saline water. Table 16.5 shows the various types of water resources in Kerala. The rivers yield 42.7 bcm of utilisable water. The State Development Report, 2008 mentions that the majority of the rivers suffer from saltwater intrusion, especially during summer months, with seawater reaching up to about 26 km upstream from the river mouths[9]. The rivers are polluted from industrial and domestic wastes, pesticides and fertilisers.

16.3.2.2.2 A major source of fresh water in Kerala is private ponds (other than rivers and reservoirs) followed by panchayat ponds. Their importance can be seen in Krishnan (2010), which discusses the case of Palakkad where re−distribution of land led to the re−distribution of water commons; this affected the traditional water network and, in turn, affected farming[10].

[8] Dinesan, V.P. 2013. Monsoon Rainfall Deficit and its Impact. *Kerala Calling*. March.
[9] Planning Commission, Government of India. 2008. "Kerala Development Report". www.planningcommission.nic.in.
[10] Krishnan, J. 2010. How dams and irrigation canals killed Kerala's traditional kulams? Infochange http://infochangeindia.org/environment/technology-vs-tradition/how-dams-and-irrigation-canals-killed-keralas-traditional-kulams.html. October.

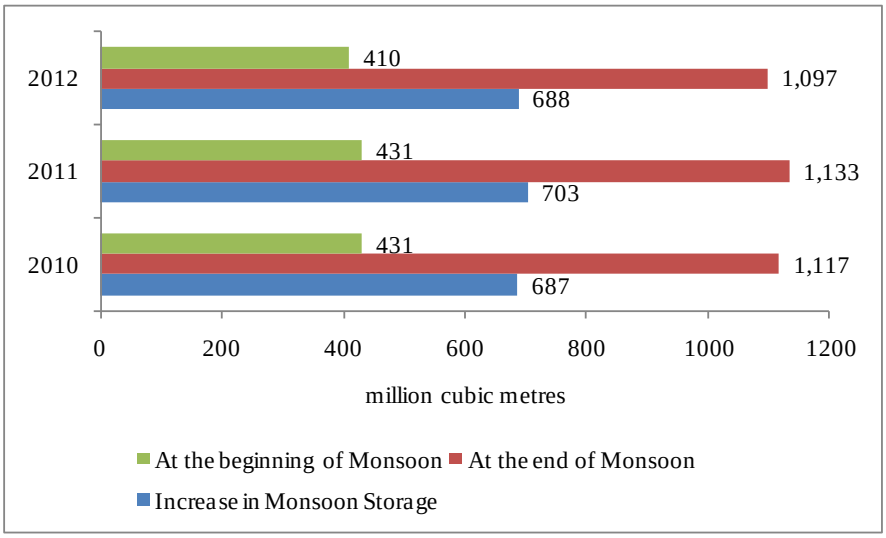
Table 16.5: Water Resources in Kerala, 2010

Type of Water	*Type of water body*	*Number*	*Area (ha)*
Freshwater resources	Private ponds	35,763	21,986
	Panchayat ponds	6,848	1,487
	Quarry ponds	879	341
	Holy ponds	2,689	480
	Village ponds and other water holds	185	496
	Irrigation tanks	852	2,835
	Public sector freshwater fish farms	13	85
	Freshwater springs	7	NA
	Freshwater lakes	9	1,620
	Waterfalls	11	NA
	Rivers	44	85,000
	Check dams	80	259
	Bund/Barrier/Anicut/Shutter waterholds	70	879
	Reservoirs	53	44,289
	Kole lands		17,000
	Kuttanad Padasekharams		35,000
	Paddy fields in Palakkad		1,20,000
Brackish water resources	Brackish water area		65,213
	Backwaters	53	46,219
	Prawn filtration fields	234	12,873
	Public sector brackish water fish farms	12	227
	Estuaries (Azhi/Pozhi)	84	NA
	Mangrove areas	NA	1,924

Source: Department of Fisheries. 2012. *Kerala Inland Fisheries Statistics 2010*. Government of Kerala, Thiruvananthapuram.

16.3.2.2.3 Reservoirs are an important source of fresh water and energy for Kerala. With the drought in 2012, water storage in reservoirs increased by 340 million cubic metres, which is barely half of what it did in 2010 (681 million cubic metres) and less than half in 2011 (749 million cubic metres). Figure 16.2 shows the storage position of the reservoirs.

Figure 16.2: Live Storage Position in the Reservoirs (average for 10 years): 2010, 2011 & 2012



Source: State Planning Board, Government of Kerala. 2013. Economic Review 2012. http://www.spb.kerala.gov.in/images/pdf/er12/Chapter2/chapter02.html#Water

16. 3.2.3 Groundwater

Kerala is dependent on Groundwater

16.3.2.3.1 Groundwater is a major source of water in Kerala. The latest Census 2011 shows that 65 per cent of rural and 59 per cent of urban households have wells; the density of wells is the highest in the country (or even in the world) and is higher in the coastal regions[11]. In addition, 50 per cent of irrigation needs are met through groundwater as per the Economic Review 2012. However, recently problems of a decline in the water table, contamination of groundwater, seawater intrusion, etc. are being reported at several places[12].

Limited Groundwater Potential in Kerala

16.3.2..3.2 The groundwater potential of Kerala is limited because 88 per cent of the total geographical area of the state is underlain by crystalline rocks devoid of any primary porosity[13]. There are 10 different principal aquifer systems in Kerala. Groundwater in Kerala has a potential of 34–601 metres below ground level (mbgl) and the yield varies between 0.1–38 lps (litres per second) depending on the area (Table 16.6). Alappuzha, Kollam, Kozhikode witnessed the highest depth level. The discharge range is higher in

[11] Planning Commission, Government of India. 2008. *Kerala Development Report*. www.planningcommission.nic.in.
[12] ENVIS Centre: Kerala State of Environment and Related Issues website. http://www.kerenvis.nic.in/.
[13] This paragraph has been taken from the Central Ground Water Board, Ministry of Water Resources, Government of India. September 2012. *Aquifier Systems of Kerala*. cgwb.gov.in/AQM/**Kerala**.pdf (accessed May 18, 2013).

Palakkad, Alappuzha and Pathanamthitta districts of Kerala. Dug wells are the major groundwater extraction structure in Kerala (Table 16.6).

Table 16.6: Groundwater Exploration by District as on March 2011

District	*Area (sq km)*	*Depth range (mbgl)*	*Discharge range (lps)*	*Dug Wells*	*PZ (Piezometer)*	*Total Col (5)+ Col. (6)=(7)*
1	2	3	4	5	6	7
Alappuzha	1,414	200−601	1 to 33	38	29	67
Ernakulam	3,068	130−296	1 to 20	34	17	51
Idukki	4,358	34−233	0.1−14	20	9	29
Kannur	2,966	86−200	0.2−14	16	17	33
Kasargod	1,992	60−200	0.5−7	31	24	55
Kollam	2,491	114−416	0.3−20	57	17	74
Kottayam	2,208	86−200	0.5−20	16	11	27
Kozhikode	2,344	114−200	0.2−17	17	21	38
Malappuram	3,550	89−300	0.3−15	28	33	61
Palakkad	4,480	59−300	0.5−38	58	36	94
Pathanamthitta	2,637	44−257	0.5−29	50	8	58
Thiruvananthapuram	2,192	52−200	0.2−20	40	23	63
Thrissur	3,032	69−301	0.2−24	40	13	53
Wayanad	2,131	60−200	0.3−11	17	9	26
Total	38,863	34−601	0.1−38	462	267	729

Source: Central Ground Water Board, Ministry of Water Resources, Government of India. 2012. *Aquifer systems of Kerala*. September.

Low Level of Groundwater Development

16.3.2.3.3. The annual replenishable ground water resources of Kerala have been reassessed at 6.7 billion cubic meters (bcm) as on March 2011. The main source of groundwater is recharge from rainfall, which contributes about 82 per cent of the total annual replenishable resources. The annual ground water draft in the state as on March, 2011 is about 2.8 bcm. The stage of groundwater development for Kerala as a whole has been computed as 47 per cent. The utilisation pattern is, however, uneven across the state, with groundwater stressed conditions in some parts and sub−optimal groundwater development in others. Despite the relatively low level of groundwater development in the state, problems related to shortage, mainly for drinking and domestic uses and contamination of water due to natural and anthropogenic causes, are felt in different areas of the state.

16.3.2.3.4 The groundwater levels during November 2012 are compared to average water levels for the past decade (*decadal* refers to November 2002−2011). Table 16.7 shows that 43 per cent of monitored wells have registered a decline in water level, while around 57 per cent of the wells have shown a rise in water levels.

Table 16.7: Decadal Ground Water Level Fluctuation with Mean [November (2002 to 2011)] and November 2012

Item	*Details*		*Kerala*	*India*
No. of wells analysed			677	10,356
Range in metre	Rise	Min	0.01	
		Max	6.7	
	Fall	Min	0.02	
		Max	10.56	
Rise	0−2 metre	No.	331	3,966
		%	48.89	38.3
	2−4 metre	No.	34	842
		%	5.02	8.13
	>4 metre	No.	23	436
		%	3.4	4.21
Fall	0−2 metre	No.	231	3,564
		%	34.12	34.41
	2−4 metre	No.	42	879
		%	6.2	8.49
	>4 metre	No.	16	669
		%	2.36	6.46
Rise		No.	388	5,244
		%	57.3	50.6
Fall		No.	289	5,112
		%	42.7	49.4

Source: Central Ground Water Board, Ministry of Water Resources, Government of India. *Ground Water Level Scenario in India November 2012*.
http://cgwb.gov.in/documents/GROUND%20WATER%20LEVEL%20SCENARIO_November−12.pdf

Kerala lags in monitoring of Groundwater

16.3.2.3.5 Monitoring of groundwater regime is an effort to obtain information on groundwater levels and chemical quality through representative sampling[14]. The Central Ground Water Board monitors groundwater four times a year. Of the 15,653 groundwater monitoring wells located all over the country (March 2011), Karnataka has the highest number of wells in India at 1,507[15]. Kerala lags behind seven other states in the number of monitoring wells, although it has the highest density of wells in the country. Kerala has 658 dug wells and 267 piezometers that operate as monitoring wells.

[14] Ground water levels are being measured four times a year during January, April/ May, August and November. The ground water regime monitoring started in the year 1969 by Central Ground Water Board.
[15] Central Ground Water Board, Ministry of Water Resources, Government of India. *Annual Report 2010−11*.

Poor Quality of Groundwater

16.3.2.3.6 Water quality in Kerala has been steadily degraded by a combination of factors including saline intrusion, sewage and industrial effluents and urban and agricultural run−off. Groundwater in the state is highly affected by high levels of fluoride, saline, iron and nitrate content, which are above the permissible limits in certain pockets of the districts (Table 16.8). The permissible iron concentration in groundwater is less than 1.0 mg/litre for drinking water as per the BIS Standard and for nitrates it is less than 45 mg/litre, but Kerala is among the top five states in terms of the presence of iron and nitrates in groundwater[16]. In terms of salinity and fluoride, only Palakkad district in the state has high levels in the groundwater.

Table 16.8: Districts affected by different constituents of groundwater in Kerala

Indicators	***Districts***
Parts of districts having electrical conductance (Salinity) > 3000 µS/cm	Palakkad*
Parts of districts having fluoride > 1.5mg/litre	Palakkad
Parts of districts having iron> 1.0 mg/litre	Alappuzha, Ernakulam, Idukki, Kannur, Kasaragod, Kollam, Kottayam, Kozhikode, Malappuram, Palakkad, Pathanamthitta,Thiruvananthapuram, Thrissur, Wayanad
Parts of districts having nitrates > 45 mg/litre	Alappuzha, Idukki, Kollam, Kottayam, Kozhikode, Malappuram,Palakkad,Pathanamthitta,Thiruvananthapuram, Thrissur,Wayanad

Note: * Present in minor/ local spots.

Source: Central Ground Water Board, Ministry of Water Resources, Government of India. 2010. *Ground Water Quality in Shallow Aquifers of India*. Faridabad. February

16.3.3. Demand for Water

16.3.3.1 The demand for water emanates from irrigation, domestic use for humans and animals, industrial use and environmental purposes, such as removal of soil salinity. The demand and supply position of the water in Kerala as given in the Kerala Development Report for the entire period and for the summer season is provided in Table 16.9. Although the figures for the annual water balance indicate a surplus of about 8.5 bcm, the state faces acute water stress during summer months amounting to 7.1 bcm. This indicates that the summer period receives only about 15 per cent of the annual water, whereas the demand during this period is as high as 75 per cent of the annual requirement.

16.3.3.2 Table 16.9 shows that the major demand for water comes from irrigation, followed by demand from industry, conservation of kari land and domestic demand.

[16] UNICEF. 2013. "Water in India: Situation and Prospects". www.unicef.org. Accessed May 19, 2013.

Table 16.9: Demand−supply balance of water across different uses during a year and for the summer period (bcm), 2001

Water source/sector	*Annual*		*Summer*	
	Availability	*Demand*	*Availability*	*Demand*
Surface water	2.4	−	3.7	−
Groundwater	5.1	−	5.1	−
Stored surface water	5.5	−	5.5	−
Domestic demand	−	1.2	−	0.8
Birds and animals	−	0.4	−	0.3
Industrial demand	−	6.4	−	3.2
Conservation of kari land	−	5.0	−	3.5
Irrigation	−	13.7	−	13.7
Total	35.2	26.7	14.3	21.5
Surplus/deficit	+8.5	−	−	−7.1

Note: Summer lasts from end−February to May.
Source: Planning Commission, Government of India. 2008. *Kerala Development Report*. www.planningcommission.nic.in.

16.3.3.1 Irrigation

16.3.3.1.1 Irrigation began in Kerala at the end of World War II and accelerated after independence. It started with major and medium irrigation projects and has since then received significant fund flow throughout the Plans (about 15 per cent in all the Plans). However, the long−term returns that could be realised from this investment are under serious re−consideration, both in terms of the financial recovery of the projects and in terms of the intended crop benefits. This is mainly due to the continuing decline of the area under paddy, the reported not−so−significant yield difference between irrigated and un−irrigated paddy, the shift to cultivation of plantation crops that do not require the intensive irrigation paddy does, lower financial returns from the irrigation schemes, inordinate delays in completion of the projects and the associated escalation in economic and financial costs, among many others.

Insufficient and Misdirected Irrigation

16.3.3.1.2 Table 16.10 provides a glimpse of the irrigation development of the state. The gross irrigated area during 2009−10 was about 4.55 lakh hectares, which accounted for only 17 per cent of the gross cropped area and about 16 per cent of the net cropped area. Despite the continued efforts to irrigate crops through both major and minor irrigation programmes, only about one−sixth of the total area could be brought under irrigation. A close examination shows that the gross irrigated area has remained almost stagnant in the past decade.

Table 16.10: Trends in Irrigated Areas in Kerala (lakh ha), 1998−99 to 2005−06

Year	*Baeds on gross cropped area*			*Based on net cropped area*		
	Gross irrigated area (GIA)	*Gross cropped area (GCA)*	*% of GIA to GCA*	*Net irrigated area (NIA)*	*Net cropped area (NCA)*	*% of NIA to NCA*
1998−99	4.21	29.17	14.43	3.75	22.59	16.60
1999−00	4.71	30.02	15.69	3.80	22.39	16.97
2000−01	4.58	30.22	15.16	3.81	22.06	17.27
2001−02	4.32	29.92	14.44	3.77	21.91	17.21
2002−03	4.47	29.70	15.05	3.93	21.89	17.95
2003−04	4.27	29.54	14.45	3.81	21.90	17.40
2004−05	4.55	29.96	15.19	3.93	21.55	18.24
2005−06	4.65	29.86	15.57	4.00	21.32	18.76
2006−07	4.75	29.17	16.28	3.90	21.01	18.56
2007−08	4.55	27.61	16.48	3.87	20.89	18.53
2008−09	4.58	27.02	16.95	3.99	21.06	18.95
2009−10	4.55	26.69	17.04	3.86	20.79	16.34

*Source***:** Planning Board, Government of Kerala. 2013 and previous reports. Economic Review 2012. http://www.spb.kerala.gov.in/images/pdf/er12/Chapter2/chapter02.html#Water.

Private Sources of Irrigation Dominate

16.3.3.1.3 The major sources of irrigation in the state are private wells, which account for about one−third of the total area under irrigation, followed by government canals, which constitute about 25 per cent (Table 16.11). Despite the investments on canal irrigation, the area under this system has not increased much. However, the canal system has also contributed to the water levels in the soil through water seepage and supported ground and other surface water irrigation. Tanks, even though they are not as important for the state as they are in the other southern states, still contribute to 10 per cent of the total area irrigated. Kerala has about 995 tanks/ponds, mostly in need of restoration. The major "other sources" include getting water from rivers and lakes, natural streams (as noticed in Wayanad), and horizontal borings such as *surangams* in north Kerala. The dependence on canal irrigation is the highest (in terms of area) in Palakkad, Thrissur and Ernakulam districts; wells (open and bore) in Palakkad, Thrissur and Kasargod districts; and ponds in Kasaragod, Idukki, Palakkadu and Malappuram districts. The ponds for irrigation are mainly under private ownership.

Table 16.11: Net Area Irrigated in Kerala by Source (ha)

Year	*Government Canals*	*Private Canals*	*Tanks*	*Wells*	*Other*	*Total*
1998−99	94,643	2,482	47,532	1,07,213	1,22,639	3,74,509
1999−00	81,231	4,803	52,932	1,21,605	1,19,472	3,80,043
2000−01	1,00,926	4,041	49,972	1,15,703	1,10,399	3,81,041
2001−02	95,270	4,413	49,945	1,16,746	1,10,788	3,77,162
2002−03	1,01,139	4,272	66,729	1,17,490	1,03,541	3,93,171
2003−04	94,859	5,754	47,856	1,09,360	1,23,469	3,81,298
2004−05	1,01,397	4,729	43,983	1,08,445	1,34,802	3,93,356
2005−06	1,04,669	4,965	45,062	1,10,000	1,35,227	3,99,923
2006−07	98,664	4,300	42,064	1,14,477	1,25,900	3,85,405
2007−08	88,318	4,324	41,580	1,31,002	1,22,321	3,87,545
2008−09	95,956	6,318	39,752	1,33,312	1,23,915	3,99,253
2009−10	94,813	2,656	40,851	1,25,892	1,22,050	3,86,262

*Source***:** State Planning Board. Kerala Economic Review (various issues).

Irrigation Land Good for Paddy Production

16.3.3.1.4 The crop−wise irrigation development in the state is summarised in Table 16.12. About three−fourth of the area under paddy and banana are irrigated, but it is as low as 21 and 36 per cent in the case of coconut and areca nut, respectively, and irrigation coverage of tubers and vegetables is also minimal. Although the area under paddy in the state has declined considerably, the decline has been pronounced only in the case of rain−fed paddy. The total loss of area under paddy from 1998–99 to 2010–11 was about 1.4 lakh ha, but the area lost from irrigated paddy was only about 33 thousand hectares. Thus, irrigation can prevent the conversion of paddy land to a significant extent.

Wasteful Irrigation Methods

16.3.3.1.5 The methods of irrigation vary significantly across crops. While paddy is irrigated through the flood system, plantation crops are mainly irrigated through basin or ring irrigation systems. In homesteads where many crops are grown together, the flood system is common. The furrow system of irrigation is used to cultivate vegetables and bananas. All these irrigation systems lead to a high level of water wastage. These methods reduce water productivity, namely, the quantity of produce per unit quantity of water.

Table 16.12: Crop−wise irrigated area and total area under crops in Kerala

(lakh ha)

Year	*Paddy*		*Coconut*		*Banana*		*Areca nut*	
	Irrigated	*Total*	*Irrigated*	*Total*	*Irrigated*	*Total*	*Irrigated*	*Total*
1998−99	1.92	3.53	1.52	8.82	0.12	0.77	0.27	0.81
1999−00	2.09	3.50	1.70	8.99	0.19	0.92	0.32	0.82
2000−01	2.08	3.47	1.66	9.26	0.19	0.99	0.31	0.87
2001−02	1.84	3.22	1.58	9.06	0.24	1.06	0.31	0.93
2002−03	1.84	3.10	1.54	8.99	0.29	1.10	0.34	0.97
2003−04	1.70	2.87	1.59	8.99	0.28	1.09	0.33	1.03
2004−05	1.84	2.90	1.58	8.99	0.30	1.13	0.37	1.08
2005−06	1.75	2.76	1.59	8.98	0.34	1.17	0.35	1.09
2006−07	1.73	2.64	1.78	8.73	0.41	1.12	0.35	1.02
2007−08	1.94	2.29	1.71	8.02	0.42	0.56	0.34	1.01
2008−09	1.69	2.34	1.57	7.9	0.35	NA	0.34	NA
2009−10	1.69	2.34	1.52	7.8	0.36	0.51	0.34	0.99
2010−11	1.59	2.13	1.61	7.7	0.42	0.59	0.36	1.00

*Source***:** State Planning Board. Kerala Economic Review (various issues).

Impact of Irrigation

16.3.3.1.6 There has been a lot of debate amongst researchers on the relevance of irrigation in Kerala. The evidence shows that rice yield is positively affected by irrigation, which supports the rationale for providing irrigation. The yield of rice from irrigated rice fields was always higher than that from un−irrigated conditions, irrespective of the season. Data for the year 2007 shows that irrigation pushes up the rice yield to about 840 kg/ ha during the summer season, 360 kg during the winter season and about 120 kg during the autumn season (when sufficient rainfall is available for crop cultivation), clearly indicating the role of irrigation in increasing rice yields in the state. It is also noted that irrigation for crops such as coconut would increase the yield by about 30−300 per cent, depending on the stage of the variety of palm, physiography of the region and soil type.

Development of irrigation infrastructure

16.3.3.1.7 The major thrust in irrigation development in the state was provided for major and medium−sized irrigation projects, keeping in mind the need to produce sufficient paddy for the state to be self−sufficient. Crops other than paddy were considered for irrigation only after the 1970s. Kerala has 18 dams intended for irrigation, of which 13 have storage and 5 are barrages. Investments have gone into constructing these storage and irrigation structures.

Out of a cumulative investment of Rs 4,638 crore made from the first Plan to 2009−10, about 69 per cent has been towards constructing major and medium irrigation facilities (Economic Review, 2010). Table 16.13 provides Plan−wise expenditure on investment in irrigation and allied sectors in Kerala. However, such huge investments were unable to bring a correspondingly high area under irrigation. As the irrigation development was paddy−centric, the distribution structures developed were not suitable for irrigating other crops such as coconut, areca nut and banana.

Table 16.13: Expenditure on irrigated and allied sectors during various Five−Year Plans, (in Rs million)

Plan	*Irrigation Expenditure at current prices*							*Total irrigation project (at 1993−94 prices)*	*% of expenditure of India (at 1993−94 prices)*
	Major & Medium	*Minor−SWD*	*Minor −GWD*	*Flood control*	*Anti−sea erosion*	*CAD*	*Total irrigation project*		
I (1951−56)	51.1	−	−	−	−	−	51.1	791.13	1.16
II (1956−61)	89.24	22.62	−	−	18−94	−	111.86	1,553.6	2.07
III (1961−66)	103.1	56.47	−	6.3	45.7	−	159.57	1,817.4	1.57
Annual Plans (1966−69)	101.5	65.3	−	10.98	12.37	−	166.8	1,309.9	1.69
IV (1969−74)	289.2	112.2	1.08	15.8	54.01	−	402.5	2,521.78	1.67
V (1974−78)	751.3	126.67	7.34	22.8	45.4	−	885.3	3,478.6	2.16
Annual Plans (1978−80)	723.5	105.53	5.25	31.3	36.9	−	834.3	2,886.8	2.55
VI (1980−85)	2,602.7	340.9	58.44	53.1	126.03	8.36	3,020.04	7,102.6	2.63
VII (1985−90)	3,019	357.22	89.08	81.3	98.2	147.58	3,465.3	5,921.6	1.93
Annual Plans (1990−92)	1,345.9	283.57	66.15	61.3	95.3	151.05	1,696.02	2,157.2	1.64
VIII (1992−97)	5,869.3	1,286.49	313.99	406.01	725.9	477.8	7,469.8	6,745.3	2.33
IX (1997−2002)	7,033	2,258	328.92	338.4	500.9	328.1	9,619.9	6,536.7	1.58
X (2002−07)	6,000	2,050	−	−	500	−	8,050.0		
Total (Up to X Plan)	2,7996.8	5,220.4	870.25	−	2,837.1	1112.8	34,087.5		

Note: SWD: Surface water development, GWD: Groundwater development.

Sources: Economic Review, various issues; Lathika, M. 2010. Water Management for Irrigation in Kerala, *Economic and Political Weekly*, July 24, Vol XLV (30):73−80.

Minor Irrigation Development in Kerala

16.3.3.1.8 Minor irrigation possesses distinct advantages over major irrigation. They include lower investment needs per hectare, shorter payback period, easier management, reduced environmental damage and better suitability to agro−ecologies. Minor irrigation started receiving more attention since the seventh Five−Year Plan and investment to this sector accelerated from the ninth Five−Year Plan, both from national agencies such as NABARD and through international aid. The availability of a large number of water bodies

in the form of rivers, rivulets and ponds, and the ease of institutional intervention through user groups makes minor irrigation the preferred option for irrigation development in the state. Minor irrigation schemes generally take up works that involve construction of check dams, construction and renovations of the tanks, vented crossbars, weirs, etc. The operation and maintenance of minor irrigation is vested with the Panchayati Raj and Nagarpalika institutions, which provides an opportunity for better management. However, the area under lift and minor irrigation is minimal in most districts, except in Ernakulum and Malappuram. Despite the advantage in terms of unit costs, their poor coverage begs deeper exploration.

Minor Irrigation Not Achieving its Potential

16.3.3.1.9 A survey to assess the performance of minor irrigation in Kerala indicated that the minor irrigation initiatives were able to achieve only a little over 53 per cent of the targeted area coverage, the actual area irrigated is only half the potential created (as on 2004−05) and they support 5.0 lakh beneficiaries as against the proposed 7.9 lakh. One major problem with minor irrigation schemes has been the high number of non−functioning schemes. About 16 per cent of the minor irrigation schemes are not functioning, due to physical damage, changes in the agricultural methods in the locality and scarcity of water, among others (Government of Kerala, Minor Irrigation Survey, 2005). Scarcity of funds has been identified as the reason why several proposed minor irrigation schemes were not initiated. The highest proportion of "not functioning" schemes identified are those constructed against saltwater intrusion, followed by IPD (Intensive Paddy Development) yelah schemes, whereas the lowest failures are in the case of lift irrigation (Tables 16.14 and 16.15).

Table 16.14: Distribution of Minor Irrigation Schemes by Project Class, 2004−05

Class	***Not working***	***Total number installed***	***Percentage Not Working***
Class I Works	91	558	16.31
Class II Works	1,395	7,749	18.00
Saltwater exclusion	219	832	26.32
Community irrigation	157	1,394	11.26
IDP Yelah	393	1,877	20.94
Lift irrigation	186	1,952	9.53
Others	828	6,424	12.89
Total	3,269	20,786	15.73

Notes: Class I works having area of 50 hectares up to 2000 hectares will be classified as Minor Irrigation class I projects.

Class II works have area less than 50 hectares.

IDP Yelah: Aims to provide minor irrigation facilities to selected areas, where Intensive Paddy Development schemes of Agricultural department are implemented.

Lift Irrigation: Works involving lifting of water by mechanical means, with a command area of not less than 40 hectares.

Source: Compiled from Report of the Minor Irrigation survey, Government of Kerala.

Table 16.15: Distribution of Minor Irrigation Schemes by Project Type, 2004−05

Type	*Not working*	*Total number installed*	*Percentage Not Working*
Well	77	1,108	6.95
Tube wells	12	141	8.51
Ponds	650	4,103	15.84
Lift irrigation	186	1,952	9.53
Side protection wall	479	3,817	12.55
Minor dams	1,158	4,791	24.17
Saltwater intrusion	219	832	26.32
Other	488	4,042	12.07
Total	3,269	20,786	15.73

Source: Compiled from Report of the Minor Irrigation survey, Government of Kerala.

16.3.3.1.10 The latest Minor Irrigation Survey of 2006−07 shows that 91.6 per cent of the potential created in minor irrigation schemes are being used. Out of that the share of surface water schemes is 90.2 per cent and groundwater schemes 94.6 per cent. Ironically groundwater schemes (1,14,718 hectares) covered less area than surface water schemes (2,55,460 hectares). Further, the survey shows that a total of 1,449 schemes are not being used and 9,723 hectares of potential created has been lost. While larger numbers of groundwater schemes are not being used (796) versus 653 in surface water, it is surface water that has lost most of the potential created (8,725 hectares).

The Potential of Micro−irrigation

16.3.3.1.11 In the context of water scarcity and the need to increase water use efficiency, micro−irrigation is getting widely adopted. In this context, it is worth noting that the entire irrigated area in arid countries such as Israel is under micro−irrigation. The need to popularise micro−irrigation has also been acknowledged by the Government of India. The task force to assess the feasibility of micro−irrigation has estimated that there is a potential of bringing about 42 million ha of cultivated land under micro−irrigation (Table 5.9 in Chapter 5). Against this potential, the actual achievement at the national level is only 9 per cent. All the southern states barring Kerala achieved relatively better coverage of micro−irrigation. In Kerala it was only about 7.8 per cent, which is well below the national average. Kerala has the potential for about 2.1 lakh ha to be covered under micro−irrigation: 1.8 lakh ha under drip irrigation and the remainder under various types of sprinkler irrigation. The studies conducted by the Centre for Water Resources Development and Management (CWRDM) on coconut and areca nut have revealed an increase in yield following micro−irrigation.

16.3.3.2 Industrial Water

16.3.3.2.1 Demand for industrial water is poised to become a pressing problem in the near future, and water conflicts are a distinct possibility. Box 16.1 illustrates the case of the legal battle between a panchayat and a soft drinks company.

Box 16.1: Legal Battle over Groundwater between a Panchayat and a Soft Drinks Company

The relentless battle of a Kerala panchayat to stop a soft drinks major from drawing huge quantities of local groundwater for its bottling plant reached the Supreme Court in 2005, with the court issuing a notice to Coca Cola on the panchayat's plea. The panchayat had appealed a decision of the Kerala High Court, which had ruled that the panchayat's rejection of Coca Cola's application for renewal of a licence to extract groundwater was untenable in law (April 2005). Basing its verdict on scientific data provided by the court−appointed multi−agency expert committee, the court concluded that the findings of the committee that the factory could safely be permitted to withdraw 5 lakh litres of water a day appears "fair, authentic, mature and therefore acceptable". In pronouncing the verdict, the Division Bench of the High Court overturned a single−bench ruling of the same high court on the case 14 months earlier (December 16, 2003). The judge had then held that the government, holding public property of groundwater in trust, had no right to allow a private party to overexploit resources to the detriment of the people. The April 2005 judgement of the Division Bench of the High Court stated: The industry has the right to receive water "without inconveniencing others"; "We hold that ordinarily a person has the right to draw water in reasonable limits"; "There is a need to do balancing of ecological rhythm with aspirations of the people in the locality"; and finally, the findings of the single judge "might not be practical".

Sources: Upadhyay. 2005. *Perumatty Grama Panchayat* v. *State of Kerela*, 2004(1) KLT 731; *Hindustan Coca−Cola Beverages (P) Ltd* v. *Perumatty Gram Panchayat*, 2005(2) KLT 554 and IDFC. 2011. Water: Policy and Performance for Sustainable Development. *India Infrastructure Report*.

16.3.3.3 Domestic Water

Well water is the main source of domestic water

16.3.3.2.2 In Kerala, people switched from traditional sources of water to piped water, but with the failure to deliver water people have returned to traditional sources. Currently, a combination of traditional and modern methods is used to supply water in rural and urban areas, with a wide gap between rural areas (Table 16.16) and urban areas (Table 16.17). Approximately 65 per cent of the households depend on wells for drinking water, with 51 per cent using uncovered wells. The second most important source is tap water; in urban areas only 35 per cent of households use tap water for drinking purposes (70.6% for India) and 58.9 per cent use water from wells, with 43.9 per cent using water from uncovered wells.

16.3.3.2.3 The Census 2011 reveals a unique pattern for Kerala, i.e., its dependence on both well water and groundwater (hand pump/tube well/bore hole water) for drinking.

Table 16.16: Distribution of Households by Availability of Drinking Water Facility (Rural %), 2011

Districts/India	Well water			Tap water			Hand pump/ Tube well/ Bore hole water	Other source of water	Total
	Un−covered well	Covered well	Total	From treated source	From un−treated source	Total			
Kasaragod	61.9	3.5	65.4	7.1	3.6	10.7	11.3	12.6	100
Kannur	68.5	7.2	75.7	5.8	5.7	11.5	3.2	9.5	100
Wayanad	58.9	7.1	66	14.4	7.9	22.3	3.3	8.5	100
Kozhikode	64.3	8.9	73.2	11.4	6.4	17.8	1.5	7.6	100
Malappuram	65.4	11.3	76.7	10.8	4.4	15.2	3.6	4.5	100
Palakkad	43.9	7.2	51.1	28.2	11	39.2	5.9	3.8	100
Thrissur	45.3	16.6	62	23.5	5.6	29.1	6.9	2	100
Ernakulam	42.8	15.4	58.2	31.7	6.7	38.4	0.6	2.8	100
Idukki	33	6.9	40	17.1	12.2	29.3	4.2	26.5	100
Kottayam	38.7	32.2	71	16.3	3.9	20.2	1.9	7	100
Alappuzha	33.7	12.9	46.6	26.4	8.9	35.3	11	7.1	100
Pathanamthitta	45.1	30.6	75.7	13.4	4	17.3	1.4	5.5	100
Kollam	55.5	17.1	72.6	12.5	9.9	22.4	0.8	4.3	100
Thiruvanathapuram	56.3	14.2	70.5	14.4	8.6	23	2.5	4	100
Kerala	50.5	14.3	64.8	17.2	7.3	24.5	3.9	6.9	100
India	11.8	1.5	13.3	13	30.8	51.9	51.9	4	100

Source: Census of India website: Office of the Registrar General and Census Commissioner of India. 2011.

Table 16.17: Distribution of Households by Availability of Drinking Water Facility (Urban %), 2011

India/State/District	*Well water*			*Tap water*			*Hand pump/ Tubewell/ Borehole water*	*Other source of water*	*Total*
	Un−covered well	*Covered well*	*Total*	*From treated source*	*From un−treated source*	*Total*			
Kasaragod	54.1	3.9	58	13.8	4.8	18.6	21.4	2	100
Kannur	75.7	8.7	84.5	10.3	1.6	11.9	2.1	1.6	100

Wayanad	60.1	3	63.1	25.5	4.7	30.2	2.3	4.4	100
Kozhikode	54.7	17.9	72.6	19.1	3.6	22.7	2.4	2.3	100
Malappuram	65.8	14.9	80.6	11.5	2.9	14.4	3	2	100
Palakkad	31.9	7.9	39.8	49.5	5	54.5	5	0.7	100
Thrissur	43.6	20.2	63.8	21.6	5.1	26.7	8.3	1.3	100
Ernakulam	20.3	11.7	32	63.2	3.1	66.3	1.1	0.7	100
Idukki	21.4	26.7	48	46	3.4	49.4	1.7	0.8	100
Kottayam	32.3	35	67.3	26.5	3.2	29.7	0.8	2.2	100
Alappuzha	34.1	11	45.1	25.2	9.5	34.7	17.2	3	100
Pathanamthitta	29	34.3	63.2	30.2	3.6	33.8	0.7	2.2	100
Kollam	42.8	21.4	64.2	24.2	9	33.2	0.8	1.8	100
Thiruvanathapuram	33.8	11	44.7	47.5	4.2	51.7	1.8	1.8	100
Kerala	43.9	15	58.9	30.4	4.5	34.9	4.6	1.7	100
India	4.5	1.7	6.2	62	8.6	70.6	20.8	2.5	100

Source: Census of India website: Office of the Registrar General and Census Commissioner of India. 2011.

Poor Sanitation and Polluted Water

16.3.3.2.4 Census 2011 shows that 95.2 per cent of households in Kerala have latrine facilities inside their premises. Only 12 per cent have piped sewer systems and 50.3 per cent of households have a septic tank. The share of houses that have a bathroom facility inside the premises is 81 per cent and 53.6 per cent of households have no drainage facility.

16.3.3.2.5 Sanitation facilities can affect the quality of groundwater. The appropriate distance between an open well/bore well and a septic tank should be 50 feet given the terrain in Kerala[17], but it can be 20–30 feet in lateritic areas. There are about 4.5 million open wells in the state, with a density of 150−200 wells/sq km (State Development Report, 2008). In coastal areas, where the population density is the highest, the well density rises to 400 per sq km. If the wastewater is not treated, it can threaten the natural water bodies of Kerala (Harikumar and Mol, 2012)[18].

Water tariffs

16.3.3.2.6 Table 16.18 shows the water tariff rates in Kerala. The rates are nominal and do not reflect the scarcity value of water in Kerala.

[17] India Water Portal. http://www.indiawaterportal.org/questions/there-any-rule-specifing-distance-between-open-wells-bore-wells-and-septick-tank.

[18] Harikumar, P.S. and B. Mol. 2012. A Synoptic Study on the Preparation of a Liquid Waste Management Plan for Kerala State, India. *Environment and Natural Resources Research*. 2(2). June.

Table 16.18: Water Tariff Rates in Kerala

Type of Connection	*Tariff from 01/09/2008*
A. Domestic	
Up to 5000 L	Rs. 20/−
5000 to 10000 L	Rs. 20/− plus @ Rs. 4.00 per every 1000 L in excess of 5000 L
10000 to 20000 L	Rs. 40/− plus @ Rs. 5.00 per every 1000 L in excess of 10000 L
20000 to 30000 L	Rs. 90/− plus @ Rs. 6.00 per every 1000 L in excess of 20000 L
30000 to 40000 L	Rs. 150/− plus @ Rs.10.00 per every 1000 L in excess of 30000 L
40000 to 50000 L	Rs. 250/− plus @ Rs. 14.00 per every 1000 L in excess of 40000 L
Above 50000 L	Rs. 390/− plus @ Rs. 25.00 per every 1000 L in excess of 50000 L
B. Non−domestic	
Up to 15000 L	At the rate of Rs.10/− per 1000 L and Rs. 125/− minimum charge
15000 to 50000 L	Rs.150/− plus @ Rs.14.00 per every 1000 L in excess of 15000 L
Above 50000 L	Rs.640/− plus @ Rs.25.00 per every 1000 L in excess of 50000 L
C. Industrial For consumption in a month	At the rate of Rs.25/− per 1000 L and Rs. 250/− minimum charge
D. Local Bodies	
Municipal Taps	Rs. 5256/− per year
Panchayat Taps	Rs. 3500/− per year

Source: Kerala Water Authority.

16.3.4 Other Water−Related Issues

Flood Management

16.3.4.1 Four rivers, viz., Chaliyar, Bharathapuzha, Periyar and Pamba, together drain about 35 per cent of the state's total area and carry about 45 per cent of the total surface water. Structural and non−structural measures have been adopted to prevent bank erosion and flooding.

Coastal Zone Management

16.3.4.2 Construction of sea walls is a popular method for stabilising and protecting the shores. Of the identified coastline of 478 km that needs protection, 354.29 km of seawall has been newly constructed. The remaining length of new seawall to be constructed is around 123.71 km. In the area of seashore protection, modern technologies such as geo textiles, polyethylene fabrics/ sheets and nourishment of the foreshore with biomaterials, are emerging.

Groundwater Management

16.3.4.3 The National Water Policy of the Government of India states that traditional water conservation practices such as rainwater harvesting and non−conventional methods such as artificial recharge of ground water need to be practised to increase the utilisable water resources. Rainwater harvesting can be effected by *in situ* harvesting. The best method for rainwater harvesting is groundwater storage, because it not only involves filtration of surface water but is also safe from evaporation losses, natural catastrophes, etc. Artificial recharge to ground water is the process of diverting the surface water into suitable geological formations. The common structures are percolation tanks, khadins, check dams/anicuts, sub−surface dams and injection wells.

16.3.4.4 The Central Ground Water Board has implemented various artificial recharge schemes in Kerala such as surface dykes and percolation tanks, as well as rooftop rainwater harvesting. Four sub−surface dams were constructed at Palghat district (Anaganadi, Bhabaji Nagar, Alanallur and Ottappalam), one at Ernakulam (Odakali), one at Kottayam (Neezhir) one at Quilon (Sandanadapuram) and two in Trivandrum district (Mampazhakara and Ayiolam). The Board has constructed two percolation tanks: one at Chirakulam in Kottayam district and another at Kadapallam in Kasaragod district. Rooftop rainwater harvesting schemes have been implemented at two places: Ezhimala and Mayyilcolony in Kannur district. The artificial recharge structures have given satisfactory results and the groundwater condition in the area has improved considerably.

Water Pollution, Environmental Degradation and Disasters

16.3.4.5 Water pollution is the main issue facing the state and has been discussed in detail in the chapter on Environment.

16.4 Challenges

16.3.4.5 In sum, the challenges that Kerala faces on water are:

- Weather patterns have become uncertain, which directly affects the monsoon.
- Kerala's geography makes the groundwater potential low and the water tables are declining because of increased demand.
- Energy and water are simultaneously affected because of the monsoon.
- Deforestation and encroachments have affected traditional supplies of water
- Most water is spent on irrigation, but the irrigation infrastructure is misdirected at paddy, which has a very small share of the total agricultural output of Kerala.
- Drinking water comes from polluted ground wells, partially because piped drinking water and piped sewage are not available.
- Water is highly polluted
- Water is a necessity, but it is scarce. How can it be managed in a sustainable manner?

16.5 Forecasts

16.5.1 The per capita requirement of 168 litres per capita per day is used to predict the demand for water. As per the national water policy, irrigation water assumes priority next only to drinking water. As of now, the demand for irrigation water is about 13.7 bcm. As there is no firm basis to project the likely increase in irrigated areas and there is a need to conserve irrigation water, we have considered a modest increase in the water required for irrigation by 2 per cent per year for the future. As per these estimates, by 2021 the irrigation requirement of water is projected to increase to about 20 bcm. Other than the domestic and irrigation sector, the next important sector is industry, where water is an input in some industries and is also used to remove industrial effluents and pollutants. The discharge of water from industry is a major pollutant of the rivers in the state. Taking these facts into consideration, the future industrial demand for water is projected to be about 4,270 mcm. Another potential source of water demand is for environmental cleansing. Almost all rivers in the state suffer from saline water intrusion. Paddy cultivation in certain tracts, notably in *Kari* soils, is done after the intruded saline water is removed. The brackish water spread in the lakes and canals is over an area of 2,400 km^2. Of the seven lakes in the state, all but two are affected by saline water intrusion. Therefore, a large quantity of fresh water flow into the backwaters is required during the summer months to flush out the salinity. Often, the water that flows through the rivers is insufficient for this purpose and water from ponds has to be diverted here. It is estimated that by 2021 the fresh water requirement for salinity management would be about 7,200 mm^3 and that for reclaiming water−logged areas and backwaters would be at 5,000 mm^3, which together constitute 12.2 bcm annually. Table 16.19 provides an account of the water demand by 2021 and its relative share in the total water requirement. Except for drinking water and irrigation, the 2031 estimates are CAGR estimates based on the trends between 2001 and 2021.

Table 16.19: Demand for water in Kerala

Source	***2001***		***2021***		***2031***	
	Volume of demand (bcm)	***% share***	***Amount (bcm)***	***% share***	***Amount (bcm)***	***% share***
Drinking water	1.7	6.3	2.1	5.4	2.2	5.0
Irrigation	13.7	51.1	20.3	52.2	24.8	56.4
Industrial	6.4	23.9	4.3	11.1	4.2	9.5
Management of salinity	5.0	18.7	12.2	31.4	12.8	29.1
Total Demand	26.8	100	38.9	100	44	100

Source: Computations by NCAER.

16.5.2 Among the various sectors, the irrigation sector now accounts for about 50 per cent of the total demand for water, followed by the demand for reclaiming soil from salinity, mainly for agricultural purposes. The share of irrigation water is projected to increase to 55 per cent by 2031. On the other hand, the projected utilisable water supply during this period would be about 47.3 bcm, consisting of 42 bcm of fresh water and 4.7 bcm of groundwater. This points to the thin margin of availability above requirement by 2031. It should be noted that the available water supply is estimated with an optimal outlook of no change in rainfall, water storage capacity and full utilisation of the available ground water. It also does not take care of the minimum water supply to be maintained in the rivers. If these factors were taken into consideration, then supply figures would be much lower. The situation calls for effective conservation and efficient utilisation of both surface and ground waters. The total water demand during the summer months is about 21.5 bcm, whereas the available supply is only 14.3 bcm, posting a deficit of about 7.1 bcm, even after accounting for 5.5 bcm of surface water available in dams.

16.6 Way Forward

16.6.1 The strategy should be one of sustainable management.

16.6.1 Vision

16.6.1.1 Water for all: Conserve, Value, Enjoy

16.6.2 Targets

a. Drinking water and sanitation
   - Provide treated water supply to 100 per cent of all households
   - Urban households: 100 per cent underground piped sewer systems
   - Rural households: Recover, Re-cycle and Re-use
   - Households that have toilets within the premises – 100 per cent
   - Urban households that have closed drainage – 100 per cent
   - Wastewater treatment plants for all urbanised areas

b. Irrigation
   - 100 per cent of the potential area under appropriate irrigation schemes with emphasis on:
     - Continued full usage of the created infrastructure
     - Conservation of water

c. Sustainable use of water
   - Increase overall efficiency of water use by 5 per cent

16.6.3 Strategies

Pillar 1: Institutions

Element 1: Adopt Integrated Water Resource Management (IWRM)

16.6.3.1 IWRM is defined by the Global Water Partnership (GWP−2000) as "A process which promotes the coordinated development and the management of water, land and related resources, in order to maximise the resultant economic and social welfare in an equitable manner without compromising the sustainability of vital ecosystems"[19]. It is implemented at the river basin level. Here are the basic conditions for adopting IWRM:

- Basin management plan and clear vision
- Participation and co−ordination mechanisms, fostering information sharing and exchange
- Capacity development
- Well−defined flexible and enforceable legal frameworks and regulation
- Water allocation plans
- Adequate investment, financial stability and sustainable cost−recovery
- Good knowledge of natural resources present in the basin
- Comprehensive monitoring and evaluation of the river basin

16.6.3.2 Kerala may adopt an integrated regional strategy that accompanies its spatial strategy or is a part of it for water resource management. Depending on the type of soil, water usage, availability, urbanisation rate and agricultural patterns, a suitable water strategy may be adopted that caters to the needs of all sectors and stakeholders together[20].

Element 2: Water is a common resource

16.6.3.3 Private ponds dominate in Kerala. Instead, all the water resources should be combined in one place in a village with each person owning a share equivalent to their present holding. Shareholders will be able to sell their shareholding only to fellow villagers. The water is managed by a committee.

16.6.3.4 Australia has used another solution. It has opened the market for water, i.e., to facilitate trade in water entitlement. Irrigators can purchase temporary or permanent entitlements, or if they hold these entitlements they can sell them to other users, but this

[19] The ideas in this paragraph have been taken from Mahto, S. and R. Srivastava. 2013. Need for Integrated Water Resources Management in India. *India Water Week 2012 – Water, Energy and Food Security: Call for Solutions, 10-14 April 2012, New Delhi*

[20] ARGHYAM (2010) has developed a toolkit on integrated urban water management of India. We are proposing a further step.
ARGHYAM. 2010. Developing a tool kit on integrated urban water management in different urban typologies of India. Institute for Research Analysis and Policy (IRAP). Hyderabad.

requires the government to intervene and buy water rights in the open market and also take care of the negative externality. For example, take an irrigator who is currently producing a commodity that is a relatively low−value water−intensive crop. This irrigator could, in dry periods, choose to sell his water allocation to a farmer producing higher−value crops and thereby earn extra income by trading the water. In this way, income can be generated for farmers and the problem of over−allocation of river water that exists in many locations can be reduced.

Element 3: De−centralise water and sanitation to local governments

16.6.3.5 There should be de−centralisation of water and sewer authorities to local bodies especially in urban areas. In rural areas, the successful Jalanidhi water scheme of Kerala should be extended.

16.6.3.6 "The Jalanidhi water scheme sought to help villages plagued by chronic water shortages, making special provisions to include vulnerable people such as tribals, scheduled caste communities as well as fisher−folk within the project's ambit. Small groups of households who wanted better water supply were helped to come together to build and run their own water supply schemes. They were helped to dig new wells (to tap into the upper layers of water), drill bore−wells (to tap into deeper aquifers), or build systems to draw water from the state's numerous springs, streams, rivers and lakes. They were also helped to build storage tanks and lay down pipes to distribute water to village homes. While the state government bore the lion's share of capital expenditure (75%), the gram panchayat paid 10 per cent, and the beneficiaries themselves 15 per cent. The operations and management also lies with the beneficiary groups. Community groups determined the timings and duration of water supply to member families, and levied service charges to meet their operation and maintenance expenses. A number of communities installed water meters to curb consumption"[21].

Element 4: Water metering

16.6.3.7 Water metering is crucial for monitoring the usage of water.

Element 5: Pilot projects to supply 24x7 water

16.6.3.8 Data from various pilot projects across the country suggest that for the current population 24x7 water supply can be designed with the current levels of per capita supplies of source water (Karnataka, Punjab, Maharashtra)[22]. Appendix A.13.1 in the Urbanisation chapter has detailed requirements of the infrastructure and financing required to provide drinking water, sewerage and solid waste management.

[21] World Bank. 2013. India: Getting Water on Tap in Rural Kerala. http://www.worldbank.org/en/news/feature/2013/08/12/india-getting-water-on-tap-in-rural-kerala. August 2012.
[22] Water and Sanitation Programme. 2010. The Karnataka Urban Water Sector Improvement Project 24x7 Water Supply is Achievable. *Field Note*. September.

Element 6: Capacity development

16.6.3.9 Develop degree courses in the following:

- Hydrology and Water Quality
- Desalination and Water Treatment

Become a hub for water innovation and research.

Pillar 2: Supply Management

Element 1: Protection of forests, wetlands and ecologically fragile areas for water sustainability

16.6.3.10 The overall strategy mentioned in the Kerala Perspective Plan 2030 is that a detailed spatial strategy will be used to zone off certain lands from conversion.

16.6.3.11 The importance of wetlands can be seen in the example of Bayawan City in the Philippines, which is constructing wetlands for wastewater treatment.

Element 2: Increase investment in water and sanitation

16.6.3.12 Increase investment in water and sanitation activities to 2 per cent of GSDP.

Element 3: Strengthen physical infrastructure

16.6.3.12 Augment physical infrastructure in each sector. Physical leakages should be plugged with appropriate technology. Regular maintenance is important.

Element 4: Recycle and re-use water

Change in Building norms in urban areas

16.6.3.13 Recycling and re-use of water should progressively be made compulsory for residential buildings to conserve water as the Kerala Perspective Plan 2030 is advocating compact cities.

16.6.3.14 The 3R principle should also be adopted for industrial use of water.

Water and Waste Management are complementary

16.6.3.15 Water supply and liquid waste management schemes should be implemented together, with the same organisation managing both. Some examples from around the world are[23]:

- Singapore is recycling "gray water" to drinking quality standards by using new filtration technology (Box 16.2).

- In Ashkelon, Israel a new desalination plant on the Mediterranean Sea, just north of Gaza, is delivering fresh water at US$ 0.50 per cubic meter down from US$ 2.50 in the early 1990s. This was achieved by an improved reverse osmosis system requiring less energy to drive seawater through the desalination unit.

- An auto/truck manufacturer operating in an arid region of Mexico reduced its water consumption per unit of output by 90 per cent.

- A modern paper mill in Finland has reduced the amount of water used per unit of output by over 90 per cent over the last 20 years by switching from chemical to thermo−mechanical pulp and installing a biological wastewater treatment facility that permitted recycling of water.

- A modern microchip manufacturing plant in Malta was able to reduce its water consumption by over 70 per cent in the late 1990s.

- A textile firm in India reduced its water consumption by over 80 per cent by replacing zinc with aluminium in its synthetic fibre production and by reducing trace metals in wastewater, which enabled reuse. It also used the treated water for irrigation by local farmers.

- A plant converting sugarcane into sugar in Mexico reduced its consumption of water by over 90 per cent by improving housekeeping and segregating sewage from process wastewater.

[23] World Business Council for Sustainable Development. Water Facts and Trends. http://www.unwater.org/downloads/Water_facts_and_trends.pdf.

Box 16.2: Public Utilities Board

Singapore presents a challenging environment for water resources management, as it is a small but densely populated island city-state. The Public Utilities Board (PUB) is the national water agency charged with water, wastewater and storm water management in the city-state. The public agency services about 4.5 million people and several major industries. The development and implementation of the complete management system is ongoing but has taken over 40 years. PUB's holistic approach has resulted in a lower dependence on external water sources by diversifying its water sources, including water reuse, desalination, storm water storage in new water storages and supply of very high-quality recycled water to industry with some internal reuse of this supply. In its own operations, the PUB has significantly reduced water losses due to leakage in pipes and inaccurate meters. It has 100 per cent servicing of its population with water and waste water services and strong political and public acceptance of its policies and services. This has been accompanied by a major change in its water pricing and access policy that aims to use the rate structure to encourage more efficient use of water. The PUB has been able to provide lowered costs of delivered water of improved higher quality to industry and the community. Reclaimed water branded NEWater in Singapore is recognised for its high quality. Singapore has also been able to maintain low water costs for households on the lowest tariff water supply despite the major capital investments in new equipments and systems. Its household directed campaign of "Water efficient homes" helps residents save water at home and reduce their water bills. Through an extensive partnering programme with water industry in all aspects of implementation, it has been a model of out-sourcing skills. From this it has developed an industry capable of transferring this knowledge and skills to the region as well as attracting a broad rage of industry skills and capabilities as well as research in Singapore. The PUB fits well as a study example in the education of water managers. PUB has won the prestigious 2007 Stockholm Industry Water Award.

Source: PUB. 2013. Innovation in Water Singapore. http://www.pub.gov.sg/mpublications/Innovation/Pages/default.aspx. 4. April 10

Co−existence of modern and traditional methods

16.6.3.16 Treatable tap−piped water should be delivered to 100 per cent of the urban households and 80 per cent of rural households. In rural areas, traditional methods should also be examined to boost water supply for purposes other than drinking.

16.6.3.17 Revive traditional methods of water conservation. In Tamil Nadu, *Oorani* or ponds were revived under the pilot pond innovation programme, which has resulted in supply of water to the village throughout the year and water pollution has gone down[24]. Kerala should also explore on a pilot basis a way to revive the *kulams* in Palakkad district to assess if this makes any difference and, if so, to extend the scheme to other places with a similar geography. In general, the tanks and ponds should be revived in Kerala for irrigation given their positive economic and ecological benefits.

[24] Planning Commission, Government of India. Eleventh Five-Year Document. Chapter 5. http://planningcommission.nic.in/plans/planrel/fiveyr/11th/11_v2/11v2_ch5.pdf.

Management of Sewage Water

16.6.3.18 Pipes should be laid to channelise the run−off water so that it can be treated and re−used. Storm−water drains should be developed (Box 16.2). To start with, all cities/hubs should get wastewater treatment plants.

Smart Water Planning

16.6.3.19 Smarter maps for better water planning. A new computational strategy promises to boost the efficiency of sewer network planning as Kerala continues to grow.

Management of Groundwater

16.6.3.20 Groundwater needs to be monitored, managed and re−charged[25]. In areas where groundwater withdrawal is higher than the recharge, artificial recharging of the aquifers can be practised on a long−term basis to maintain the quantum of groundwater and to combat its progressive decline. The available techniques are:

- Direct surface techniques: Flooding, basins or percolation tanks, stream augmentation, ditch and furrow system and over−irrigation.
- Direct sub−surface techniques: Injection wells or recharge wells, recharge pits and shafts, dug well recharge, bore hole flooding, and natural openings and cavity fillings.
- Combination of surface and sub−surface techniques: Basin or percolation tanks with pit shaft or wells.
- Indirect techniques: Induced recharge from surface water sources and aquifer modification.

Adopt rainwater harvesting in all areas

16.6.3.21 Rainwater harvesting should be compulsory in urban areas with hefty fines on both buyers and builders, if not implemented. It could be adopted in rural areas too. In rural areas the traditional systems of storing water in tanks can be revived. There are several technologies for rainwater harvesting:

- Roof water harvesting is recommended for urban areas
- Rainwater syringe (coastal areas)[26]: Rainwater is collected from the rooftops of houses and stored in a pressure tank in the ground and with the help of PVC pipes, water is lowered below sea level (up to 16–24 feet). The water is retained in the underground water column and this harvested water can subsequently be collected by

[25] Central Ground Water Board.
[26] Technologies and practices for small agricultural products website. http://teca.fao.org/read/6919.

a simple piston pump or motor by constructing a tube well in the vicinity before mixing with saline water. Through this method, 500 to 2,500 litres of water can be drawn daily and used for both drinking and minor irrigation.

Check Dams for irrigation in rural areas

16.6.3.22 A check dam is a small dam built across a minor channel or drainage ditch that caters to the temporary or permanent needs of a few hectares of lands. The construction cost of a check dam is only a few lakh rupees. Their major advantages are that they reduce erosion and gullying in the channel, slow the speed of the water flow, allow sediments and pollutants to settle and facilitate ground water recharge. Since the state has a number of rivulets, this technique can be widely adapted. This would help sustain the water flow in the rivers as well as the biotic wealth. In India, the most successful example of check dams can be found in the Kutch and Saurashtra regions of Gujarat. These regions saw unprecedented drought in the year 2000. The government of Gujarat invested more than Rs 118 crore to construct 10,708 check dams in Saurashtra, Kutch, Ahmedabad and Sabarkantha regions under the Sardar Patel Sahakari Jal Sanchaya Yojana. These works were carried out with the direct and indirect financial participation of the beneficiaries, with 40 per cent of the estimated cost contributed by beneficiaries while the government paid the remaining 60 per cent. An independent evaluation study by the Indian Institute of Management (IIM), Ahmedabad found that the localised rain water harvesting systems in the form of check dams in Saurashtra contain a proven solution to water crisis by recharging rainfall run−off into underground aquifers, decentralised drought−proofing systems, and people involvement in critical water management tasks using simple, local, skill−based, cost−effective and environment−friendly technologies. The efforts have been lauded in academic circles as well. For example, Gulati et al. (2009) found that the water strategies adopted in Gujarat helped raise agricultural productivity. In 2009−10, the agricultural economy in the state grew at the rate of 9.6 per cent per year, and the growth was not led by the canal irrigated areas, but by the dry Saurashtra and Kutch, and north Gujarat.

16.6.3.23 China is also a leader in the check dam system. With advantages such as drought−resistance and fertile and good yields on dam farmland, about 100,000 check dams were built in the late 1960s and the 1970s.

Watershed Management

16.6.3.24 Watershed management can play a key role in Kerala[27]. Watershed is defined as a geo−hydrological unit draining to a common point by a system of drains. Singapore has applied this for urban areas. Watersheds combine land management, water management and biomass management. Water management consists of the topics discussed earlier—rainwater harvesting, ground water re−charge, maintenance of water balance, preventing water

[27] Jain, P.C. 2004. Permanent Solution for water scarcity: Watershed Management. *Kerala Calling*. July.

pollution and economic use of water. Kerala can learn and adapt from Singapore Intelligent Watershed systems. Also, it can learn from successful community watershed management systems in Gujarat and Brazil (Box 16.3). Watersheds can be of various types: Macro watershed (> 50,000 ha), Sub−watershed (10,000 –50,000 ha), Milli−watershed (1,000–10,000 ha), Micro watershed (100–1000 ha) and Mini watershed (1–100 ha).

Box 16.3: Community-based watershed Management in India and Brazil

Examples of community-based watershed management systems in countries such as India and Brazil provide evidence of the value of involving women's groups in maintaining and protecting their water sources. In semi-arid areas of Gujarat, India, the Self-Employed Women's Association (SEWA) created its Women, Water and Work campaign in 1995 to sustain and protect traditional water sources through water harvesting, watershed management and repair and maintenance of pipelines and equipment. SEWA's collective action approach for women combines the presence of a strong grassroots institution and the establishment of a technical cadre of women. SEWA's membership has increased greatly due to the success of the water campaign. Women have benefited in terms of increased income, reduced drudgery, improvements in the livelihoods of their families, reduced migration of both women and men and increased participation in SEWA's other programmes. SEWA is a powerful non-governmental organisation (NGO) with the capacity to negotiate in the water management area previously occupied only by men (Panda, 2007).

In the community of São João D'Aliança in central Brazil, the local Union of Rural Workers in collaboration with the University of Brasília (UnB) designed a community water project to stop pollution of the das Brancas River and to rehabilitate original vegetation along the riverbanks. In the women-led initiative, called the 'Water Women' project, each group of women adapted environment-friendly practices to their daily activities. Community education taught local people not to dump their sewage into the river and how to plant native species of trees along the riverbanks. As a result, there is a visible absence of waste in the river, a considerable growth of new vegetation of native species on the riverbanks and decreased soil erosion. Women's political participation was strengthened, and public perceptions regarding their leadership capabilities were changed (Souza, 2006).

Source: UNESCO. 2012. United Nations World Water Development Report: Managing Water under Uncertainty and Risk.

Adopt Technologies

16.6.3.25 The state can adopt, adapt and develop innovative technologies that would optimise the water treatment processes in the state for the production of safe drinking water rather than depending solely on river water. The state can adopt techniques in desalination, such as Multi−State Flash Desalination, Multi−Effect Distillation, Reverse Osmosis (RO), NIOT's Low Temperature Thermal Desalination and Variable Desalination Plant. Other

technologies to treat water include emulating tongue−to−screen water quality, using peat to treat the microbes and membrane technology. Also, seawater can be used after it is desalinated.

Pillar 3: Water Demand

Element 1: Training and Education

16.6.3.26 Educate people on the sustainable use of water. The Andhra Pradesh Farmers Ground Water Management System (APFAMGS) is an example of a community−based project involving over 28,000 men and women farmers in 638 villages across 7 drought−prone districts[28]. The project focuses on developing the capacity of groundwater users in managing their resource in a commonly sustainable way. The project adopted a demand−side approach to groundwater management, in which farmers are made to understand how their groundwater system functions so that they can make informed decisions about their water use. The core concept or belief of APFAMGS is that sustainable management of groundwater is feasible only if users understand its occurrence, cycle and limited availability, and they accept that groundwater conservation through collective decisions is ultimately to safeguard their own interests.

Element 2: Price

16.6.3.27 A modest cost recovery may help the water authority invest more in not only the current technology but also in research and development activities. Further, pricing water educates people to conserve water. Selin et al. (2012) evaluated the domestic water tariff in Kerala and the analysis suggests that it is 5.7 times less than what it would have been if it matched the consumer price index and electricity rate[29]. Devi found that the majority of farmers would be willing to pay for water for irrigation[30]. The evidence indicates that there is a willingness to pay for better service. Further, prices should be charged for both water and sewage. Strategies need to be in place for the economically weaker sections. Cash subsidies might be a good option. Public taps also may prove to be useful, especially in urban slums. In rural areas, community water participation may help those who are less well−off. Also, consumers may be encouraged to pay more (contribute) to a water conservation fund or water R&D activities. Dynamic pricing methods may also be thought for water use.

Element 3: Technologies to manage demand

16.6.3.28 Some examples of technologies to manage demand are:

[28] http://planningcommission.gov.in/plans/planrel/12appdrft/appraoch_12plan.pdf.

[29] Selin, S.J., John, G. and Georgee K.I. 2012. "An Evaluation of Domestic Water Rate adopted by Kerala Water Authority". *India Water Week 2012 – Water, Energy and Food Security : Call for Solutions, 10-14 April 2012, New Delhi.*

[30] Devi, P. Indira. "Pricing of Irrigation Water in Kerala with Special Reference to Environmental Management". EERC Working Paper Series: WIS-2.

- Domestic Waste Management: Compost toilets are an alternative to pits and septic tanks especially in waterlogged or coastal areas[31]. The United Kingdom is the leader in dry compost toilets that require no water or electricity and China has been using them for centuries. By using compost toilets, cities and peri−urban areas do not need to extend capital−intensive sewerage networks and sewage treatment plants, and they avoid the recurring cost of maintaining additional infrastructure. Both these factors represent a huge saving. Also, in areas where toilets are flushed with municipal water there is an enormous saving in water requirements. Cross−contamination between water mains and sewers is eradicated because compost toilets are well−established as the standard sanitation technology. Soils are steadily improved by the regular addition of good quality compost.
- Irrigation: Adopt drip irrigation/micro irrigation or localised irrigation. Drip irrigation is the targeted, intelligent application of water, fertiliser, and chemicals, which if used properly can provide great benefits. Farmer−driven irrigation methods are better than public irrigation. For example, drip irrigation in Israel uses plastic pipes that release water directly onto the roots of the plants without flooding the entire field, and recapture any excess water for reuse[32].

16.7 Monitoring

16.7.1 The data on water is outdated and insufficient. Data needs to be collected on per capita water consumption by cities and villages and how much water each sector uses, particularly the agriculture sector. Groundwater needs to be monitored regularly—water tables, pollution levels, etc. For water conservation, water efficiency measures need to be calculated. Further, methods are required to assess how much water each sector uses and returns. There are five major indicators that need to be monitored[33]:

- Water availability
    - Total actual renewable water resources per capita
    - Per cent of freshwater resources withdrawn
- Water use and sustainability
    - Intensity of use of water resources: Total water withdrawals over total actual renewable water resources (TARWR)
    - Sectoral withdrawal as a percentage of total withdrawal (agricultural, industrial, municipal)
- Water use effectiveness
    - Percentage of population with access to improved water sources

[31] Practical Action website. http://practicalaction.org/docs/technical_information_service/compost_toilets.pdf.
[32] World Business Council for Sustainable Development. Water Facts and Trends. http://www.unwater.org/downloads/Water_facts_and_trends.pdf.
[33] UN Water. 2012. Federated Water Monitoring System (FWMS) and Key Water Indicator Portal (KWIP) Project implemented on behalf of UN-Water by the AQUASTAT Programme of the Food and Agriculture Organization (FAO). http://www.unwater.org/downloads/Final_Report_Phase_I_FWMS-KWIP.pdf. March.

    - Percentage of population with access to improved sanitation
- Economic performance of water
    - Change in water productivity in irrigated agriculture
    - Water productivity in the industrial sector
- Environment performance
    - Change of quality in freshwater systems
    - Urban wastewater treatment connection rates

16.8 Conclusion

16.8.1 Kerala cannot be complacent about water and sanitation. This has been a neglected social sector that is now hurting the state because of uncertain weather patterns that are here to stay. The path forward is how to manage water. It has to leapfrog by changing the institutions and managing demand and supply. Kerala has to conserve water. This means following the 3R Principle. Also, consumer behaviour needs to be modified, and price acts as an incentive to do that. It is always going to be a challenge, and flexibility and continuous innovation are key elements in this process.

CHAPTER 17

LAND, LABOUR AND CAPITAL IN KERALA'S JOURNEY TO SUSTAINABLE PROSPERITY

Factor market rigidities are acting as a barrier to quality economic development in Kerala. The KPP 2030 designs a strategy for each which will prove to be enablers in the process of increasing productive capacity in Kerala. A spatial strategy needs to be adopted with zoning where ecologically fragile land, forests, wetlands are protected and no conversion is allowed. After that mixed zoning is the recommended strategy to build compact cities and villages. Land acquisitions strategies are suggested which will prove to sustainable and inclusive. In case of capital, approximately forty per cent of GSDP will be required. The diaspora will be the most important source for resource mobilisation for Kerala. Last but not the least for labour, an inclusive model is suggested which ensures flexisecurity.

17.1 Factor market rigidities and economic development

17.1.1 Rigidities in factor markets can result in inward shifts in the production possibilities of an economy and to a decline in its attainable output. According to an estimate for the Japanese economy, distortions in factor markets are attributable to up to 3.6% of the decline in its real GDP growth[1]. This confirms that the exacerbation of structural impediments in factor markets is one of the major causes for economic stagnation. Furthermore, considering that the resolution of factor market distortions through market mechanism is not desirable, it is important for the government to undertake conscious policy measures to achieve a more efficient allocation of productive resources. Without such measures, development planning cannot push the economy to a sustainable growth path. This chapter analyses the factor market rigidities of Kerala and offers alternative proposals to address them.

17.2 Managing factor market rigidities in the process of development: Global experience

17.2.1 It is one of the iron laws of economics that as countries get richer, the share of agriculture in GDP, employment and land declines. That, in turn, is the result of two other iron laws: one, the Engel's law, which envisages a decline in the share of agricultural products in the total consumption basket as the country gets richer; and two, the inability of productivity in agriculture to keep up with that in the non-agricultural sector as the country gets richer. Over a

1 Masayuki Nakakuki, Akira Otani, and Shigenori Shiratsuka Distortions in Factor Markets and Structural Adjustments in the Economy. Institute For Monetary And Economic Studies Bank Of Japan Discussion paper, 2004.

very long term, the validity of this law is demonstrated by the history of countries such as the UK and the US. According to data presented by Angus Maddison in his monumental piece, "The World Economy"[2], the share of agriculture in employment declined from 56 per cent in 1700 to 37 per cent in 1820 to 16 per cent in 1890 to 2 per cent in 1998 in the UK. In the US, the same share declined from 70 per cent in 1820 to 38 per cent in 1890, to 3 per cent in 1998. This basic theory is strongly confirmed from more recent data on the share of agriculture in countries that have recently moved towards a high-income status.

17.2.2 Table 17.1 confirms the inexorable tendency of the share of agriculture to decline in GSDP and employment on the road to prosperity. In addition, it brings out the often overlooked fact that the decline in the share of agriculture in land utilization remains much smaller than that in GDP and employment. For example, in Korea the share of agriculture in GDP drastically declined from 29.2 per cent in 1970 to 2.8 per cent in 2007. The decline in the share of agriculture in employment from 34 per cent in 1980 to 7.4 per cent in 2007 was commensurate with its decline in GDP. But in land utilization, it declined from 23.5 per cent in 1970 to only 18.9 per cent in 2007. Thus in the course of its journey from a low income country in 1970 to a high income country in 2007, only 4.6 percentage points of the original land under agriculture was transferred to non-agricultural uses. Similar is the case with other countries. This is because of the rather low productivity of land in agriculture as compared to that in non-agricultural uses.

17.2.3 Historical evidence suggests that many countries resorted to "forced transfer" of resources. The very first case of industrial revolution which occurred in England, for instance, was associated with forced transfer (though backed by the "law of enclosure") of land and labour from agriculture to industries and that was brutal indeed.[3] No less brutal was the transformation under Soviet Communism, where there were forced collectivization in land and massive transfer of labour from agriculture to non-agricultural uses that enabled Soviet Union to achieve massive industrialization within just 15 years (1928-1943). Since the late 1970s, China has also been following the traditional pattern of transfer of land and labour from agriculture to non-agricultural sector. Indeed it is taking place, but at the cost of creating inhuman living conditions for migrant workers in urban areas and non-transparent and forced transfer of land from farmers to urban and industrial development. There are many cases in Latin America and Africa where the transfer process has been tortuous: labour is "pushed" out of agriculture not by state actions but by poverty of rural areas and the hope of higher incomes in urban areas. These hopes of higher income however failed to materialize and migrants ended up in slums.

[2] Maddison, A (2006). The World Economy, OECD.

[3] Polanyi, K.. "The Great Transformation – the political and economic origins of our time." The book provides a poignant account of that transformation." .

Table 17.1: Share of Agriculture in GDP, Employment and Land Utilization in Some Successful Growth Stories

Indicators/Countries	1960	1970	1980	1990	2000	2007
Korea						
A. Per capita income in Constant 2000$	1109.8	1993.6	3358.2	6895.4	11346.6	15157.6
B. Share of agriculture in (%):						
I. GDP	NA	29.2	16.2	8.9	4.6	2.8
ii. Employment	NA	NA	34	17.9	10.6	7.4
iii. Agricultural Land Share of Land Area	21.4	23.5	22.7	22	19.9	18.9
Taiwan						
A. Per capita income in 2000$	1492	2980	5869	9886	16859	17154(*)
B. Share of agriculture in (%) :						
i. GDP	28.5	15.5	7.3	4.1	2	1.5
ii. Employment	50.2	36.7	19.5	12.8	7.8	5.3
iii. Agricultural Land Share of Land Area						
Ireland						
A. Per capita income in 2000$	5046.8	7276.5	10024.3	13880	25380.2	32319.2
B. Share of agriculture in (%) :						
i. GDP	NA	16.3	11.43	8.7	3.2	1.4
ii. Employment (% of total employment)	NA	NA		15.1	7.8	5.4
iii. Agricultural Land Share of Land Area	81.9	82.2	83.1	82	64	62
Portugal						
A. Per capita income in 2000$	2343.2	4419.5	6503.6	8838.4	11443	11926.1
B. Share of agriculture in (%) :						
i. GDP	NA	29.8	18.8	8.8	3.6	2.4
ii. Employment	NA	NA	27.3	17.9	12.5	11.6
iii. Agricultural Land Share of Land Area	42.3	43	43.5	43	41.8	38.2
Spain						
A. Per capita income in 2000$	3715.9	6841.8	8826.3	11346.2	11421.9	16367.4
B. Share of agriculture in (%) :						
i. GDP	NA	10.9	7.2	5.5	4.3	2.88
ii. Employment	NA	NA	19.3	11.5	6.7	4.5
iii. Agricultural Land Share of Land Area	66.5	64.2	62.5	61	59.6	56.1

Note : Taiwan Per Capita GDP in US 2006 $ terms.(*) 2006 Prices Figures.

Source: WDI 2012, Historical Statistics for World Economy, Angus Maddisson, Taiwan Statistical Data Book 2012.

17.3 The Kerala Experience

17.3.1 Kerala follows the classical patterns of structural change along with the rest of India, but with some variations. Table 17.2 presents the picture of the structural change in GDP, land and labour in Kerala and India over the same period as in Table 17.1 to draw international comparisons. For India, the share of agriculture in GDP has declined from 42.3 per cent in 1970 to 18.2 per cent in 2010. However that in employment has remained high at 51 per cent. This

suggests that the relative GDP per worker in agriculture has declined sharply, leading to much misery in the agricultural sector and a heightened interest of farmers (particularly younger farmers) in migrating out of the sector. Land utilization ratio has also shown a very small decline over this period indicating low productivity in agriculture on the one hand and adding to land scarcities and frustration in industrial development on the other.

17.3.2 Kerala's situation is a little better than the national picture. Along with a decline in the share of agriculture in GDP, its share in employment has also come down (Table 17.2). But all is not well. For instance, it is indeed an issue that the non-agricultural sector is not able to absorb the labour released from agriculture. Elasticity of employment with respect to GDP is practically zero (jobless growth) even worse than that at the all-India level (where the employment elasticity has been estimated to be 0.2). This has resulted in high unemployment rates especially among educated young population. On the land front, the decline in the share of agricultural land has indeed taken place, unlike at the All India Level[4]. Yet, 60 per cent of the land contributed to 13 per cent of the agricultural GDP (including allied sectors) in 2007.

Table 17.2: Share of Agriculture in GDP, Employment and Land Utilization in India and Kerala

Indicators	1970	1980	1990	2000	2007
Kerala					
A. Per capita income in 2000$	327.4	323.2	367.4	555.9	936.5
B. Share of agriculture in :					
i. GDP (%)	44	36	26	21	13
ii. Employment (%)	-	-	48	38	25
C. Agricultural Land as share of land area* (%)	63.2	63	62.9	61.5	60
India					
A. Per capita income in 2000$	214	229.2	318.4	452.9	687.5
B. Share of agriculture in :					
i. GDP (%)	42.3	35.7	29.2	23.3	18.2
ii. Employment (%)	74.3(^)	69.2(@)	62 (#)	60	51 (*)
C. Agricultural Land as share of land area (%)	59.8	60.6	60.8	61.4	60.4

Note: * Figures for land use are calculated by NCAER based on international practices.

Source: WDI, Kerala Economic Review (Various Editions), Statistics for Planning, Kerala (Various issues), Directorate of Economics and statistics.(*) 2010 figures.(#) 1994 figure.(^) 1972 figure, (@) 1982 figure.

Kerala Employment figures for 1990 correspond to 1993-94 NSSO round, 2000 figure correspond to 1999 NSSO round and 2007 to 2009-10 NSSO round

[4] Notably, at the All India level, agricultural land as percentage of land area has shown no decline in India during 1970-2007.

17.3.3 The question before Kerala is therefore how to manage these factor market rigidities to facilitate the transition of the economy to a "knowledge economy". Now is the time to reflect on this issue and facilitate (not frustrate) this transformation in a socially and economically harmonious, and sustainable manner. In what follows, we analyze the current situation in each of the three factors of production separately and present strategic directions for addressing the issues being faced in their respective markets.

17.4 Labour

17.4.1 Dismal Outlook on Employment Growth in Kerala

17.4.1.1 Kerala's poor employment record is well known (see, Chapter 1 for discussion). In the business-as-usual scenario, the future outlook is also not bright. Three alternative employment **scenarios** are constructed here, with varying assumptions regarding the GSDP growth rate and employment elasticity.

a) *Scenario 1 - Growth rates drop with no change in employment elasticity:* Poor as the performance on employment has been, the business-as-usual outlook on growth and employment in Kerala is even worse over the Perspective Plan Period (2012-2030). As discussed in Chapter 1, the good economic growth performance in Kerala since 1986 has essentially been driven by construction; transport and communication; trade, hotel and restaurants; real estate ownership; and other (Community) services. This in turn is consumption-driven and is induced by the inflows of remittances, spurt in the tourism sector, and government spending on community services. As discussed in Chapter 1, these sources of growth are likely to peter out, and if alternative drivers of growth are not found, GDP growth rate during the next twenty years (2012-31) may drop to even 3-4 per cent per year from the level of 7-8 per cent per year during the preceding twenty years (1992-2011). In this scenario, the unemployment rate will increase by 100 per cent over and above the already high unemployment rate of 6.6 per cent in 2011 . Table 17.3 presents the picture by plan periods during 2012-2031.

Table 17.3: Employment Situation in BAU Low Growth Scenario

Indicators	**2011**	**2012**	**2016**	**2021**	**2026**	**2031**
Labour force (In Millions)	14.49	14.58	15.03	15.74	15.95	16.28
BAU growth (After shock given to all the sectors) (%)			4.00	4.00	3.60	3.70
BAU employment elasticity	0.07	0.07	0.07	0.07	0.07	0.07
Employment (millions)	13.53	13.61	13.77	13.96	14.14	14.32
Unemployment rate (%)	6.62	7	8	11	11	12

Source: NCAER's calculations

b) Scenario *2- Perspective Plan growth rates with no change in employment elasticity:* The first step for correcting the dismal employment outlook is to restore the growth momentum of the economy. As discussed in Chapter 2, that would require a focus on a knowledge driven strategy. However, our analysis presented in Table 17.4 below shows that accelerated growth by itself will not solve the problem of high and growing unemployment, as it has not done so in the past. The growth remains "jobless" because the elasticity of employment is rather low. In fact, the very measures to stimulate growth through knowledge economy may have the unintended effect of increasing the "reserve price" of educated labour and that may neutralize whatever small positive effect growth has on employment. Clearly, the process of growth is unlikely to put Kerala on the road to sustained and sustainable prosperity with the current employment elasticity. Indeed, a direct government intervention is needed.

Table 17.4: BAU Employment Elasticity with Perspective Plan Growth

	2011	2012	2016	2021	2026	2031
Labour Force (In Millions)	14.55	14.72	15.46	16.57	17.11	17.76
Growth Assumption (Perspective Plan Scenario)			8.00	9.00	8.00	7.00
BAU Employment Elasticity	0.07	0.07	0.07	0.07	0.07	0.07
Employment (In Millions)	13.53	13.61	13.91	14.32	14.72	15.11
Unemployment rate	7.3	7.3	10.00	14.00	14.00	15.00

Source: NCAER's Calculations

c) *Scenario 3* - Perspective *Plan growth rates and doubling of employment elasticity:* Table 17.5 confirms the point made above. It reveals that the unemployment rate will drop to 4 per cent by 2030 if the elasticity of employment is doubled from 0.07 to 0.15 along with the sustained growth rate of 7-8 per cent per year over the next twenty years period.

17.4.1.2 The recommended employment generation in each five year plan period starting from 2012 till 2031 is reported in Table 17.5. Over all, it is found that 3.48 million additional jobs will have to be created during 2012-2030.

Table 17.5 –Recommended Employment (in Million) –Perspective Plan Scenario

Year	2011*	2012	2016	2021	2026	2031	Incremental jobs created between 2012 and 2031
Employment	13.53	13.61	14.24	15.18	16.10	17.01	3.480

**Base year employment;*

Source: NCAER

17.4.1.3 This indicates that the employment elasticity will have to be more than doubled to achieve the targeted unemployment rate of 3% even with a sustained growth rate of 7.5-8 per cent.

17.4.2 Towards an integrated growth oriented labour welfare policy

17.4.2.1 For effective tackling of both growth and employment problems, the perspective plan has to work simultaneously on sustaining high GSDP growth rates and increasing employment elasticity of growth without affecting labour interests. It is proposed that the state should formulate a comprehensive "Growth oriented labour welfare policy" with the following objectives.

a) Connecting supply with demand for labour;
b) Increasing employability by matching demand with supply of labour
c) Increasing employment opportunities
d) Ensuring social security net for labour

17.4.2.2 The "connecting" problem arises from dysfunctional employment exchanges. The mismatch between demand and supply arises from rigidities (lack of flexibility and responsiveness) in the educational systems and the employers not having tight linkages with the supply side educational and vocational institutions. This gap has compounded by wider changes in the world of work. Employment opportunities are constrained by the lack of entrepreneurship and labour market rigidities. Finally, if in the process of course correction, labour interests are affected adversely, the purpose of reforms will be self-defeating. Therefore, there is a need for social security net for labour. In other words, the proposed comprehensive "Labour Policy" should be based on the following four pillars

a) **Pillar 1 - Transformational changes in education:** In the knowledge economy, knowledge and skills are the driving forces for the socioeconomic development of a country. This requires assigning top position to skill and knowledge acquisition in the policy framework. The proposed knowledge economy framework (Chapter 2) for Kerala will spark five labour market transitions - farm to non-farm, rural to urban, unorganized to organized, subsistence employment to decent skilled employment, and school to work. According to our calculations between 2012 and 2031, over 2 million workers will shift out of agriculture. These people will need to be absorbed in the knowledge economy. This will call for transformation in the educational system to prepare them to get absorbed in the system. But a major dilemma is that the skill mismatch and employability are noticed both in vocational education and training (VET) and the higher education sectors in India. An employment survey indicates that not more than 15 per cent of University Graduates of General Education and 25-30 per cent of Technical Education

are fit for employment[5]. The term, employability, is defined as the capability to gain initial employment, maintain employment and switch over to new employment, if required. It means a synergic combination of personal qualities, skills and subject matter understanding. This in turn implies a focus on overall human resource development, the essence of which is education. To address the issue of employability, therefore the education system needs to be ready for changes in organizational structures, policies, clientele group, teaching-learning processes and the type of academic offerings. It needs to be geared to life-long learning by being flexible in terms of entry, exit and re-entry with a greater focus on skill development. The Universities will no more be just the centres of mere knowledge transmission but they will also prepare a skilled work force ready to be absorbed in the market. The specifics of what needs to be done to correct this mismatch between jobs requirements and skill-acquisition are discussed in Chapter 3 and are not repeated here. In the context of the proposed "Labour Policy", it is recommended that the Departments of Labour, Employment Service, Vocational Higher Secondary Education, and Higher Education should work together to bring out a "State Skill Development Policy" mainstreamed into the educational systems (See Chapter 3) aiming at transformational changes in education to improve the relevance of education and employability of the young generation. It will be implemented with the support of the Labour and Employment Service Departments.

b) **Pillar 2 - A well-developed labour information system:** Employers need institutions that aggregate candidates for matching after preliminary screening or short listing. Students need geographically distributed centres which offer continuous information on aggregate jobs. Employment Exchanges (EEs) were set up for this purpose but currently they are in need of upgrading. In this internet age, they can serve as powerful players in connecting demand and supply of labour. Kerala already has 3 Professional and Executive Employment Exchanges at Thiruvananthapuram, Ernakulam, and Kozhikode, 14 District Employment Exchanges, 58 Town Employment Exchanges, 6 Special Employment Exchanges for Physically Handicapped, 2 Coaching-Cum-Guidance Centres for SC/ ST, 5 University Employment Information & Guidance Bureaus[6]. They are being upgraded to offer online services. It is also important that the data management systems of these EEs are strengthened on a regular basis. The state will also network all the employment exchanges in the state with a view to giving them a new-generation look and providing all employment-related services online throughout the state. Efforts will be made to connect it with the EEs of other states, which will serve as a step towards creating a "National Labour Market". In addition, the government will also encourage, regulate and standardise the development of job agencies run by non-governmental

[5] Innovation for Quality and Relevance–The Higher Education Summit 2007, Federation of Indian Chambers of Commerce and Industry, New Delhi reported in the India Labour Report, 2012 by TeamLease Services & Indian Institute of Job Training.

[6] http://www.kerala.gov.in/index.php?option=com_content&view=category&layout=blog&id=73&Itemid=339

entities. There will be clear guidelines on their operations to avoid abuse and frauds. The information related to registered private companies will be made available online on the government website.

Further, efforts will be made to develop "Vocational Career Guidance Systems" at the school and college levels under the policy for students to explore new career areas. This will require an online module on career opportunities and appointment of trained career counselors on visiting basis, at the school and college levels.

The "labour information system" will serve as a useful guide for providing information on skill requirements to the policy makers, which in turn will serve as a feedback for updating the skill development programmes. This needs to be integrated into the VET system in order to maintain supply demand match.

c) **Pillar 3 - Encourage entrepreneurship:** As discussed in the sectoral chapters, Kerala needs to make the transition from a wage economy to an entrepreneurial economy, where the youth is not looking for jobs but is encouraged to indulge in creativity and self-employment. Kerala has a Kerala Self Employment Scheme for the Registered Unemployed (KESRU) under which bank loans up to Rs. 1,00,000 is given for starting self-employment ventures to individuals, of which 20 per cent is re-imbursed as Government subsidy through the Employment Department. However, monetary support alone is not adequate. The proposed Labour Policy should have elaborate policy guidelines on state support to promote self-employment (Box 17.1 for China's approach). These guidelines will have special provisions for the training and monetary support for laid-off and disabled workers. Efforts will need to be made to promote public-private partnership in these areas by involving social entrepreneurs who are engaged in entrepreneurship development. Chapter 19 of this report discusses the policy approach to entrepreneurship that offers strategic directions in this context and may provide useful inputs in drafting policy guidelines on self-employment in the proposed labour policy of Kerala. China has been a successful example in this case (Box 17.1).

Box 17.1 : Labour Strategy – China

The post 1980 period has witnessed important changes in China's labor policy, that is, the replacement of lifelong employment with contract-based employment and the replacement of government job assignment with the labor market. Such changes indicate a paradigm shift in China's labor policy in the reform era. The objectives of the policy are:

- to increase the posts of employment in large numbers through developing the economy and improving its structure
- to create a better environment for workers to choose jobs on their own
- to control the unemployment rate and average unemployment cycle within limits the society is able to bear

It is based on the following principles:

- Market based adjustment in labour employment: the Labor Policy has reduced substantially the job security of Chinese workers as it legally abolished the lifelong employment system and allowed employers to dismiss workers for economic reasons. However, it pays special attention to the protection of laid off workers.
- Encouragement to self-employment: This means encouraging the unemployed and laid-off workers to take up self-employment or start their own businesses. This can be done by supporting training and setting up of individual ventures, reducing and exempting taxes and administrative charges on start-up ventures by individuals, and introducing small security-backed loans and loans at discounted interest. These loans are made available when the applicant meets specified qualifications, and within certain term and number of loans. Labour unions are encouraged to set up training facilities for laid-off workers and help them in getting self-employed or re-employed.
- Employment preference for laid off workers: This includes establishment of re-employment service centres generally; laid-off reporting requirement; and the guaranteeing of funding for the re-employment centres from various sources. Laid-off men over 50 years and women over 40 years, who have difficulties finding new jobs but have working ability and a desire to be employed are regarded as a major target group for employment assistance and promptly provided with offers of posts and other kinds of help. The government has invested in the development of public posts, through re-employment assistance, to help the most vulnerable people to get their jobs.
- Social security payment for laid off workers: In the mid-1980s, an unemployment insurance system was established in China to provide unemployment relief and medicare subsidies for the unemployed, facilitate the administration of and services for the unemployed, and give full play to the role of unemployment insurance in promoting employment and re-employment. It is independent of enterprises and public institutions, with diversified fund sources, standardization in security system, and socialization in management and service delivery. Laid off workers are also offered tax reduction policies, small loan support policies and preference in state-owned enterprises
- Free employment guidance services: The public employment service agencies at all levels provide free job placement and employment guidance to the urban unemployed and rural migrant

workers. For the 'laid-offs' and the unemployed, they provide a "one-stop" service ranging from registration of laid-off and unemployed persons looking for jobs, to providing employment consultancy, job placement, social insurance coverage, and vocational skill training.

- Employment guarantee for disabled people: According to China's laws, the state guarantees the disabled people's right to work. The government makes overall plans for the employment of the disabled and creates conditions for this purpose. To guarantee disabled people's legitimate right to employment, the government has strengthened supervision and law enforcement, so as to find out and correct in time any employer infringement of the disabled people's legitimate rights and interests in violation of the law and relevant regulations.
- Matching skills by establishing and improving the National Vocational Training System: In 1999, the Chinese government called upon all social sectors to adopt the system of recognizing both school diplomas and vocational qualification certificates for the sake of enhancing the laborers' capacity for employment, starting up their own businesses, and adapting to job transfer. In 2000, the preliminary framework of the Employment Permit System was set up. At present, China has basically set up a vocational qualification training system of five levels, from elementary intermediate- and advanced-grade skilled workers to technicians and senior technicians, that corresponds to the national vocational qualification standards and forms an important part of a life-long learning system for workers.

Source: DI, Y.China's Employment Policies and Strategies, Chinese Academy of Labour and Social Security, Ministry of Labour and Social Security, P.R.China.
http://www.oecd.org/els/employmentpoliciesanddata/37865430.pdf

d) Pillar 4 - Labour market management:

(i) Flexicurity: Flexibility with security

- Kerala needs to conceptualise new models of labour management systems without compromising the income security of workers. It needs to introduce a system that combines flexibility in labour market with income security of workers and provides assistance in their retraining and relocation. The Flexicurity system of Denmark has been recognized as one of the best practices in labour management. It has been adapted by many countries to their local conditions. It is a *leitmotiv* of the European employment strategy. Box 17.2 describes the system. It entails a "golden triangle" with "three principles:

    - Flexibility in the labour market combined with
    - Social security and
    - An active labour market policy with rights and obligations for the unemployed".

- It is designed and implemented around four policy components:
    - Flexible and reliable contractual arrangements;
    - Comprehensive lifelong learning strategies;
    - Effective active labour market policies; and
    - Social security systems providing adequate income support during employment transitions.

BOX 17.2: The Flexicurity Model –Denmark

This scheme allows the employers to fire employees during downturn and hire new personnel when conditions improve. Security is provided to workers without jobs. The third corner of the triangle involves activation policies like offering guidance for job, training and education to unemployed. Denmark spends around 1.5 per cent of its GDP on its labour market activation policies.

The main aim of this policy is to provide employment security over job security. The dual advantage of this framework is that it makes available a flexible labour force to the employers and at the same time an unemployment safety net is also available for employees, with an active employment policy. This model is based on a long tradition of social dialogue between social partners. The Danish collective bargaining model has been the driver of extensive workers protection, while considering changing market and production into account. In 2007, the European Council also adopted some of the council conclusions on Flexicurity, which would help the member countries of EU in decisions regarding jobs and growth.

In China, the policy is enhanced by offering preference to laid off workers in employment and providing specialized services to them to facilitate the process of self- and re-employment.

Source: Official Website of Denmark
http://denmark.dk/en/society/welfare/flexicurity/

- All this is done in the context of high minimum wage and high average wage with progressive taxation. This system should be studied in depth and introduced in Kerala on a pilot basis in the new "knowledge hubs" as proposed in Chapter 3.

(ii) Employment policy and socially marginal/vulnerable people

- A guiding role will be assigned to the government and general public in promoting the employment of socially vulnerable/marginalized people (Chapters 22-23) to create a favourable environment for them to equally participate in social life. This will include,

- The policy of equal employment opportunities for all in all public and private organisations; preferential policies on selected basis.
- preferential policies and supporting measures to encourage self-employment by way of granting discount-interest, poverty-alleviation loans;
- employment services such as free vocational guidance, job referral and vocational training through government and social organizations.

(iii) *China's employment policy:* China has moved from passive to active employment policies. These are systematic and comprehensive. Their design assimilates good practices of international experience while adapting them to national circumstances. It has received wide applause from the international community as well as the ILO. The Chinese experience is a good example of a successful employment policy. Its major features are provided in Box 17.2.

(iv) *Social security* - M*erge Welfare Boards and formalise social security for all labour:* In the face of economic stagnation during the 1960s and 1970s, Kerala created an institutionalized form of welfare arrangement to protect the incomes of the labouring poor. In 1969, a Welfare Fund was established for Toddy Tappers. In 1977 another Welfare Fund known as the Kerala Labour Welfare Fund, was set up for workers in small-scale factories, plantations, shops and cooperative institutions. During the eighties, Welfare Funds proliferated and covered workers in such diverse occupations as loading and unloading (known as head-load workers), motor transport, clerks working with legal advocates, artisans, fishermen workers, hand loom workers and coir and cashew nuts. These Welfare Funds offer some form of social security at the end of working life; social insurance in the event of sickness, accident and/or death; and a measure of welfare arrangements in the form of assistance for housing, education of children and marriage of daughters. A typical welfare fund board administers a welfare fund, consisting of contributions from employers and employees from the specified sector, and a grant from the State Government, typically equal to contributions from employees. In certain cases where the Welfare Funds are not in a position to provide old age pension, the state comes out directly to provide such pensions from their budget. However, these Welfare Funds are constituted on an occupational basis, which has posed challenges. For instance it has been observed that the entry to and exit from the labour market tends to be controlled by unions, since recruitment of membership is primarily routed through unions. Further, in most cases payments exceed the receipts. Over the next 20 years as the economy marches ahead with increasing formalization of economic activity, these welfare funds will need to be standardized along formal sector lines. It is proposed that they are merged in a single monolithic

"Social Security Institute" with well-designed guidelines of operation. It will cover not only formal and informal sector workers, but also self-employed persons. This will prove to be a cornerstone for the new paradigm that Kerala will shift into during the Perspective Plan period. Most developed countries have seen this type of evolution from occupation-based social security funds to a unified "Social Insurance Fund" in the early 1990s. In that sense, Kerala will need to traverse the same trajectory.

(v) *Skill based Labour unions:*

- The model of labour unions has been shaped to deal with "Fordist Industrialisation". In the knowledge economy, this model needs modifications. Trade unions need to shift from "labour protection approach" to a "skill-oriented" one and participate in the future building of labour. Under this approach, trade unions and workers' representatives at plant level should take more 'responsibility' for the upgradation of skills of workers on a continuous basis and enhance competitiveness of the firms. Besides, they need to focus on better living environment for labour to ensure high productivity. Among other things, they are advised to enter into 'alliances' with the management. Through this approach, they can bargain for higher wages for labour without compromising on the competitiveness of the company. Germany offers a good model for analysis and adaptation. German unions are partners for businesses and through effective co-management in the form of legally secured co-determination, they have a say in developing long-term strategies for economic success for both businesses and workers. That leads to a sense of shared responsibility (Box 17.3).

Box- 17.3 The German model of co-determination

Co-determination is an institutionalised process of employee information, consultation and decision-making in the management of an establishment. Co-determination in Germany is a two-levelled system: in every establishment with 5+ employees, workers have a right to elect a works council which represents their interests. In big companies with supervisory boards (Aufsichtsrat) – a typical example is the joint stock company - workers have additional representation on board level. Depending (mainly) on the size of the company, there is either one third or parity representation on board level. Worker's representatives in the supervisory board have full voting rights.

Co determination in the workers' Council: In every establishment with 5+ employees, employees are entitled to set up a works council. The works council has to be established by

initiative of the employees. The works council is independent of employers – there are no representatives of the employer and no managers or executive staff in the works council . Works council members may or may not be members of labour unions. There are three different kinds of rights of the works council: informational rights, rights demanding mandatory consultation and rights demanding mandatory agreement

Co-determination in the supervisory board: In large companies with 500+ employees, like limited liability companies, family enterprises, or joint stock companies, employees are represented in the Supervisoryboard of the company – in addition to their representation in the works council. The works council elects the representatives of employees in the supervisory board. The number of representatives of the employees is between 1 and 21,depending on the size of the company. It is 1/3 in companies with 500+ employees and parity in companies with 2000+ companies. The task of the supervisory board is to appoint and to control the management board. It has to decide on certain important business operations. Additionally, the supervisory board is informed on business operations and other basic aspects of corporate planning.

Source: Heiner Michel (2007) Co-determination in Germany: The Recent Debate; http://www.uclouvain.be/cps/ucl/doc/etes/documents/WDW004.pdf

- Further example is Sweden, which has no statutory system of works councils and no parity representation on board level but a rather strong culture of consensual decision-making. Following suit, China also involves the labour unions in the growth process, not in decision making though. Vocational training institutions are being run by trade union organizations at different levels for laid-off workers. This model can be adopted and these organisations may become instrumental in ensuring life-long learning of labour by arranging for their training programmes. The labour policy should clearly define the role of labour unions in this regard.

(vi) *Trust building between management and labour:* In a knowledge economy, growth is human centric. Human capital is even more important than physical capital. In this scenario, the gap between management and labour is narrowed down. It needs to be further bridged through participation of management in labour unions and vice versa. This will act as a trust building measure between the two and will ensure better understanding of the problems that each faces in the process. In many countries this practice has already been in prevalence. The knowledge economy paradigm will call for a paradigm shift in the labour management relationship in Kerala also.

17. 5 LAND

17.5.1 Current situation

17.5.1.1 The perspective plan strategy requires massive release of labour from agriculture to be absorbed in non-primary sectors, in particular in services. This growth will be accompanied by structural changes, like urbanization and demographic changes. A natural consequence of this process will be change in land-use patterns. Kerala is already witnessing this phenomenon as land devoted to non-agriculture uses has increased over time. This process is bound to continue as challenges evolve and is no different from the economic history of any other country in the world. However the key objective in Kerala is to learn from the economic history lessons of other countries like England, the erstwhile Soviet Union and even China and avoid their mistakes. The challenge will be to strategise an economic development path which will efficiently use all its land in a sustainable, inclusive and planned manner, keeping its natural ecology intact and avoiding speculative elements.

17.5.1.2 Land is a key bottleneck in the process of implementing a growth strategy. The challenge in Kerala is that it is a relatively small state of 39,863 square kilometers forming 1.18 per cent of India but with a population comprising 2.76 per cent of the total population of India. As a result, its population density is quite high, at 859 people per square kilometer (2011). Kerala is a North-South state versus an East-West one. The north-south stretch has a coastline of 580 km with a varying width of 35 to 120 km. As discussed in Chapter 1, even within that narrow width, the topography and physical characteristics change distinctly from east to west starting with the hills on the East and sloping downwards to coasts covered by coconut groves. Further, increasing economic growth has increased the many alternative uses of land, such as for agriculture, industries, mining, infrastructure (roads, railways, power, telecom, etc), building houses, malls and other economic activities. But the supply of land has stood constant. Kerala faces this trade-off even more acutely than the rest of India, given its geographic features and the ecological importance of wetlands (Palakkad, Kuttanad and Kole wetlands).

17.5.1.3 The evolution of land-use pattern of Kerala over the last few decades in percentage terms is shown in Table 17.6. Three things may be observed:

- There has been a continuous decline in barren and uncultivated land; pastures and other grazing land; and land under miscellaneous tree crops since 1960-61.
- Land under agriculture (gross and net cropped) has declined during the past decade. But the decline in agricultural land is not associated with commensurate increase in land put to non-agricultural use which has increased from 5.14 per cent in 1950–51 to 9.57 per cent in 2009–10. Surprisingly, one sees a marginal decrease in the land put

to non-agricultural use between 2000–01 and 2009–10. The corresponding Indian numbers in 2008–09 was 26.31 per cent (up from 9.36 per cent in 1950–51)[7].

- In contrast, the share of 'fallow land' and 'fallow land other than current fallow' has increased over time. There is thus clear evidence of people leaving land fallow to eventually convert it into non-agricultural land. The Kerala Conservation of Paddy Land and Wetland Act (2008) prevents conversion of paddy land and discourages keeping land fallow but it has not been effective.

17.5.1.4 Though not directly shown in Table 17.6 (due to non-availability of this standardized classification in land use patterns), the above patterns indicate that wetlands are shrinking which is threatening the ecosystems of Kerala. But at the same time there is no corresponding increase in the land under non-agricultural uses, thus posing a threat to Kerala's industrialization plans which are important for absorbing educated labour in the economy.

Table 17.6: Land Use (in %), 1950–51–2009–10

Category	***1950-51***	***1960-61***	***1970-71***	***1980-81***	***1990-91***	***2001-01***	***2009-10***
Forests	23.40	27.37	27.34	27.84	27.83	27.83	27.83*
Non-Agricultural Use	5.14	5.31	7.13	6.94	7.65	9.7	9.57
Barren and Uncultivated	6.57	3.92	1.87	2.21	1.5	0.77	0.57
Permanent Pastures and other Grazing Land	1.11	1.17	0.73	0.14	0.05	0.01	0.01
Miscellaneous tree crops	4.74	5.30	3.42	1.64	0.89	0.13	0.11
Cultivable Waste	7.94	3.71	2.05	3.32	2.43	1.93	2.52
Fallow other than current fallow	2.50	1.62	0.57	0.69	0.68	1.07	1.17
Current fallow	1.27	1.74	0.62	1.12	1.14	1.81	1.98
Net area sown	47.31	49.86	56.28	56.1	57.83	56.74	53.49
Area sown more than once	7.57	11.01	19.72	18.15	19.9	21.19	15.18
Total cropped area	54.88	60.87	76.00	74.25	77.72	77.94	68.67
Cropping Intensity	-	-	-	132	134	137	128.38

*Note: * This Does not match the forest area as given in the Forest Survey of India*

Sources: Planning Commission. 2008. "Kerala Development Report". www.planningcommission.nic.in. Accessed November 22, 2012.

Kerala Agricultural Statistics. 2009–10. Accessed November 29, 2012.

Economic Reviews, 1962 and 1972.

[7] Directorate of Economics and Statistics, Department of Agriculture and Cooperation, Ministry of Agriculture, Government of India. "Agricultural Statistics at a Glance 2011". http://eands.dacnet.nic.in/latest_2006.htm. Accessed November 30, 2012.

17.5.2 Land management - The way forward: Kerala's main objectives in land management will be to

- Manage land use through land planning over the next twenty years in a sustainable and inclusive fashion. The land management strategy should be such that it augments physical and human capital without losing out on natural and environmental capital.
- Facilitate structural change in land use in a socially equitable and economically viable manner.

a) **Pillar 1: Land Planning:** Three things that Kerala needs to streamline for efficient management of land are:

(i) *Institutions:* Put in place long-term strategies and plans to ensure that Kerala retains its lifestyle and unique character, while also allowing for continued growth and development. It is strongly recommended to develop a "Spatial Planning Policy" (see, chapter on Urbanisation). This will comprise guidelines for a master plan with well-planned cities, rural areas, and connecting infrastructure facilities. This will be an integrated framework of agricultural, ecological and non-agricultural uses in a scientific manner, using spatial planning techniques. The land- use plans can be developed for districts in line with the state guidelines and principles. Last but not the least, land use plans will be developed through coordinated efforts with the involvement of both Gram Panchayats and Municipalities. These guidelines will be binding.

(ii) *Data collection and maintenance:*

- Kerala already has an advanced system of land-use data collection. It will need to be improved upon further. Data on environment, ecology and non-agricultural uses of land is to be strengthened with granular details. The United Nations developed a System of Environmental-Economic Accounting (SEEA).
    - Following that the environmental assets are classified as under:
        a. Natural Resources
        b. Mineral and Energy Resources
        c. Soil Resources
        d. Water Resources
        e. Biological Resources
        f. Land and associated Surface Water Resources
            i. Land underlying buildings and structures
            ii. Recreational land
            iii. Agricultural land and associated surface water
                - Cultivated Land
                - Pasture Land
                - Agricultural land

iv. Wooded land and associated surface water
v. Major water bodies
vi. Other land

g. Ecosystems.

- Total Housing and Transport Area
  a. Building and Adjacent Open Area
  b. Recreation Area
  c. Transport Area (including roads)
  d. Agricultural Area with all its details
  e. Forest Area
  f. Water Bodies
  g. Other Land use

  It is proposed that Kerala adopts a similar system of land classification as a way forward to Environmental Economic Accounting.

- *Land evaluation:* Appoint appraisers and assessors for Real Estate to estimate the value of real property-land and the buildings on that land-before it is sold, mortgaged, taxed, insured, or developed. Appraisers of commercial property (such as office buildings, hotels, and other businesses), must have at least a bachelor's degree. In addition, both appraisers and assessors must be licensed or certified. Kerala will need to develop technical courses in real estate assessment along the lines of foreign universities. Such institutes in real estate management are also sprouting in cities like Pune and Delhi such as, the Indian Institute of Real Estate in Pune and National Institute of Real Estate Management in New Delhi. However, one does not know the quality of these institutions.

(iii) Develop multiple Land-Use Models at both the Departments and educational institutions around Kerala:

- For the whole state, identify the areas which need to be protected like the wetlands, forests and any other ecologically fragile land with specific goals in view. See Box 17.4

Box 17.4 :Zoning of wetlands in Sri Lanka

The wetlands in the Western province of Sri Lanka was zoned, the goal was to facilitate environmentally and economically sustainable use of low - lying areas, considering their intrinsic potential while maintaining essential flood storage capacity and other environmental benefits. Four basic zones have been identified:

wetland protection zone; wetland nature conservation zone; wetland agriculture zone; and low‐lying development zone. The zoning is based on a precautionary principle, flood protection requirements, potential economic uses, and the needs of local communities and the ecology of the wetlands. A steering committee, comprising local stakeholders and NGOs and chaired by the Minister, has been established to take the zoning guidelines forward.

Source: Urban Development, Bio-Diversity And Wetlands, Expert Workshop Report, 2009 prepared by Rob Mclnnes, Bioscan Ltd.,Oxford, UK. *h*ttp://www.unhabitat.org/downloads/docs/ExpertWorkshopWetlands.pdf. Accessed March 3, 2013.

- Eco-sensitive areas may be zoned off and these areas should not be open to conversion to non-agricultural uses at all. This will help preserve the environmental capital. These can be used for the creation of wetland parks and to promote tourism (Chapter 11 provides further details). The wetlands may be connected through the state. Bike trails, camps, etc. may be created.

- Further, integrate wetlands with urban planning where wetlands are viewed as a water resource rather than natural reserves by using smart urban planning. See Box 17.5.

Box 17.5: Wetland and Urban Planning- USA

The state of Oregon in the United States has adopted a Wetland Planning Guide. In Oregon, the local wetlands inventory identifies wetlands as small as 1/10 acre in size. There is an economic and historical assessment and, in case, the wetland is to be acquired, a mitigation plan is developed. Oregon allows density transfer i.e. for example, if a 2-acre site is zoned for 5 dwellings per acre, a total of 10 dwellings are permitted. If one of the 2 acres is a wetland, full-density-transfer provisions would allow all 10 dwellings to be located on the remaining one. This type of provision generally is easy to implement since the density transfer is within a single parcel. It can be accomplished through a development review process or through a planned unit development (PUD). The wetland that remains must be protected through regulation. Mitigation banks are one more tool used by Oregon to conserve wetlands.

Source: Oregon Department of State Lands andOregon Department of Land Conservation and Development (2004), "*Oregon Wetland Planning Guidebook*" prepared by Shapiro and Associates, Inc. and Winterbrook Planning.
http://www.oregon.gov/dsl/WETLAND/docs/wet_plan_guide.pdf

- There should be a policy to re-claim and restore wetlands that have been destroyed, where ever possible.

- Agricultural land planning will need to take into account agricultural clusters, as proposed in the chapter on agriculture (chapter 6).

- For the rest of the land, Kerala will need to adopt mixed zoning to develop compact planning, given its limited land, population density and rural-urban continuum. Integrated planning is recommended for social, physical, human and environmental capital i.e. houses, schools etc, transport (all modes), sewage and sanitation, greening of urban spaces like development of parks in cities etc.

b) Pillar 2: Land acquisition

(i) Kerala will need more land to follow the growth strategy. This land will come from two sources – part of the agricultural land and re-developing of existing non-agricultural land. Land has to be used efficiently. The process of land acquisition should not alienate the land-owners, whether in rural or urban areas. The land acquisition strategy will depend on the extent, need and feasibility of the areas. One-size fits all strategy should not be used. Again, the key is to make sure that the local population is part of the growth and development strategy.

(ii) The Land Acquisition Rehabilitation and Resettlement Act 2011 (LARR, 2011) is tabled in Parliament. It may not be the best way to achieve the objectives of sustainable development (Box 17.6).

Box 17.6: Land Acquisition Rehabilitation and Resettlement Act 2011

In the past land, acquisition process in India (and Kerala to some extent) has been highly arbitrary and extortionary. The colonial era 1894 Act on Land Acquisition has inadequate provisions for valuation of land and for rehabilitation of those affected by such acquisitions. The implementation of these measures was also unfair in practice. The draft bill of Land Acquisition Rehabilitation and Resettlement (2011) (LARR) is intended to correct these unjust practices. However, in trying to correct the past injustices to landowners, the present LARR goes to the opposite extreme of being in favour of landowners and other stakeholders in the land at least in conceptualisation. Implementation may prove to be complex and expensive. The system of market valuation proposed in LARR is also unscientific. First, the recorded prices of recent land sales on which the market value of land is to be based may not show the true price of land, because of high incidence of "black money" in these transactions. Second, basing the market price on the valuation after the development decisions are known, gives undue benefit to the

landowners without any contribution on their part in value addition. The increased value of land due to acquisition for hub development, should in-principle belong largely to the state developing these hubs and not to the present owners or future real-estate developers. Even more onerous is the procedure proposed for such land acquisition. For example, consent needs to be taken from 80 per cent of the project-affected families given consent.

(iii) The Government of Kerala (GOK) may define its own land acquisition policy under the aegis of LARR 2011, one that would be fair to landowners and workers on land and provide resources for development of world-class infrastructure in knowledge cities. First of all, it is proposed that land must be acquired by the government for development purposes. It should not be left to the private companies to do so. Below are listed a few best practices for land acquisition,

- **Model 1: This model involves four steps:** First, determine the value of land. The value of land will be assessed by authorised assessors based on the present value of income stream created for the owners of land. This will eliminates speculative value of land. And this can be calculated with some robustness. Second, once it is ascertained, a generous compensation to land-owners may be fixed based on this. Of the total compensation to the land-owner, half can be paid as cash and the other half deposited in a fund to be paid out as annuity, the terms of which can be determined on an actuarially sound basis. Third, land will be acquired by the government based on this compensation. Fourth, a part of this land (say 25%) acquired by the government may be auctioned to private developers. The money generated may be used to fund the cost of development of infrastructure in the area. A part of money can also be used for training of displaced people so that they can join modern industry and service sectors.

- **Model 2: Community Land Trust Model:** A Community Land Trust (CLT) is a model which was motivated by the Indian history of community land and the European history of land banks and assumed its modern form in the United States. Over 200 community land trusts have now been established throughout the United States, with pilot schemes currently being carried out in both Canada and the UK. The CLT is a non-profit, community-based organisation run by volunteers (including land owners) that develop housing, workspaces, community facilities or other assets that meet the needs of the community, are owned and controlled by the community and are made available at permanently affordable levels. There are many variations in the framework of the basic structure. These are:
  - Dual ownership: Ownership of land is retained by land-owners and buildings on the land can be sold.

- Leased land: Owners of buildings on land are provided with the exclusive use of their land.
- Perpetual affordability: The CLT retains an option to repurchase structures on the land when the owners decide to sell. Resale price is set by a formula in the ground lease.
- Perpetual responsibility: The CLT has a continuing interest in structures on its land (and people residing in them), even after they are sold.
- Open, place-based membership: Residents of a geographically defined community can become voting members of the CLT. (Variations include broader eligibility criteria or allowing non-profit corporations, local governments, and private institutions to become members).
- Community control: Two- thirds of the governing board are community members.
- Tripartite governance: One- third of the board represents leaseholder interests, one- third represents community members in general, and one- third represents public leaders.
- Expansionist acquisition: CLTs are committed to an active acquisition and development program.
- Flexible development: CLTs accommodate a variety of land uses, property tenures and building types ranging from housing to commercial space to parks and gardens.
- A CLT may get land from:
    - Pool Land from its members
    - Acquire land from outside and pool it
- Receive public land at little or no cost;
- Purchase a rural exception site at about agricultural value;
- Acquire a site at open market value, through access to grant funding or community share issues;
- Already own a site that is permitted for development.
- After pooling land, the trust may give it to a developer for commercial uses. The money thus earned can then be transferred to the trust, out of which interest income is paid to the trust members. In India, some variations of this model have already been in practice.

    ❖ **Magarpatta Model:** The Magarpatta township in Pune is currently a mixed-use township located next to Pune which caters mostly to IT firms. The story of this model began in the late 1980s, when the sugarcane farmers realized that their area would most likely be acquired in the future by the Pune Municipal Corporation due to increasing urbanization in the city. At that time, one hundred and twenty three

farmers came together in 1993 to pool 400 acres of farmland and set up a private limited company, which was then developed into a mixed-use private township. Each family got equity shares equal to the size of the landholding i.e., each share was equal to 1 square meter of land costing Rs 100 in 1998. Shares could only be sold to member families. The equity shares give permanent rights to the shareholders over the company and the lands. The most important feature of the model is that the land pattas (7/12 registrations) remain in the name of these families, safeguarding their ownership over the land.

The bye-laws of the company ensure preference to family members of shareholders in the employment generated by the company. Shareholders may also invest in the construction of commercial spaces that are rented out to companies. Apart from these provisions, shareholders are encouraged to bid for contracts for development work in the township, such as supplying raw material for RCC construction, labour contracts, vending contracts (shops), landscaping, beautification, and security and maintenance contracts. People are also earning money out of renting to IT employees. The children of farmers are now employed in the modern sectors that the area is offering. The mixed-zone ensures that people are walking to work or school.

- **Pune Model:** The Maharashtra Industrial Development Corporation (MIDC) acquired land for the Ranjangaon industrial area and the multi-product Bharat Forge Special Economic Zone (SEZ) area in Khed-Shirur in 2007[8]. In 2008, the farmers could buy back 15 per cent of the developed land at half the industrial rates. Thirty eight farmers came together for buying back land and have set up industries there. The profits generated is distributed amongst the farmers in proportion to the size of the land holdings that was acquired.

(iv) In summary, one needs an integrative approach with change in land-use classification system, institutions and the way we do business especially in agriculture and non-agriculture uses, to grow in a sustainable manner.

[8] Nambiar, N. 2008. "In Pune, SEZ farmers buy back land to start their own companies". The Indian Express. April 6. Accessed March 10, 2013.

17.6 Capital

17.6.1 Capital requirement: International experience

17.6.1.1 The role of capital formation in growth cannot be underestimated even in a knowledge economy. Creation of infrastructure itself will require massive investment funds. Table 17.7 elaborates upon the successful growth stories including Korea, China, Malaysia along with India. It shows the role that capital formation has played in the economic growth process.

Table 17.7: GDP Growth, Capital Formation and ICOR

Indicators/Countries	1971-80	1981-90	1991-00	2001-10
GDP growth (annual %)				
China	6.3	9.4	10.5	10.5
India	3.1	5.6	5.5	7.6
Korea, Rep.	7.3	8.7	6.2	3.9
Malaysia	7.9	6.0	7.2	4.4
Gross fixed capital formation (% of GDP)				
China	27.5	28.9	33.6	40.3
India	16.1	20.6	22.7	28.8
Korea, Rep.	27.5	30.1	34.9	28.9
Malaysia	24.4	29.8	35.5	21.5
Gross savings (% of GDP)				
China		36.4	40.4	48.0
India	19.6	21.2	24.0	32.0
Korea, Rep.	27.0	31.5	35.7	31.4
Malaysia	25.6	25.3	35.3	34.5
ICOR				
China	4.4	3.1	3.2	3.8
India	5.2	3.7	4.2	3.8
Korea, Rep.	3.8	3.4	5.6	7.3
Malaysia	3.1	4.9	4.9	4.9

Source: WDI, 2012

17.6.2 Capital requirement for the Perspective Plan

17.6.2.1 We attempt to calculate broad orders of magnitude of investment needs during 2012-2030 and the possible sources of funding. Unfortunately, for Kerala break up of figures on investments - total and by sectors - are not available. This lacuna should be corrected. Urgent effort should be made to improve data availability on capital utilization by sectors, total capital utilization and the sources of their funding. In the meantime, we prepare some indicative figures on investment requirements by using sectoral ICORs from national level data (see, Appendix A17.1 to A17.5) using two scenarios. The two scenarios are:

Scenario 1: When ICORs remain constant over the PP period;
Scenario 2: When ICORs increase over the PP Period

17.6.2.2 Based on our calculations we present two sets of investment requirement and investment/GDP ratios for the PP growth targets in Tables 17.8 and 17.9.

Table 17.8 Investment Requirement for Capital Formation based on constant ICORs (in crores)

Year	2012-17	2017-22	2022-27	2027-32	2012-13-2031-32
Agriculture Forestry & Fishing	2166	2835	2951	2887	2710
Mining & Quarrying	811	878	871	771	833
Manufacturing	14584	28391	42812	58573	36090
Electricity Gas & Water Supply	1695	2323	2654	3009	2420
Construction	5822	11333	17089	23381	14406
Trade Hotels & Restaurants	7009	11697	16254	22141	14276
Railways, Transport & other means	8908	13707	18519	24255	16347
Banking, Financial services & Real estate	18597	31052	43280	58910	37960
Public administration	6949	8676	10129	10968	9181
Other services	15025	25317	32938	50679	30990
Total investment	81565	136210	187497	255573	165211
Total income(GDP)	258421	385600	574675	835352	513512
Capital formation ratios	31.6	35.3	32.6	30.6	32.2

Note: The absolute values are reported in Appendix A17.1.
Source: NCAER

17.6.2.3 However these estimates do not take into account the financial costs of "leap-frog" strategy for sustainable prosperity proposed in the report. This strategy will require development of world-class knowledge cities which would initially require heavy investment. Development of non-renewable resources for energy, such as solar, would be initially costlier than the thermal alternative. Generation of energy from urban waste would require costly investments. Similarly world-class hospitals and educational institutions will require high investment initially. We thus assume in Scenario 2 that the ICROs will increase in future. Our investment requirement estimates are presented in Table 17.8.

Table 17.9 Investment Requirement for Capital Formation based on increasing ICORs (in crores)

Year	2012-17	2017-22	2022-27	2027-32	2012-2032
Agriculture Forestry & Fishing	2218	3016	3256	3301	2948
Mining & Quarrying	814	886	883	787	842
Manufacturing	14870	29834	46315	65176	39049
Electricity Gas & Water Supply	1709	2375	2750	3159	2498
Construction	6035	12411	19707	28315	16617
Trade Hotels & Restaurants	7287	12894	18929	27166	16569
Railways, Transport & other means	9353	15446	22265	30944	19502
Banking, Financial services & Real estate	19145	33427	48705	69044	42580
Public administration	7105	9178	11073	12378	9933
Other services	15586	27739	37994	61412	35683
Total investment	84121	147206	211877	301682	186222
Total income(GDP)	258421	385600	574675	835352	513512
Capital formation ratios	32.6	38.2	36.9	36.1	36.3

Source: NCAER

17.6.2.4 We envisage that approximately 40 per cent of the GDP will be required for investment in at least the next three FYPs. This will require huge resource mobilisation.

17.6.3 Resource Mobilisation: The mobilisation of domestic resources is the foundation for self-sustaining development. It requires creating conditions that make it possible for securing the needed financial resources for investment. Information on household savings rate, corporate savings rate or public sector saving rates is not available. Again, pending better data availability, we indicate some broad orders of the magnitude of saving potential from different sectors.

17.6.3.1 Diaspora in Development:

a) For Kerala, the diaspora is the biggest potential source for resource mobilisation. Here is a road map for engaging the diaspora for development.

Diaspora Investments[9]: A Menu of Viable Options

1. Provide access to information
    a. Share information on how to invest or obtain business loans
    b. Create a one-stop shop for investment information
2. Provide access to networks
    a. Organise business events for diaspora members
    b. Match local entrepreneurs, business owners, and government leaders with their diaspora counterparts
    c. Create exclusive international networks of top business leaders
3. Provide access to business training programs
    a. Supply training directly
    b. Support training programs provided by the private sector and international organizations
4. Provide entrepreneurs access to funds
    a. Set up matching funds
    b. Provide loans
5. Channel private funds to finance public infrastructure.

b) The best solution for Kerala is to create a special fund for Infrastructure Development Fund for the KPP 2030 and mobilise funding from diaspora to this fund. This fund will be exclusively focused on developing infrastructure and institutions which will enable implementation of the KPP 2030.

17.6.3.2 Saving from the house hold sector

a) A very low domestic savings rate is a major structural weakness to be overcome in Kerala, a high consumption state. Exploring instruments for mobilisation of household savings for investment, both public and private, is a moot issue. In the traditional development experience (including that of Korea, Taiwan, China etc.), banking system including specially designed development banks played a large role in such intermediation. However, in the era of neo-liberalism, these banking institutions were degraded and the role of capital markets and speculative finance was promoted.[10]

[9] Agunias, D.R. and K. Newland. Developing a Road Map for Engaging Diasporas in Development A Handbook For Policymakers And Practitioners In Home And Host Countries. International Organisation for Migration and Migration Policy Institute. http://www.migrationpolicy.org/pubs/thediasporahandbook-Chapt7.pdf.

[10] It is sad to recollect today that in 1994 just as the State Development Bank of China was opened, the World Bank wrote to the Chinese authorities pointing out the sorry state of performance of development banks and strongly advised against the setting of the State Development Bank. SDB however went from strength to strength and played a key role in financing China's infrastructure development.

b) In the wake of the global financial crisis that started in 2008 and is continuing till date, the fallacy of relying on speculative finance stands exposed. Kerala, which has been by and large above succumbing to neo-liberal doctrines, should stand for time-tested models of financial resource mobilisation practiced in Korea, Taiwan, and China and assign an important role to state financial institutions for financing of development. The management of these financial institutions should, of course, be of world-class standard by appropriate twining with counterpart institutions, particularly in East Asia.

c) Recently, Islamic banking has been permitted in Kerala. The distinguishing features of these banks are the prohibition of charging or paying of interest, the impermissibility of demanding collateral and, to a small extent, compulsory charitable spending. Primary modes of profits include profit-sharing arrangements such as 'mudharabah' (partnership) and 'musyarakah' (equity participation). This may be instrumental in promoting entrepreneurship and productive capacities in the state by chanelizing domestic savings, but this practice can also feed asset inflation in a highly consumption-oriented state such as Kerala[11]. Malaysia is a successful example in Islamic banking with Islamic finance in Malaysia touching 22 percent market share[12] of the total banking sector. Kerala will have much to learn from Malaysia's experience in Islamic finance policy, regulation, legal framework, product innovation and market practice.

17.6.3.3 Savings by corporate sector: In Kerala, the private corporate sector is small but it will grow and make substantial contribution in future.

17.6.3.4 Savings by public sector: Mobilizing funds for use by governments is undertaken in three ways: through the levying of taxes, through the generation of non-tax revenues and through government borrowings from local capital markets.

17.6.3.5 Public debt: This is where Kerala can do better, particularly by exploiting its advantages in certain areas. One such advantage is remittances, which form approximately 20 per cent **o**f Kerala GSDP now. If Kerala can devise attractive schemes with old age security, medical insurance and unemployment benefits for the migrant workers modeling itself on Singapore (Box 17.7), it could perhaps mobilize 3-4 per cent of GDP through these sources. Unlike Singapore, Kerala has to make these schemes voluntary but it can make them attractive and sell them aggressively as it has done in the case of tourism. Similar schemes for local employees can mobilize further resources, particularly in new knowledge cities. If, by co-operating with Singapore, Kerala can develop a good brand name for its social security schemes, it can mobilize

[11] Ewa Karwowski (2009) Stability: The Significance and Distinctiveness of Islamic Banking in Malaysia, Levy Economic Institute of Bard College, Working paper 555.
[12] Arab News (2013) Savings drive growth of Islamic banking in Indonesia ; August 18, 2013 http://www.arabnews.com/node/388305

6 per cent more of GDP from diaspora and residents, then that can be channeled towards infrastructure development.

Box 17.7: Singapore Central Provident Fund

Singapore's pioneering Central Provident fund (CPF) was initiated in 1955. Initially catering to the social security needs of old age people in its early days, the scheme was enhanced with components for buying homes from CPF funds (home ownership) , health care needs, family protection , asset enhancement and retirement requirements of the elderly. The CPF is a joint effort of the employers, employees and the government. Citizens with permanent residentship, Singaporean citizens and self employed individuals are members of the CPF. The CPF board is the trustee of members' savings in such a way that they protect the value of the savings. Fair market returns with minimum risks are returned to the members. At the same time avenues for members to gain higher returns are also part of the scheme, after considering the risks involved. The Government helps the scheme by exempting it from tax and providing guaranteed payment of CPF savings. It is a fully funded scheme. Assets are accumulated by members in their individual accounts and later they are drawn upon. It is a compulsory scheme for permanent residents as well as people working in Singapore. Both employers and employees make monthly contributions to the fund. The total contribution rate for workers up to 50 years of age is 36 per cent, of which 20 per cent is employees' share and 16 per cent is employers' share as of 2012.

Working personnel make monthly contributions to the CPF and this money goes into three accounts; **i) Ordinary Account**: It is an account which can be used for retirement, buying home, buying CPF insurance, investment and education **ii) Medi save account**: It is used to pay medical bills and approved medical insurance **iii) Special account** is one which is kept for old age and contingncies. The five main functions of the CPF are retirement provisions, healthcare, home ownership, family protection and asset enhancement. **Retirement** scheme: This allows members to withdraw from their CPF fund at the time of retirement, leaving a Minimum Sum Requirement, which allows them to receive monthly payments to enable them to maintain a basic standard of living**. Healthcare**: Under the CPF account some part of the saving goes to Medisave account. Members and their dependents can use this account to avail of medical treatment. **Home Ownership**: The savings from the ordinary account can be used to purchase houses under the CPF home schemes. **Family Protection: This** scheme provides protection to the family of members for the first few years on account of death. And lastly, **Asset Enhancement** provides the facility of investing in Unit Trust, Exchange Traded Funds, Fixed Deposits, Treasury Bills, Insurance, Property Funds and gold with the money saved in ordinary and special accounts. Employers are obliged to make contributions towards the employees' CPF. In case of non-compliance of the CPF Act, the employer is liable to pay penalty.

Source: Ministry of Manpower Website, Singapore Governement.
http://www.mom.gov.sg/employment-practices/employment-rights-conditions/cpf/Pages/default.aspx

17.6.3.6 Sovereign wealth funds: A Sovereign wealth fund (SWF) is a state-owned fund composed of financial assets such as stocks, bonds, property or other financial instruments. Some sovereign wealth funds are held solely by the central banks while others are simply state savings that are invested by various entities for the purpose of investment return. Kerala may consider such funds.

*17.6.3.7 Tax revenue***:** Taxation is used as the main policy instrument for transferring resources to the public sector. The capacity of the state to raise tax revenue depends not only on the sources of tax but also on tangible economic (such as GSDP and economic structure) and non-economic factors, such as, political will, administrative efficiency, and a culture of tax compliance. We propose that the state should design its fiscal architecture based on a careful analysis of the revenue capacity of different taxes, given the characteristics of the state. However, we also propose some specific measures:

- **An automobile tax**: This tax may be imposed as an additional source of tax revenue. It is clear that checking vehicle population explosion is a must for sustainable prosperity. A 1 per cent of annual tax on vehicle purchase price may serve the twin purposes of government revenue and the control of greenhouse gas emission.
- **Consumption tax**: Most countries have been raising consumption tax (such as sales tax and VAT) to mobilize resources and curb consumption. This is an alternative to taxing the corporate sector which affects its competitiveness. Kerala, being a high consumption state, can consider augmenting resources through this.

17.6.3.8 Non Tax revenue: Kerala will strive to supplement tax revenues by exploring sources of non-tax revenues, with due consideration given to equity concerns, including institution users' fees, or by improving the targeting of subsidies for publicly financed goods and services.

17.6.4 Resource management: Additional resources without improving efficiency in revenue collection and resource management will not yield desirable outcomes. Therefore, we propose measures to ensure better resource management:

17.6.4.1 Increasing tax compliance: Evidence suggests that tax compliance is determined by factors specific to tax rates and tax structure, level of development, and societal behavior (including personal moral belief and social norms). The government will need to address these issues by taking appropriate measures to enhance tax compliance in the state. The Nordic countries (particularly Denmark, Norway and Sweden) have embarked on their own internal surveys of best practices and benchmarking exercises. Sweden set a target for itself to become the best tax administrator in the OECD by 2012. They have focused on compliance, cost efficiency and effectiveness, collection losses, e filing, helpline services, taxpayer perceptions of the tax agency, and tax gap measurement and management. Other good country examples are

Norway, New Zealand, Australia, Italy, Canada and Korea. A summary rank order of top OECD countries, based on the OECD data has been provided below[13] and these examples may be used for benchmarking.

- Tax compliance rank order: Norway (100 per cent), Sweden (96%), Netherlands (92%), Ireland (88%)
- Cost effectiveness rank order: Italy (100%), Norway (95%), Sweden (90%),
- e filing rank order: Italy (100%), Australia (95%), Iceland (91%), Korea (88%),
- Telephone service helpline rank order: Ireland (100%), UK(90%) and New Zealand (80%).

17.6.4.2 Fiscal discipline: Mobilisation of resources will not be enough without macroeconomic discipline. Economic policy must be designed to contain inflation and the fiscal deficits. Focus should be on mobilizing domestic sources and curtail public debt. Fiscal discipline is required at all times so as to keep deficit financing small enough to avoid causing inflation, excessive accumulation of public debt, and to ensure that the government borrowing does not crowd out private sector investment. Government expenditures may be revisited and better rationalized.

17.6.5 The key point above is the importance of capital formation, both physical and human, The central role of the government in meeting these investment needs on the scale done by countries such as Korea, Taiwan and China and also the expansion of scope for economically and ecologically efficient taxation to meet these needs

.

17.7 Conclusion

17.7.1 The Perspective Plan 2030 aims at achieving the income and living standards of the Nordic countries and proposes a knowledge driven sustainable growth strategy for achieving this target. The success in achieving the target depends upon removing the obstacles that it is likely face in implementing the proposed strategy. Factor market rigidities are one of the objectives it will face. Structural impediments in factor markets may prove to be one of the major bottleneck in achieving sustainable growth. This chapter identifies these rigidities and addresses them. A major recommendation on the labour front is to move away from a passive employment policy to a comprehensive, pro-active employment policy. This policy will be based on the principles of improving employability, labour information systems, and labour market management; and creating a unified social security system for both formal and informal sector employees and self employed workers. In this context, it highlights the Employment Policy of China and the Danish practice of "flexicurity" in labour markets.

[13] Hasseldine, John (2007) Study into: "Best Practice" in Tax Administration Consultancy Report for the National Audit Office , United Kingdom
http://www.nao.org.uk/wp-content/uploads/2008/07/n0708930_international_review.pdf

17.7.2 Further, land acquisition needs to be placed in the broader perspective of land management. We recommend a Spatial Policy for the state with due preservation of its eco-sensitive assets. We also suggest alternative models for land acquisition for development purpose. One of the major recommendations is that the land must be acquired by the government at the rate that reflects its actual real value.

17.7.3 Finally, we emphasise the importance of augmenting the domestic resource base for addressing capital market bottlenecks. We propose that a fiscal architecture can be designed for the state based on the economic and non-economic factors to assess the revenue generation capacity of the economy through various sources. Attempts should be directed at curbing consumption and mobilizing resources through savings. Tapping remittances is an additional advantage that Kerala possesses. Further, it will be important to improve the culture of paying taxes. In addition to finding innovative ways of doing that, specific country references of best practices in both operational areas and organization/management tasks may also be studied and adapted to local conditions. Finally, it is also crucial to use the available funds more prudently. There needs to be a strong move to maintain fiscal discipline.

17.7.4 In sum, Kerala will need to put in place comprehensive policies to address the rigidities in factor markets. In the absence of these policies, the Perspective Plan cannot be implemented effectively.

*****

APPENDIX A17.1

Investment (Rs. Lakh) Requirement for Capital Formation under scenario 1: When ICORs remain constant over the PP period

Sectors	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Agriculture Forestry & Fishing	206120	211192	216416	221798	227342	269482	276312	283329	290538	297946
Mining & Quarrying	71935	76251	80826	85676	90816	79464	83437	87609	91990	96589
Manufacturing	1242978	1342416	1449810	1565794	1691058	2325205	2557725	2813498	3094847	3404332
Electricity Gas & Water Supply	153819	161283	169102	177293	185873	209650	220401	231694	243557	256019
Construction	496159	535852	578720	625017	675019	928151	1020966	1123062	1235368	1358905
Trade Hotels & Restaurants	588220	639666	695801	757063	823933	967496	1059192	1159863	1270402	1391793
Railways, Transport & other means	743885	810851	884011	963947	1051300	1141769	1245911	1359896	1484683	1621326
Banking, Financial services & Real estate	1561291	1697510	1846105	2008228	2185144	2569037	2812166	3079040	3372017	3693690
Public administration	592245	639625	690795	746059	805743	754377	807184	863687	924145	988835
Other services	1206252	1338940	1486223	1649708	1831175	2032605	2256191	2504372	2779853	3085637
Total investment	6862904	7453587	8097809	8800583	9567403	11277235	12339484	13506050	14787401	16195073
Total income(GDP)	22132130	23832466	25680628	27690057	29875453	32426175	35216733	38270522	41613265	45273245
GDP Growth rate	7.6	7.7	7.8	7.8	7.9	8.5	8.6	8.7	8.7	8.8
Investment /GDP ratio	31.0	31.3	31.5	31.8	32.0	34.8	35.0	35.3	35.5	35.8

Sectors	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
Agriculture Forestry & Fishing	282021	288394	294915	301589	308418	277650	283087	288632	294286	300051
Mining & Quarrying	80362	83577	86920	90397	94012	72625	74803	77047	79359	81740
Manufacturing	3541356	3877785	4246175	4649562	5091270	4942551	5362668	5818495	6313067	6849678
Electricity Gas & Water Supply	242051	253215	264887	277091	289851	276228	288059	300394	313256	326666
Construction	1413601	1547893	1694943	1855963	2032279	1972915	2140613	2322565	2519983	2734182
Trade Hotels & Restaurants	1366558	1484967	1613907	1754327	1907262	1883469	2035624	2200407	2378879	2572193
Railways, Transport & other means	1568421	1698453	1839666	1993050	2159686	2080769	2239832	2411638	2597246	2797807
Banking, Financial services & Real estate	3638059	3953672	4297366	4671669	5079343	5011536	5416271	5854555	6329210	6843294
Public administration	898427	952333	1009473	1070041	1134243	992463	1042086	1094190	1148900	1206345
Other services	2751827	2999492	3269446	3563696	3884429	4234027	4615090	5030448	5483188	5976675

Sectors	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
Total investment	15782684	17139781	18617698	20227385	21980794	21744233	23498134	25398371	27457372	29688630
Total income(GDP)	48893409	52825501	57097208	61738709	66782906	71795061	77210277	83061951	89386291	96222557
GDP Growth rate	8.0	8.0	8.1	8.1	8.2	7.5	7.5	7.6	7.6	7.6
Investment /GDP ratio	32.3	32.4	32.6	32.8	32.9	30.3	30.4	30.6	30.7	30.9

Source: Computations by NCAER

APPENDIX A17.2

Investment (Rs. Lakh) Requirement for Capital Formation under scenario 1: When ICORs increase over the PP Period

Sectors	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Agriculture Forestry & Fishing	207754	214542	221566	228834	236358	282306	291652	301306	311277	321576
Mining & Quarrying	72014	76419	81094	86054	91317	79990	84082	88383	92903	97655
Manufacturing	1250693	1359081	1476806	1604669	1743539	2411798	2668854	2953202	3267732	3615635
Electricity Gas & Water Supply	154244	162173	170502	179249	188437	213120	224657	236807	249604	263082
Construction	501925	548305	598895	654070	714240	992865	1104016	1227468	1364571	1516819
Trade Hotels & Restaurants	595573	655658	721893	794916	875429	1040058	1151871	1275849	1413322	1565768
Railways, Transport & other means	755612	836403	925771	1024625	1133967	1248439	1381511	1528794	1691812	1872257
Banking, Financial services & Real estate	1575879	1729194	1897729	2083014	2286732	2713403	2996396	3309389	3655584	4038527
Public administration	596452	648712	705516	767257	834361	786529	847320	912768	983226	1059076
Other services	1220311	1370151	1538190	1726618	1937889	2174747	2440265	2737883	3071450	3445273
Total investment	6930457	7600639	8337962	9149306	10042268	11943255	13190624	14571849	16101482	17795670
Total income(GDP)	22132130	23832466	25680628	27690057	29875453	32426175	35216733	38270522	41613265	45273245
GDP Growth rate	7.6	7.7	7.8	7.8	7.9	8.5	8.6	8.7	8.7	8.8
Investment /GDP ratio	31.3	31.9	32.5	33.0	33.6	36.8	37.5	38.1	38.7	39.3

Sectors	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
Agriculture Forestry & Fishing	306625	315841	325322	335076	345109	312882	321255	329836	338631	347645
Mining & Quarrying	81338	84683	88167	91793	95568	73907	76207	78578	81023	83544
Manufacturing	3783146	4166613	4588797	5053592	5565285	5433398	5928522	6468561	7057573	7699982
Electricity Gas & Water Supply	249396	261597	274387	287793	301845	288420	301568	315310	329675	344689
Construction	1594298	1763744	1950997	2157909	2386527	2339742	2563495	2808382	3076378	3369644
Trade Hotels & Restaurants	1554460	1707712	1876167	2061335	2264874	2260162	2468195	2695498	2943862	3215242
Railways, Transport & other means	1834637	2012453	2207524	2421535	2656336	2588815	2819866	3071710	3346244	3645540
Banking, Financial services & Real estate	4018547	4405011	4829103	5294500	5805241	5771585	6288927	6853156	7468537	8139727
Public administration	968628	1033511	1102692	1176455	1255099	1105261	1167927	1234096	1303962	1377729
Other services	3104630	3419007	3764823	4145193	4563534	5023600	5529514	6085801	6697431	7369859

Total investment	17495705	19170173	21007979	23025180	25239417	25197773	27465475	29940928	32643316	35593599
Total income(GDP)	48893409	52825501	57097208	61738709	66782906	71795061	77210277	83061951	89386291	96222557
GDP Growth rate	8.0	8.0	8.1	8.1	8.2	7.5	7.5	7.6	7.6	7.6
Investment /GDP ratio	35.8	36.3	36.8	37.3	37.8	35.1	35.6	36.0	36.5	37.0

Source: Computations by NCAER

Appendix A17.3
Ratio of Savings and Investment to GDP at All India level
(at current market prices , in %)

Particulars	2004-05	2005-06	2006-07	2007-08	2008-09	2009-10PE	2010-11QE
Gross domestic saving	32.4	33.4	34.6	36.8	32	33.8	32.3
Public sector	2.3	2.4	3.6	5	1	0.2	1.7
Private sector	30.1	31	31	31.8	31.1	33.6	30.6
Household sector	23.6	23.5	23.2	22.4	23.6	25.4	22.8
Financial saving	10.1	11.9	11.3	11.6	10.1	12.9	10
Saving in physical assets	13.4	11.7	11.9	10.8	13.5	12.4	12.8
Private corporate sector	6.6	7.5	7.9	9.4	7.4	8.2	7.9
Gross capital formation							
(investment)	32.8	34.7	35.7	38.1	34.3	36.6	35.1
Public sector	7.4	7.9	8.3	8.9	9.4	9.2	8.8
Private sector	23.8	25.2	26.4	28.1	24.8	25.2	24.9
Corporate sector	10.3	13.6	14.5	17.3	11.3	12.7	12.1
Household sector	13.4	11.7	11.9	10.8	13.5	12.4	12.8
Gross fixed capital formation	28.7	30.3	31.3	32.9	32.3	31.6	30.4
Stocks	2.5	2.8	3.4	4	1.9	2.7	3.3
Valuables	1.3	1.1	1.2	1.1	1.3	1.8	2.1
Saving-investment gap	-0.4	-1.3	-1.1	-1.3	-2.3	-2.8	-2.8
Public sector	-5.1	-5.5	-4.7	-3.9	-8.5	-9	-7.1
Private sector	6.3	5.8	4.6	3.7	6.3	8.5	5.8

Source: NCAER calculations based on CSO

Appendix A17.4
ICORs over the Perspective Plan: Two scenarios

	Constant ICORs	Increasing ICORs				
Year	2012-2031	2012-16	2017-21	2022-26	2027-31	2012-2031
Agriculture Forestry & Fishing	4.88	4.99	5.19	5.38	5.57	5.28
Mining & Quarrying	11.63	11.67	11.73	11.79	11.86	11.76
Manufacturing	8.47	8.63	8.90	9.16	9.42	9.03
Electricity Gas & Water Supply	18.52	18.67	18.93	19.18	19.44	19.05
Construction	2.62	2.71	2.86	3.01	3.17	2.94
Trade Hotels & Restaurants	1.83	1.90	2.02	2.13	2.25	2.08
Railways	7.30	7.48	7.77	8.06	8.35	7.92
Transport by other means	2.73	2.86	3.08	3.30	3.52	3.19
Storage	5.65	5.69	5.75	5.81	5.87	5.78
Communication	1.99	2.10	2.27	2.44	2.62	2.36
Banking & Insurance	0.35	0.42	0.53	0.64	0.75	0.58
Real Estate &Business Services	7.35	7.52	7.81	8.09	8.38	7.95
Public administration	7.46	7.62	7.89	8.15	8.42	8.02
Other services	4.48	4.64	4.90	5.16	5.43	5.03
Implicit ICOR	4.07	4.19	4.39	4.55	4.76	4.47
Investment /GDP ratio	31.52	32.47	38.07	36.79	36.05	35.84

Source: NCAER

Appendix A17.5

Sectoral shares in investment based on increasing ICORs assumption in Perspective Plan scenario

Year	2012-16	2017-21	2022-26	2027-31	2012-2031
Agriculture Forestry & Fishing	2.67	2.08	1.55	1.11	1.85
Mining & Quarrying	0.97	0.61	0.42	0.26	0.57
Manufacturing	17.71	20.26	21.84	21.60	20.35
Electricity Gas & Water Supply	2.05	1.63	1.31	1.05	1.51
Construction	7.18	8.42	9.29	9.38	8.57
Trade Hotels & Restaurants	8.66	8.75	8.93	9.00	8.84
Railways	1.07	1.14	1.23	1.31	1.19
Transport by other means	5.28	5.42	5.60	5.71	5.50
Storage	0.06	0.06	0.06	0.06	0.06
Communication	4.69	3.87	3.61	3.17	3.84
Banking & Insurance	0.74	0.92	1.19	1.30	1.04
Real Estate &Business Services	22.02	21.79	21.80	21.58	21.80
Public administration	8.46	6.27	5.25	4.13	6.03
Other services	18.45	18.79	17.92	20.32	18.87

Source: NCAER

CHAPTER 18

SCIENCE & TECHNOLOGY IN KERALA: EMBARKING ON A NEW S&T STRATEGY

Abstract:

The S&T support system in Kerala appears a little lopsided and too general to make any substantive impact. There are no focused programmes to support innovations. Most programmes focus on supporting science and technology. Kerala faces the economic, social and environmental challenges. The KPP 2030 proposes a sustainable innovation strategy that will help steer the Kerala economy out of the economic, social and environmental challenges that the state it faces. The mission of this policy will be to mobilise S&T to *Kerala's advantage,* towards *building a more competitive and sustainable knowledge economy with the help of science and technology. This new, focused policy will create a platform that encourages the private sector to compete with the world on the basis of their innovative products, services, and technologies.*

18.1 The Context

Over the next 20 years, Kerala will be transitioning from a traditional to a knowledge economy. The idea of a knowledge driven economy is not that of a large presence of high technology industries. Rather, it points to the emergence of knowledge as a new source of competitive advantage that can apply to all sectors, all companies and all regions, from agriculture and retailing to software and biotechnology. Knowledge is the most strategic resource in a knowledge economy. A critical element of the success of a knowledge economy is an effective innovation system in firms, research centers, universities, consultants and other organizations that can keep up with the knowledge revolution, tap into the growing stock of global knowledge and assimilate and adapt it to local needs. It will therefore be vital for the Kerala government to strengthen its R&D strategies and initiatives to ensure that Kerala is scientifically, technologically and economically equipped to meet the challenges in the process of transition.

18.2 The Current scenario

18.2.1 Administrative infrastructure: The Kerala State Council for Science, Technology and Environment (KSCSTE) was constituted in November 2002 as an autonomous body to encourage and promote science and technology related activities in the State by restructuring the erstwhile State Committee for Science, Technology and Environment (STEC), which was established in 1972 in concurrence with the Science Policy of the Government of India. This is an apex body which is responsible for planning, formulating and implementing science and technology promotion and other related research and development programmes. There are seven R&D centres under the umbrella of the Council that have been assigned specific domains for their R&D work:

- The Centre for Earth Science Studies (CESS) is established to promote modern scientific and technological research and development studies in earth sciences (problems related to land, sea and atmosphere);
- The Centre for Water Resources Development and Management (CWRDM) focuses on the field of water management;
- The Kerala Forest Research Institute (KFRI) is established to undertake research in areas like forestry, biodiversity etc.;
- National Transportation Planning and Research Centre (NATPAC) is undertaking research and consultancy works in the fields of traffic engineering and transportation planning, highway engineering, public transport system, inland water transport, tourism planning, rural roads, environmental impact assessment and transport energy;
- Tropical Botanic Garden and Research Institute (TBGRI) works in the conservation and sustainable utilization of plant biodiversity;
- The Kerala School for Mathematics (KSoM) has been set up as a joint venture of KSCSTE and the National Board of Higher Mathematics to promote mathematical research in the country and particularly in Kerala;
- The Srinivasa Ramanujan Institute for Basic Sciences (SRIBS) is a capacity building initiative of KSCSTE in basic sciences.

18.2.2 Current Schemes & Programmes: There are four types of R&D support schemes:

18.2.2.1 Funding schemes for science and technology These schemes focus on funding to scientists and technologists (Science Research Scheme, Emeritus Scientist Scheme, Engineering and Technology Scheme, Rural Technology, Technology Development

Adaptation Programme, Research fellowship programmes); departments/ colleges for scientific research/academic work (SARD); and autonomous institutions (Grants-in-aid). Further, Kerala Biotechnology Board and Kerala Biotechnology Commission provide quick research support to young scientists to pursue their ideas in emerging and frontline areas of research in biotechnology

18.2.2.2 Promotion of Science education: These programmes aim at inspiring interest in science at the school level (Sastraposhini Scheme, Scheme for Promoting Young Talent in Science, Rural Agriculture Work, Women Scientists Cell); at the University level (Student Project Scheme, Young Scientist Programme); and at the managerial level (Training facility for S&T management). Support is provided for Seminars, Symposia, Workshops, National Science Day, and National Science Technology Celebrations. Kerala Sasthrapurashkaram award is conferred to appreciate the lifetime contributions of scientists and their achievements in S&T. Technology Festival (TECHFEST) and Kerala Science Congress is organized every year by KSCSTE with the aim of stimulating interest and proficiency in science. A science city is coming up in Kottayam with the objective of promoting interest in science. This project is envisaged to be one of the largest Science Cities in Asia. It will be the fourth of its kind in India, following the ones in Kolkata, Jalandhar and Ahmedabad. It will have science galleries, science parks, an open air auditorium and a planetarium.

18.2.2.3 Encouraging innovation at the grassroot level: A scheme titled 'Grassroots Innovation Augmentation Networking (GIAN)' is implemented in collaboration with the National Innovative Foundation, to promote grassroots level innovations and to convert their innovations to an enterprise level. Further, the Patent Information Centre facilitates the filing of patent applications from the state by conducting prior art patent database search, free of cost.

18.2.2.4 Encouraging S&T in environment and ecology: Environment and Ecology Programme provides assistance in the form of grants to scientists and technologists for scientific/research work on environmental problems and issues. Short term courses for professionals and other officials including NGO workers, teachers, students and general public are organised on environment management. The Kerala Coastal Zone Management Authority provides protection of oceans, seas, coastal areas and contributes to the protection, rational use and development of their living resources. Green technology

centers are proposed to be established to encourage research and adoption of energy efficient chulhas, organic farming, afforestation, vermin-composting, biogas, use of CFL and LED's in place of incandescent bulbs. Finally, initiatives are being taken up on conservation of wetlands in the State.

18.2.3 Challenges

18.2.3.1 The S&T support system in Kerala appears a little lopsided and too general to make any substantive impact. There are no focused programmes to support innovations. Most programmes focus on supporting science and technology. Kerala faces economic, social and environmental challenges that require a new level of R&D effort and success. On the economic front, the economy is stuck in low productivity cycles. For the economy to transit to a knowledge economy, it must improve economic productivity and competitiveness through innovation and upgrading of human capital. From the societal perspective, availability of basic utilities including water and energy; and basic services such as sanitation, solid and liquid waste management, transport, and health pose serious challenges. Finally, there are environmental challenges in terms of land, water and air pollution, biodiversity loss, and vanishing wetlands. These challenges require a new S&T strategy that helps Kerala leapfrog to the league of the advanced economies using science and technology to develop practical applications to address the emerging challenges.

As discussed in the report, there has been a technology explosion worldwide, impacting almost every aspect of human activity. To succeed in an increasingly competitive global arena, Kerala must be at the leading edge of important developments that generate health, environmental, societal, and economic benefits. Now that Kerala has built a strong research foundation, it must strive for excellence in science and technology.

18.3 A new innovation strategy

18.3.1 The KPP 2030 proposes a sustainable innovation strategy that will help steer the Kerala economy out of the economic, social and environmental challenges that the state it faces. The mission of this policy will be to mobilize *S&T to Kerala's advantage,* towards building a more competitive and sustainable knowledge economy with the help of science and technology. This new, focused policy will create a platform that encourages the private sector to compete with the world on the basis of their innovative products, services, and technologies and will at the same time address the social and environment challenges the

state is facing. This policy will also lay out a framework that will guide strategic investments of public funds. Government will need to be more strategic, more efficient, more effective, and more accountable for delivering results that make a difference in people's lives which is the ultimate objective of the policy.

18.3.2 In the knowledge-based economy, the innovation system contributes to the key functions of:

i) Knowledge production and knowledge acquisition – developing new knowledge;
ii) Knowledge transmission – educating and developing human resources; and
iii) Knowledge dissemination- providing knowledge inputs to problem solving.

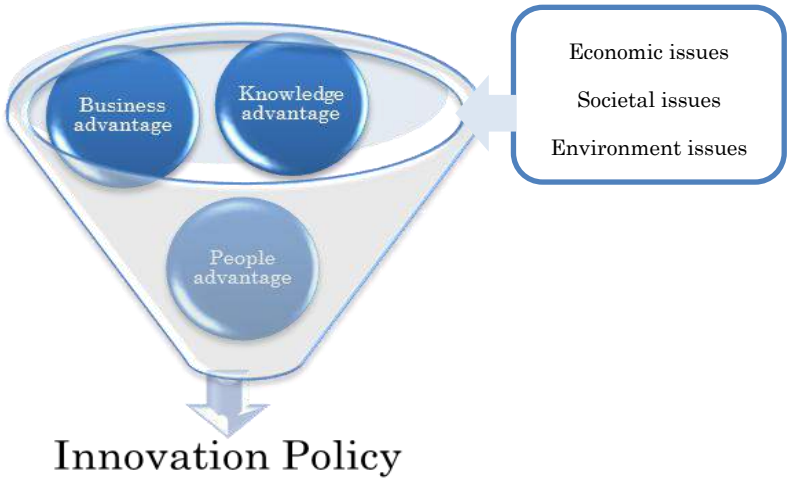
18.3.3 While knowledge production and acquisition will serve as the basis of knowledge advantage, knowledge transmission will build people advantage. Finally, knowledge dissemination will prepare the basis for business advantage. The proposed S&T strategy needs to be built on these three pillars, which will translate into knowledge advantage, people advantage and business advantage.

18.3.4 The KPP 2030 propose a new Innovation policy which will aim at creating an "Innovation Ecosystem", incorporating the three advantages. It will involve systematic engagement of the three sub-systems in interactive learning:

- The regional production structure or knowledge exploitation sub-system which consists mainly of firms, especially where these display clustering tendencies;
- The regional supportive infrastructure or research sub-system which consists of public and private research laboratories, technology transfer agencies, and research consultants;
- Academic subsystem consisting of universities and colleges, vocational training organizations, etc.

18.3.5 The proposed Innovation policy is thus explained through figure 18.1:

Figure 18.1: A new Innovation strategy



Source : Conceptualized by NCAER

18.3.6 The proposed "Innovation ecosystem" will be a concrete tool for policy-makers to systemically enhance localized learning processes to secure regional innovativeness in practice. This can be achieved if industrial; education and health clusters are supported by a high density of research labs and other actors in R&D development in the vicinity. To achieve this objective it will provide the rules to ensure accountability. What follows provides a comprehensive action plan to strengthen each of the three dimensions of the Innovation System.

18.3.6.1 Pillar 1: Creating knowledge advantage through research sub-system: The Kerala government will focus strategically on research in areas that address regional interests from a social, environment and economic perspective and promote creation and acquisition of knowledge through international transfers of technology.

a) Promotion of scientific knowledge and R&D

(i) Science is the fundamental knowledge base which is generic to technological development. It is new knowledge, largely through basic research at universities and government laboratories. This new knowledge has traditionally been distinguished from the knowledge generated by more applied or commercial research, which is closer to the market and at the "technology" end of the spectrum. Because of this, much of science is considered as a "public good", a

good in which all who wish can and should share, if social welfare is to be maximised. The public-good character of science means that the private sector may under-invest in its creation since it is unable to appropriate and profit adequately from its production. The government should therefore play an important role in ensuring and subsidising the creation of science. Currently, the S&T council has several programmes to fund research proposals. However, a more direct and proactive approach will be required to promote research. The Government of Kerala will play an important role in supporting basic research across a broad spectrum of science by

- **Encouraging Partnerships**. The Government will support S&T collaborations involving the business, academic, and public sectors, at home and abroad. Partnerships are essential to accelerate the pace of discovery and commercialization in Kerala. Through partnerships, the unique capabilities, interests, and resources of various and varied stakeholders can be brought together to deliver better outcomes.

- **Focusing on strategic areas of research**: There is a need to identify the priority research areas and initiate projects. The priority areas may be identified by respective government departments on a yearly basis and communicated to the KSCSTE. These projects should be outcome-oriented with world-class infrastructure created for them.

(ii) The proposed knowledge cities (proposed in chapters 2, 3 and 4) will put in place the right conditions to attract, retain, and develop the talent and ingenuity Kerala needs. The quality of higher education will be world-class in these hubs. This will attract talent from all over the country and abroad. This interactive environment will be conducive to new ideas.

b) Facilitating R&D by the private actors

(i) There is a growing recognition that in a knowledge economy, ideas for innovation can stem from many sources, including new manufacturing capabilities and recognition of market needs. Innovation can assume many forms, including the incremental improvements to existing products, application

of technology to new markets and use of new technology to serve an existing market. Innovation requires considerable communication among different actors – firms, laboratories, academic institutions and consumers – as well as feedback from science, engineering, product development, manufacturing and marketing. To capture this dynamism, the government will focus on the interaction among all the possible sources of scientific knowledge. It will promote interactions between knowledge and production networks by undertaking following programmes:

- **Research alliances with national and international agencies:** Annual technology development programmes will be established based on the strategic issues identified by the government departments (as mentioned above). Further, alliances will be formed and executed annually with public and private research organizations, technology research associations, specialized production technology research centers, universities, government funded research organizations and international agencies etc. and funding for these projects will be facilitated. Their outcomes will be evaluated from time to time.

- **Incentives:** The R&D tax incentive applies to expenditure incurred on R&D. Most countries offer such incentives to private firms to undertake these efforts. Since Kerala is a regional economy it is benefitted by the R&D tax incentive offered by the central government. However, the future strategy will require identifying the winners and rewarding them at the state level too. The incentives will be based on research outcomes rather than expenditures.

(ii) The future will require widespread evolution of public innovation support systems along with stronger institutional and organizational support from the private sector.

c) Linkages between academic sub-system and research subsystem:

(i) Many developed countries have promoted strong linkages between universities and industry as a means of publicizing and/or strengthening their contributions to innovation and economic growth. Government departments in these countries

allocate annual funding to universities to facilitate research and its commercialization. In recent years these linkages are strengthened through commercialization of higher education. This enhances opportunities to increase the relevance of the university's educational mission and to stimulate new research directions. This will also generate more interest among young people in pursuing S&T studies and careers, encouraging a virtuous circle of talent generation and mobilization. However there are also concerns:

- An increasing share of the resources allocated to university research will be derived from contracts with industry, thus making the universities more and more dependent on the private sector for funding and steering the overall research activity in a more commercial direction.

- As university/industry collaboration becomes the norm in many areas of basic research, the traditional contribution of academia to the production of scientific knowledge may weaken.

- There are also concerns that university/industry collaboration may tend to consolidate excellent researchers in a handful of universities or research centres.

(ii) While designing the policy, these concerns will be addressed.

d) Promotion of regional innovation systems and the proposed knowledge hubs: Business advantage

(i) Regional innovation systems involve systematic engagement of two sub-systems in interactive learning:

- The regional production structure or knowledge exploitation sub-system which consists mainly of firms, especially where these display clustering tendencies,

- The regional supportive infrastructure or knowledge generation sub-system which consists of public and private research laboratories, universities and colleges, technology transfer agencies, vocational training organizations, etc.

(ii) Regional innovation systems are a concrete tool for policy-makers to systemically enhance localized learning processes to secure regional innovativeness in practice. This can be achieved if industrial, education and health clusters are supported by a high density of research labs and other actors in R&D development in the vicinity. The KSCSTE will be coordinating its efforts with the PP2030 "Coordinating Committee" (proposed in Chapter 2), to ensure a well-developed regional innovation system in the proposed hubs (Chapters 2,3,4).

e) Facilitating Knowledge acquisition

(i) The characteristics of technological development are different across developed and developing countries. While major (radical) innovations will occur in the advanced industrial countries through internally driven R&D processes, firms in developing countries acquire those innovations that are useful or appropriate through technology imports from developed country firms, in particular from TNCs (Transnational Corporations). But that does not mean that they can apply them successfully here. Absorption of these technologies and building technological capabilities requires gaining mastery over technology or adapting them to local conditions. This is because technology is tacit. Unlike the developed countries, therefore, innovations in developing countries are often the result of adaptation of knowledge developed elsewhere and are mainly of an incremental nature. Building technological capabilities thus requires technology acquisition and then gaining mastery over it through absorption and adaptation. Technology acquisition by firms in developing countries can either be embodied or disembodied and takes place either through market based mechanisms or non-market mechanisms such as licensing and imports of capital goods. The State can play an important role in identifying appropriate technologies and promoting their transfer, absorption and adaptation.

- **Centre for International Technology transfers:** It is proposed to create an agency within the S&T Council, called the "Centre for International Technology Transfer" to identify the latest technologies available worldwide in economic, social and environment sectors; create their inventory, and help in procuring them on behalf of the relevant department

or industrial units. It will also be responsible for the absorption and the possible adaptation of these technologies and for international collaborations in technology development.

- **Promotion of FDI:** FDI is believed to be a carrier of the latest technologies to the host economies. It will be important to create the conditions for its inflows. However, FDI may not result in technology transfers if the economy has no absorptive capacity. Thus the transition of the economy to a knowledge economy may be combined with FDI inflows. It may be mutually reinforcing and will benefit the economy.

(ii) Acquisition of knowledge is important in view of the fact that there has been an explosion of technology in every sector including the primary sector. The knowledge and acquisition of these technologies may be vital for addressing the challenges being faced by Kerala. Box 18.1 offers four illustrative examples to emphasise the importance of the state's role in technology acquisition.

Box 18.1: Illustrations of technological advancement

Illustration 1: Hydroponic Farming

Hydroponics means "Hydro" = water and "Ponics" = Working with, also known as soilless gardening. This technique allows plants to grow without soil, both indoors as well as in outdoor settings. Roots of plants are partially or totally sprayed with a nutrient solution, mixed with water. These roots are then exposed to the air inside the hydroponic growth enclosure, so that roots can get all the oxygen in a high humid environment. This technique was further promoted by the Singapore based Aero-Green Technology Pvt. Ltd. The main purpose of promoting vertical aeroponic growing techniques was to use them on the rooftops of buildings. This system can produce crop yield as much as 20per cent higher than the traditional farming techniques and saves 70 to 95 percent water, which can be used to grow an equivalent crop yield conventionally[1]. In 2009, more land allocation for hydroponic farming was announced, since the Singapore government wanted to reduce its dependency on food imports. Also, given the soaring food prices all over the world, this technique has been considered as a major step in order to achieve self sufficiency in food grains.

[1] **Dickson Despommier (2010) The Vertical Farm: Feeding the World in the 21st Century,** Thomas Dunne Books; 1ST edition

The advantage of this technique is that not only will the agriculture sector become "agripreneurial", but this technique will also help in promoting the accessories market for hydroponic instruments. Currently in Singapore, in order to make hydroponics farming feasible and user friendly, many accessories like hydro-light timers, hydro-net pots, hydro-reservoirs, hydro-sounds, hydro-water, hydro-aeration, hydro-drip, hydro-germination, hydro-vertical gardens etc are available. Various kinds of lights, for example : bulbs, LED systems, light movers, light stands, instruments capturing solar power to provide adequate light for plants etc have revolutionized the market. Vegetables like tomato, cucumber, beans, peas, pepper, sprouts, broccoli, cauliflower etc have extensively been grown in Singapore and can be replicated in Kerala. Since Kerala also faces water and land shortage, and imports a major portion of its food grains from outside, hydroponic farming may usher in a new revolution in Kerala's agriculture sector.

Source: Compiled from various sources

Illustration 2:Aquaponic Farming

Aquaponic farming is a combination of aquaculture and hydroponics. In aquaponics, water from fish tanks is used to circulate through a grow bed where plants are grown. Further, nitrifying bacteria converts fish waste into nutrients for plants. Plants use this nutrient as their main nutrient supply and this process at the same time benefits fishes, by providing them clean water to live in, as water is filtered by the plants. Natural chemicals and fish food are the only additives in the aquaponic system. There are three main styles of aquaponic systems including: Media Based, Deep Flow/Raft, NFT (Nutrient Film Technique). Media based is useful in backyard systems, Deep Flow/Raft are used for commercial systems and NFT is mainly used for both backyard systems and commercial usage. In aquaponics, plants like leafy green vegetables, vine plants, fruit and fruit trees, flowers and fodder can be grown. Some of the main components required for successful aquaponics systems are: fish tanks, grow beds, water pumps, aeration pumps, biofiltration and mechanical filtration, plumbing for irrigation and drainage, fish, plants, water etc.

Some of the major advantages of aquaponics are: reduced water, chemical and pesticide use (when set up in a greenhouse); reduced soil erosion; reduced running cost; ability to produce fish and plants for consumption; reduced pollution of waterways etc. :

In the world of global warming, with water shortage, problems with labour, depleted soil,

increase in genetically modified foods, rising prices and world conflicts etc soilless cultivation and hydroponics can be a new way forward. Aquaponics is practiced in Bangalore, Jaipur and Kolkata and many other cities in India.

Source: Green Acre Acquaponics Website

greenacreaquaponics.com

Illustration 3:Hay Dairies – Innovative Technique of Vacuum Milking system

Hay Dairies is the only goat farm in Singapore. The main product is goat milk and goats are milked using a high-tech vacuum milking system, from which up to 12 goats can be milked at the same time. After milking, quality check makes sure that the milk is healthy for consumption. High-tech methods to extract milk is time saving and ensures proper hygienic conditions as well. Goat milk is beneficial for people with various diseases and can be consumed by lactose intolerant individuals as well. Goat milk from Hay Dairies accepts orders on phone orders and makes home deliveries. Due to different flavors of goat milk and exceptional hygienic facilities, this place has also become a famous educational tourism spot in Singapore.

*Source:*Travel Guide Website

http://www.streetdirectory.com/travel_guide/singapore/local_guide/812 /hay_dairies_goats_galore.php

Illustration 4: Why do we use one source of renewable energy, when we can use all of them in a decentralized way to achieve energy efficiency?

A case from a German Model of energy

The German "Combined Renewable Energy Plant" is one of the classic examples of using different renewable energies at the same time. It uses 36 wind, solar, biomass and hydraulic plants that are spread throughout Germany. This ensures that power supply is supplied to all individuals, with many smaller plants in close proximity to consumers. This is also achievable in Kerala, where land is scarce and availability of big pieces of land is an issue. Small land pieces used for power and electricity generation in a clean and green manner can be the way out. How much energy is generated by wind turbines and solar heating systems depends on how much wind and sun is available, and at the same time biogas and hydraulic turbines can be used to supply energy in peak times. In this way, the entire demand for energy can be met with the help of this renewable energy.

Source: Energy Efficiency Made in Germany, Report by Federal Ministry of Economics & Technology, 2008.

f) *World- Class Research:* World-class research can be promoted in the state by:

- Build on a public and private partnership mode to deliver a sustainable, world class research system across the spectrum of humanities, physical and social sciences;
- Deliver quality by increasing the number of research teams led by internationally competitive principal investigators;
- Upgrade existing infrastructure and develop new facilities to support research;
- Enhance postgraduate skills through a strong graduate schools mechanism;
- Develop sustainable career paths for researchers;
- Enhance the mobility and freedom of researchers to innovate.

18.3.6.2 Pillar 2: Strengthening Human Resources advantage by upgrading academic subsystem: Talented, skilled, creative people are the most critical element of a successful economy in the long term. Kerala must prepare highly skilled people to thrive with the best-educated, most-skilled, and most flexible workforce in the world in order to create a People's Advantage.

a) Attract students to science and mathematics

(i) State Council of Education Research & Training (SCERT) needs to review the implementation of the primary science curriculum to ensure that the new curriculum and teaching methodologies are stimulating interest in and awareness of science at a very young age;

(ii) Make science and awareness of scientific issues a core area of study for student teachers in Colleges of Education;

(iii) Reform the maths and science curricula, starting with an emphasis on hands-on investigative approaches and the completion and assessment of practical coursework;

(iv) Invest in teacher professional development in collaboration with secondary level education boards and higher education institutions, as appropriate;

(v) Undertake promotion of information brochures, guidance materials and resources and awareness initiatives in the transition year in collaboration with the Science and Engineering programme, and ensure effective linking of this with school guidance services;

(vi) Support the development of teachers' networks which will focus on improving teaching and learning, including the Continuing Professional Development of teachers;

(vii) Further, develop the full range of awareness-raising activities under Science and Engineering.

(viii) Most developed countries are working on the strategy of attracting students to science and maths education. Kerala can draw on the examples of other countries. Box 18.2 provides a case study of PRISM, an American initiative to attract students to science and maths.

Box 18.2 : Promoting Regional Improvement in Science & Maths (PRISM): Attracting students to science and technology in USA

PRISM is an inter-disciplinary programme to promote interest in Mathematics, Physics, Biology and the sciences among college and high-school students. The goal is to engage students in discovery and research that leads to research co-op positions and further opportunities for undergraduate research with faculty. The programme is supported by the National Science Foundation and is run jointly by the faculties of Mathematics, Physics and Biology. PRISM offers bi-weekly seminars and social events throughout the fall Semester for students interested in science or mathematics, a free one-credit research-based course in the Spring semester (open to all students in their first two years), and an intensive 4-week programme during May (by application, stipend provided) exploring topics in Math, Physics, and Biology, leading on to opportunities for research co-ops and internships. PRISM provides opportunities for student exploration. It allows students to work together on challenging projects in science and math outside of the normal classroom environment, makes them think creatively and utilize critical problem solving skills necessary for careers in emerging science fields.

Source: www.theprismproject.org

b) *Improving education standards*: A major concern is the quality of education. We have discussed the Strategic Education Policy in Chapter 3 which may be referred to.

c) *Special grants for science education:* The S&T Council has programmes to fund higher education in science. However, schools and colleges can institute special grants for

students opting for science and maths education. These may be created through donations and sponsorship from companies.

18.3.6.3 Pillar 3: Business advantage through knowledge diffusion sub-system; Knowledge must be translated into commercial applications to create a business advantage. It will generate wealth and support the higher standards of quality of life. In the proposed strategy, the state will play an important role in transferring and disseminating knowledge throughout the economy. One of the hallmarks of a knowledge-based economy is the recognition that the diffusion of knowledge is just as significant as its creation, leading to increased attention to "knowledge distribution networks" and production networks. The distribution networks are the agents and structures that support the advancement and use of knowledge in the economy and the linkages between them. They influence the capacity of a country to diffuse innovations and absorb and maximize the contribution of technology to production processes and product development. This requires developing linkages between the science system and the private sector in order to speed up knowledge diffusion.

a) *Promotion of start ups:* This new, focused Strategy proposes to recognize that the most important role of the government of Kerala is to ensure a competitive marketplace and create an investment climate that encourages the young generation to compete with the world in providing innovative products, services, and technologies. Kerala must maximize the freedom given to scientists to investigate and entrepreneurs to innovate. The chapter on Entrepreneurship provides further details on the strategic direction for promoting start-ups.

b) Promotion of specialised *institutions*

(i) **Private consultancy firms:** These firms will have to be promoted to act as a link between knowledge creating and knowledge using actors. This will promote entrepreneurship and ensure higher returns from science education for the young generation. The issue of patents and copyrights will need to be sorted out.

(ii) **Government sponsored knowledge diffusion centre:** Korea is a case in point. In 2000, **Korea** Technology Transfer Center (KTTC) was established to promote transactions of technology transfer and commercialization, following the enactment of the Technology Transfer Promotion Act. In 2005,

256 cases of technology transfer transactions and commercialization consulting were completed under the management of KTTC. To encourage the transfer and commercialization of R&D under government funding, the Act encourages universities and private and public research institutes to have technology transfer offices within their respective institutions. The Ministry of Information & Communications sponsors this agency. It provides commercialization support to small & medium businesses, start up companies etc. New technologies are procured and are transferred to the organizations as a solution to their problems.

c) *Research and Development for Enterprise, Innovation and Growth:* There will be no incentive to engage in R&D if there is weak demand for these skills by the private sector. Businesses and other organizations need to make better use of the skills, talent, and knowledge of our graduates. This requires promotion of technology adoption by all the sectors. This calls for a strategy by the government which is as follows:

(i) Promote intensified competition in each sector by creating a favourable investment climate;

(ii) Establish Technology Kerala as a virtual entity and mobilise practical structures required to make it work;

(iii) Launch new Enterprise Kerala awareness campaign, including seminars and direct engagement with client firms;

(iv) Increase absorptive capacity by strengthening technology skills in firms new to R&D;

(v) Rationalise and simplify enterprise R&D grant structures to make them more accessible to firms;

(vi) Promote the formation and advancement of inter-company networks;

(vii) Strengthen measures to assist firms with licensing in technology;

(viii) Strengthen measures to increase interaction between firms and higher education institutions regionally;

(ix) Develop additional competency centres in strategically important technologies, with significant expansion of industry linkages;

(x) Examine the operationalisation of the Forum on Small Business recommendations in respect of Innovation Vouchers and Knowledge Acquisition Grant.

d) Capturing, Protecting and Commercialising Ideas and Knowhow

(i) Ensure that the government department concerned embraces Intellectual Property (IP) management and commercialization as a central part of their mission, equal to teaching and research;

(ii) Strengthen institutional competence among researchers;

(iii) Establish competitive funds administered by the Department of Science and Technology to assist strengthening of the IP management function.

18.4: Initiate Kerala's SBIR programme: A proposal

18.4.1 The Small Business Innovation Research (SBIR) program is pioneered by the US to increase the participation of small, high- technology firms in its R&D endeavor. Box 18.3 presents a case study of the famous SBIR Programme of the U.S. This programe is a successful example of knowledge diffusion and has significantly contributed to the expansion of the Silicon Valley.

Box 18.3: Small Business Innovation Research (SBIR) Programme of U.S.A.

SBIR is designed to encourage small business to develop new processes and products and to provide support in their early stages, as they translate these ideas into innovative products and services for the market. The Small Business Innovation Research (SBIR) programme is one of the largest U.S. public-private partnership programmes. In 1982, the Small Business Innovation Development Act was passed to award federal research grants to small businesses. In this programme, federal departments with large R&D budgets set aside a small fraction of their funding for competition among small businesses only. Small businesses that win awards in these programmes keep the rights to any technology developed and are encouraged to commercialize the technology. The programme has three main objectives:

- To spur technological innovation in the small business sector;
- To meet the research and development needs of the federal government;
- To commercialize federally funded investments.

The SBIR Program is structured in three phases. Only small businesses in USA are eligible to participate in the SBIR programme each Fiscal Year (FY). The 11 participating federal agencies set aside 2.5- 3.5 percentage of their extramural R&D budgets. Since 1983, all SBIR awarding agencies have funded a total of 130,856 projects amounting to $32.3 billion in current prices and $19.9 billion in 1983 prices. On average, 4362 projects were funded on annual basis during 1983-2012 with annual grant of over $1 billion (in current prices). The success of the SBIR program is unparalleled in Federal R&D programs with its focus on innovation and commercialization.

Source: An Official Website of the United States Government

www.**sbir**.gov/

18.4.2 Governments around the world are increasingly adopting SBIR type programmes to encourage the creation and growth of innovative firms in their economies. In Europe, Sweden, Russia, UK, Finland and the Netherlands have adopted SBIR-type programmes. In Asia, Japan, Korea, and Taiwan have adopted the SBIR concept as a part of their respective national innovation strategies. The Government of India's Department of Biotechnology (DBT) built a programme, SBIRI, on the same pillar for funding bio-technological innovations amongst Indian owned small to medium enterprises (SMEs). The programme was launched in 2005. Over the years, SBIRI has screened 1000 projects and funded 121, of which 60 have been completed. The support was in the form of both loans and grants to industry. They have worked under the overall guidance of the Apex Committee and Technical Screening Committee. For the 121 projects sanctioned till August 2011, DBT's commitment has been Rs. 192.84 crore (Rs. 27.28 crores as grant-in-aid and Rs. 165.56 crores as soft loans).

18.4.3 The SBIRI experience has led to initiation of the Biotechnology Industry partnership programme (BIPP), with the mandate of conducting large scale operations. The Biotech Ignition Grant (BIG) supports innovation at the grassroots level together with the Biotechnology Industry Research Assistance Programme (BIRAP) and Biotechnology Industry Research Council (BIRAC).

18.4.4 We propose that KCSE should introduce this programme by making provisions in the proposed R&D budget of the government departments. The programme will be implemented by the KNSER with the support of the government departments.

18.5 Implementation

18.5.1 A more streamlined management system, with a broad and clear mandate, is required to ensure the effective implementation of the S&T strategy. In order to achieve these objectives, the government will consolidate the roles and responsibilities of the S&T Council by

a) *Organization restructuring:* Reorganize the Council into four organs, each looking after the economic, human development, social and environmental aspects. This will ensure a more balanced approach in targets and achievements. Each organ will adopt strategies for building knowledge, people and business advantages; formulate programmes and schemes and benchmark Kerala's S&T performance against international standards of excellence.

b) *Creation of a funding agency for technology and innovation:*

(i) It is proposed that the government of Kerala sets up a funding agency to finance development of innovations that aims at growth and new business operations. As part of its strategy, the agency would specify focus areas in all the dimensions of sustainable development: economic, social and environmental. Within the ambit of the programmes and initiatives of the agency, businesses and public research units can develop new know-how, build networks and create an impact on the development of their field. The objective of the agency will be to grant funds towards innovative projects aimed at generating new know-how and new kinds of products, processes, and service or business concepts. The focus will be on developing technologies to meet the needs of public sector bodies and government departments. The departments may notify the agency of the technological areas in which they would want projects funded. The agency may then call for R&D proposals from public research bodies and businesses to address these issues. Awards may be given based on an open competition among projects. Universities would also be given the opportunity to participate in the competition. Grants will be sanctioned for the best R&D proposal. The projects would be time bound and subject to thorough monitoring over the period of development. This will facilitate addressing the economic, social and environment related problems unique to

Kerala with indigenously developed technologies. This agency will also be responsible for implementing and governing the SBIRI programme. While granting awards, it will focus on small on young enterprises, and universities.

(ii) The Nordic region which tops in terms of R&D, education and knowledge economy (as mentioned in Chapter 2) has an elaborate system of R&D and innovation. Box 18.4 presents the implementation system of R&D policy in three selected countries: Finland, Sweden and Norway. These systems can be studied and important lessons learned from them. Based on the experience of these countries, Kerala may develop its own research system.

Box 18.4 R&D Policy implementation systems in select Nordic countries

Finland

Tekes is the agency that funds R&D and innovation activities of companies and research organisations registered in Finland. In 2012, Tekes made funding decisions regarding 1,640 projects, which resulted in a total investment of 570 million euros. Of this, 353 million euros was invested in enterprise projects and 217 million euros was invested in projects carried out by universities, research institutes and polytechnics. Of the total enterprise R&D project funding, 68per cent was targeted at SMEs (with less than 250 employees); and 76per cent was targeted at enterprises with less than 500 employees.

Source: Tekes- Official Website of Finland
www.**tekes**.fi/en

Sweden

The Swedish Governmental Agency for Innovation Systems is VINNOVA. Its mission is to promote sustainable growth by improving conditions for innovations, as well as funding need-driven research. It promotes collaborations between companies, universities, research institutes and the public sector by stimulating a greater use of research, by making long-term investment in strong research and innovation milieus and by developing catalytic meeting places. VINNOVA's activities also focus on strengthening international cooperation. In order to increase their impact, they are also dedicated to interacting with other research financiers and innovation-promoting organisations.

Every year VINNOVA invests about SEK 2 billion in various initiatives. Funding decisions are made with assistance from national and international experts and there is ongoing monitoring and evaluation of all initiatives. It carries out regular impact analysis to evaluate and draw lessons from the long-term impacts of its efforts.

*Source:*Vinnova- Official website of Sweden
www.**vinnova**.se/en

Norway

The Research Council works to promote high-potential research of benefit to society at large. The Council's main strategy "Research Expands Frontiers" and various other strategy plans provide an important basis for activities designed to meet this objective. It is responsible for the development of various plans and strategies for individual disciplines, subject areas and research topics. It is highly outcome oriented. The underlying principle is that research must generate results that can be applied by the private and public sectors.

Source: Euraxess- The Research Council of Norway
http://www.euraxess.no/prognett-euraxess/Research_system/1246541738840

c) *Enhancing Accountability:* The Government will implement stronger governance and reporting practices to deliver and demonstrate results. Accountability is important because it puts the responsibility on those who are supported by public funds to demonstrate to taxpayers that results are being achieved. It needs to establish competitive environments, measure success, and hold people and organizations more accountable for the results they achieve. The four organs of the Council will be responsible for increasing its accountability to the people of Kerala by improving the way programmes are implemented and their performance evaluated. It will develop R&D indicators for each organ and measure and report the results of S&T expenditures. A set of illustrative indicators has been provided in Table 18. These can be used to start a database for R&D indicators. Baseline data may be compiled in terms of these indicators and targets may be set to for the Perspective Plan. Currently, there is no baseline data which could be used for setting the targets.

Table 18.1: An illustrative list of R&D indicators*

Input	R&D intensity of firms, R&D expenditures by public and private research agencies, R&D expenditures of government department People employed in R&D in private and public R&D organizations and firms Enrollment of students in tertiary education % of students doing PhD Technology acquisition from international firms/agencies Number of projects funded Number of collaborations between research institutions and between universities and research institutions
Output	Number of new products launched Number of patents, trademarks, business design registrations Share of high and medium-high tech industries in total industrial value added Share of knowledge intensive services in the service-sector value added Share of high and medium tech products/services in exports Number new innovation based start ups World ranking by environmental performance Publication per thousand researchers Business entry rates

* For an extensive list of indicators visit, http://www.oecd.org/sti/sci-tech/34250656.pdf

Source: NCAER based on the existing international practices

18.6 Conclusion

18.6.1 One of the important lessons learned from the experience of the developed world is the pivotal role of innovation in economic development. The build-up of innovation capacities has played a central role in the growth dynamics of successful countries. In developing economies, technological development, the transfer and, when necessary, adaptation of technologies from developed countries can contribute significantly to addressing urgent

developmental challenges such as improving economic competitiveness, providing access to drinking water, eradicating neglected diseases or reducing hunger, promoting green growth.

18.6.2 The Kerala government is committed to addressing the challenges in the areas of health, safety, water, energy, transport, ICT, agriculture , businesses and environment. It also recognises the need to engage with the community to both increase public understanding of the technology and to increase the understanding of technology developers and government about the public's concerns and aspirations. The nature of the challenges requires creation of new networks and a comprehensive State Innovation Policy focusing on a variety of issues and solutions to the unique state specific issues. We propose a transition in the innovation system from its traditional functions to a newer role as an integral part of a larger network and system – the knowledge-based economy. The policy will be developed around four major themes of sustainable development:

- Contribution of innovation to economic growth and well-being
- Inclusive innovation
- Education, skills and human capital
- Environment friendly development

18.6.3 This in turn requires a multi-pillared strategy based on

- Creating knowledge advantage: Knowledge creation, acquisition and networking of research organizations, ICT
- People advantage: Empowering people through education and skills
- Business advantage: Extent of knowledge intensive production in the economy.

******

CHAPTER 19

POWERING THE KNOWLEDGE ECONOMY OF KERALA THROUGH ENTREPRENEURSHIP

Abstract:

Kerala is a traditional economy that is stuck in low-productivity vicious circle. Moreover, presence of weak economic, political and legal institutions prohibits the growth of entrepreneurs. So, entrepreneurship is restricted to trade, transport and tourism, all of which are low knowledge-intensive sectors. The labour scenario in Kerala is also very challenging for entrepreneurs because trade unions are still active here. It is envisioned that Kerala will be a knowledge economy by 2030. The government need to address structural bottlenecks which will promote entrepreneurship. And, in order to target, design and implement entrepreneurial initiatives to achieve optimum effect, government should focus on building an "Entrepreneurial Ecosystem".

19.1 The Background

19.1.1 Entrepreneurs play a crucial role in propelling the knowledge economy by driving innovations, nurturing new skills and capabilities, opening up new markets and spurring growth in new industries. As described in the previous chapter, they are instrumental in commercialising new ideas and raising productivity and employment in all the sectors. Creation of new firms can create benefits for the society as a whole by creating employment opportunities and generating incomes in the hands of the public. So, it is a perfect complement to community-based development. A development scenario is primarily understood as one that is investing more on hard infrastructure-buildings, bridges, roads, transportation networks; hiring labour and employing more capital. But entrepreneurship can work with minimal resources and infrastructure. Entrepreneurship development can be a low-cost, high-impact approach to economic development. Promoting private sector development and entrepreneurship in particular, has thus become a defining feature of development policy in recent years. In a recent UNU-WIDER book titled "Entrepreneurship and Economic Development", William Lazonick[1] compares development in industrial Great Britain and post-war Japan with the technology boom in Silicon Valley. In each of these cases, he argues, the creation and growth of indigenous enterprises was the necessary ingredient for lasting development. He suggests that while investment in education and foreign direct investment may make important contributions to growth, these are insufficient without entrepreneurial activity within the domestic economy.

[1] William Lazonick, "Entrepreneurship and the Developmental State," in Wim Naudé, ed., Entrepreneurship and Economic Development, Palgrave, 2011: 254-270.

19.1.2 Kerala's economy is essentially a wage economy. Entrepreneurship is restricted to trade, transport and tourism, all of which are low knowledge-intensive sectors. Recently, the government has started playing an active role in promoting entrepreneurial skills and infrastructure for encouraging start-ups. However, in a traditional economy that is stuck in low-productivity vicious circles, the government will need to address structural bottlenecks to change the attitude, values and perceptions of the people of Kerala, so as to promote entrepreneurship among them. This Chapter identifies the concerns and issues relating to entrepreneurship development and provides strategic directions towards promoting entrepreneurship.

19.2 Entrepreneurship: The current status

19.2.1 The entrepreneurship movement in India began in the 1960s with the establishment of the National Institute of Small Industry Extension Training (NISIET). NISIET was the first institution to develop an Entrepreneurship Development Program (EDP) model in India. In addition to NISIET, there are four national enterprise development institutions and 14 other regional institutions[2] promoting and developing entrepreneurship in the country through a variety of programmes, mainly in training and skill development. In addition, Entrepreneurship and Business Development Centers are being implemented through select universities/colleges/regional engineering colleges and other institutions/organizations in India. SIDO, NABARD, RBI and EDI also provide support for entrepreneurship development. Entrepreneurship has long been a subject in postgraduate courses in the Indian Institutes of Management (IIM), the Indian Institutes of Technology (IIT), and other engineering Colleges. Tool Rooms under SIDO, Regional Industrial Technical Institutes (ITIs), and Polytechnics in the public sector; and NGOs and social entrepreneurs in the private sector impart technical skills to youth and practicing entrepreneurs in India. Several initiatives by industry associations are also directed towards enterprise promotion. Prominent among them are the Federation of Indian Micro and Small & Medium Enterprises (FISME), the Confederation of Indian Industries (CII), the Associated Chamber of Commerce and Industry (ASSOCHAM), the Federation of Indian Chambers of Commerce and Industry (FICCI), All India Manufacturers' Organization (AIMO), and the Federation of Small Industries of India (FASII).

19.2.3 In Kerala, the Kerala Institute for Entrepreneurship Development (KIED) is a Public Sector Training Institute for entrepreneurs. Further, under the *Student Entrepreneurship Scheme for the Universities, Colleges and Polytechnics in Kerala,* 20per cent attendance relaxation and 4per cent grace marks are provided for students who pursue entrepreneurship and innovation during their studies.

[2] APO (2007) Entrepreneurship Development for Competitive Small and Medium Enterprises, Report of the APO Survey on Entrepreneur Development for Competitive SMEs, Asian Productivity Organisation, Tokyo, 2007

19.2.4 The government is creating, *inter alia*, a Technology Innovation Zone in about 10 acres of land in Kochi, with an initial investment of Rs 100 crore. The zone will house incubators formed in the public-private-partnership model, in areas like data analytics, animation and gaming, nanotechnology and biotechnology. The government is also providing a built-up space of one lakh square feet for a Start-up Village, one of the first incubators in the country to come up in the public-private-partnership model. The Start-up Village aims to incubate 1,000 product start-ups over 10 years and initiate the search for a billion dollar company from a college campus by the turn of this decade. The National Science & Technology Entrepreneurship Development Board (NSTEDB) under the Department of Science and Technology, Govt. of India has also set up 10 Technology Business Incubators (TBIs) across universities in Kerala.

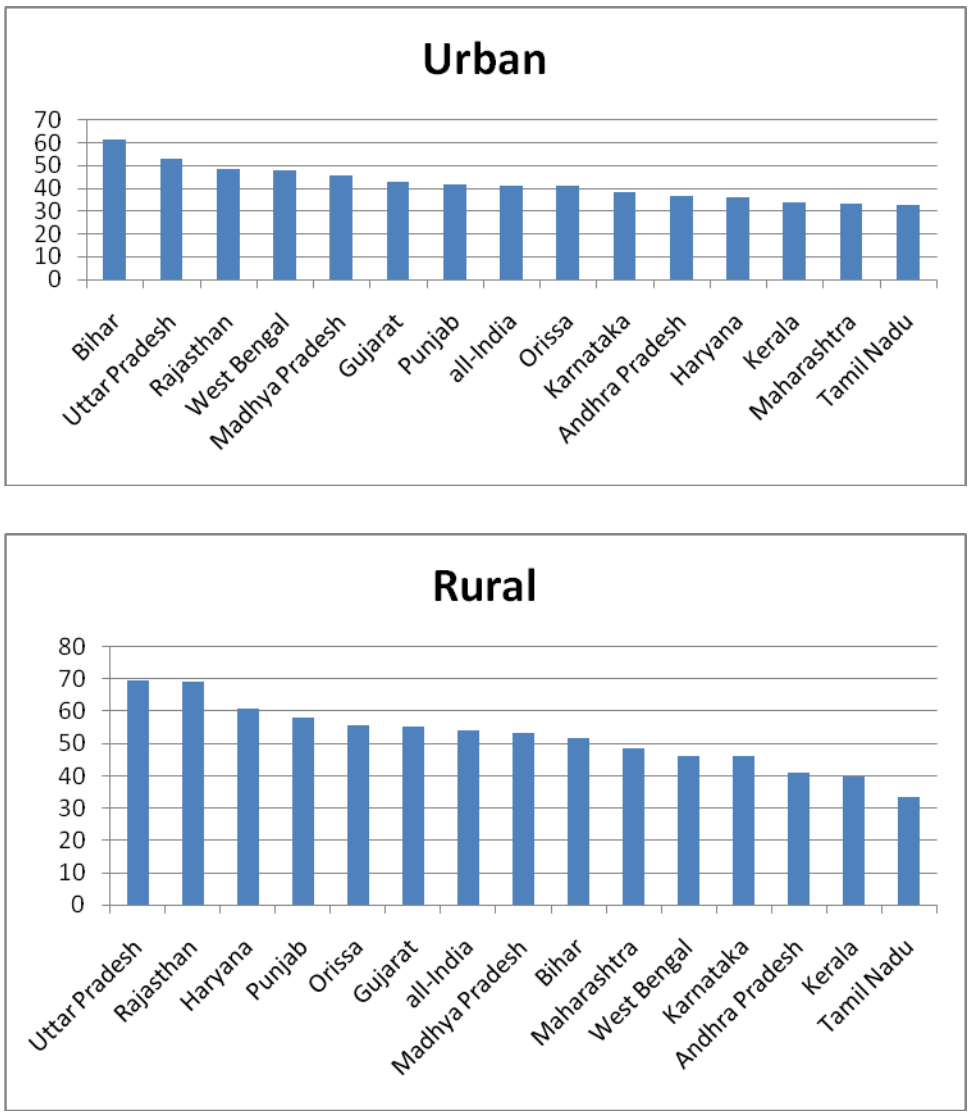
19.2.5 The Kerala State Self Entrepreneurship Development Mission aims at inculcating entrepreneurial confidence among the youth of the State through a process of selecting persons with aptitude and earnestness, training them meticulously and enabling them to avail of finance on easy terms from Banks/Financial Institutions. The youth will be given opportunities in the agriculture and IT sectors. The Kerala Chapter of t**he Indus Entrepreneurs (TiE)**, a global not-for-profit organization, was registered in March 12, 2003 for providing advice, guidance and assistance to budding entrepreneurs by successful & experienced entrepreneurs and professionals.

19.2.6 In rural areas, a Panchayat-level scheme, the Kerala State Self Entrepreneur Development Mission (KSSEDM), aims at providing training and soft loans to 10 select entrepreneurs in each Panchayat up to Rs. 20 lakh to start an enterprise. The project is aimed at educated unemployed youth.

19.2.7 These initiatives notwithstanding, there has been little progress in developing an entrepreneurial economy. The Global Entrepreneurship Monitor (GEM) publishes entrepreneurship indices on an annual basis and ranks select countries on entrepreneurship. These indices are based on entrepreneurial attitudes and perceptions in the respective countries. In addition, it also publishes the rates of nascent entrepreneurial activity, early stage entrepreneurial ownership, and established business entrepreneurs. These indices are not available for Indian states. Entrepreneurship at the state level is most often measured by the ratio of self-employed persons in the total work-force. This ratio does not distinguish between necessity and opportunity-driven entrepreneurship. In the absence of a comprehensive index, however, it is this ratio that is used in literature to measure entrepreneurship. Figure 19.1 presents the proportion of self-employed workforce in the total workforce for 14 major (excluding North-East) states in 19.2.8 India in 2009-10, for both rural and urban areas. Kerala remains among the bottom three states in terms of self-employment ratio in urban areas (above Maharashtra and Tamil Nadu). In rural areas, Kerala is in the bottom two (after Tamil Nadu) in terms of self-employed work-force. Inter-state patterns of self-employment ratios need to be analysed cautiously. They may sometimes reflect the lack of employment opportunities in urban areas and the predominance of agriculture in rural areas. Low-growth states such as Bihar, UP, Rajasthan and West Bengal, for

instance, have been at the top in terms of self-employed work force in urban areas. In rural areas, on the other hand, agricultural states such as Bihar, UP, Haryana and Punjab are at the top with respect to self- employed work force. However, the fact that less than 40per cent of the rural work-force and less than 35per cent of the urban work force is self-employed indicates that the preference is skewed in favour of wage-employment in Kerala.

Figure 19.1: Share of self-employed in total work force for selected states (%) -2009-10



Source: 66th Round, NSS: 2009-10

19.2.9 Kerala is essentially a wage economy. The youth aspire for government jobs due to the social status attached to it. Unless this is resolved in their education system, these tendencies will continue. Due to the low level of legitimacy, young people, with entrepreneurial talents opt for other career opportunities or migrate to distant places in search of greener pastures. This situation needs to be changed for the economy to make transition from traditional to knowledge economy.

19.3 Constraints for Entrepreneurship

19.3.1 Economic, political and legal institutions

19.3.1.1 Evidence suggests that entrepreneurship is negatively influenced by economic policies such as over-regulation, licensing procedures, burdensome bureaucracy in business registration and complicated licensing and permit requirements. Unfavourable business conditions, such as high costs of doing business, weak enforcement of property rights, poor capital markets, lack of access to credit and under-developed markets also impede entrepreneurship.

19.3.1.2 Further, it has been found that characteristics of the political system, such as instability or corruption, public action politics and delays in approvals may play an important role in impeding successful business endeavours. In a survey conducted by the Institute for Enterprise Culture and Entrepreneurship Development, Jaipur (2006), some entrepreneurs opined that sanctions which take just two or three weeks in other states take many months in Kerala. The entrepreneurs in Kerala don't feel that the single-window and green-channel schemes introduced by the Directorate of Industries of the government of Kerala have made any significant difference. Further, in other states, the number of offices that an entrepreneur has to visit for sanctions is much fewer than that in Kerala.

19.3.1.3 The labour scenario in Kerala is challenging for entrepreneurs because trade unions are still active there. Hartals and bandhs may not be violent but they have a financial and psychological impact on the entrepreneurs. If labour problems occur in the take-off stage of an enterprise, it harms the enterprise the most. Hartals, anywhere in the state affect the movement of finished products and raw materials throughout the state. Psychologically,'flash hartals' declared at short notice affect the morale of the entrepreneurs.

19.3.1.4 Kerala, according to the CII-World Bank study of 2002, is ranked 5th among major states in infrastructure penetration, but the quality and serviceability of its infrastructure leaves much to be desired. Though the entrepreneurs are generally positive about the road network of Kerala, most of them complained about the availability and quality of power during the survey. Kerala faces frequent electricity failures and gets power without the requisite voltage. This causes wastage of considerable raw materials and increased wear and tear of machinery, thereby adding to the overall cost of production.

19.3.1.5 The economic, political, and legal institutions that limit the development of entrepreneurship is captured by the "Economic Freedom" index. The "Economic Freedom of the World"(EFW) report is published by the Fraser Institute on an annual basis for select countries of the world. This index is constructed based on 42 variables classified in 5 broad categories: size of government; legal systems and property rights; sound money; freedom to trade internationally; and regulation. According to the *EFW World Report 2012,* India stands 111

among 144 countries. Using a similar methodology, a distinguished group of economists[3] have constructed "Economic Freedom" indices for the Indian states. In Indian conditions, this index is constructed with the help of three sets of variables out of five, as the state governments have the powers to directly impact conditions and institutions. These three variables include: the size of government, legal structure and security of property rights, and regulation of labour and business. According to their estimation, Kerala ranks 10 among 20 states in the overall economic freedom ratings.(Table 19.1) Its lower relative ranking has been attributed to social and economic problems - political instability, high budgetary deficits, low standards of higher education, high unemployment, poor infrastructure, deteriorating public hygiene, spiralling cost of real estate, and a rapidly growing gap between the rich and the poor.

Table 19.1 : Overall Economic Freedom Ratings 2011

	2005	***2005***	***2009***	***2009***	***2011***	***2011***
States	***Overall***	***Rank***	***Overall***	***Rank***	***Overall***	***Rank***
Gujarat	0.46	5	0.57	2	0.64	1
Tamil Nadu	0.57	1	0.59	1	0.57	2
Madhya Pradesh	0.49	2	0.42	6	0.56	3
Haryana	0.47	4	0.47	4	0.55	4
Himachal Pradesh	0.48	3	0.43	5	0.52	5
Andhra Pradesh	0.4	7	0.51	3	0.51	6
Jammu & Kashmir	0.34	15	0.38	8	0.46	7
Rajasthan	0.37	12	0.4	7	0.43	8
Karnataka	0.36	13	0.34	13	0.42	9
Kerala	0.38	10	0.36	10	0.42	10
Chhattisgarh	0.33	16	0.33	15	0.41	11
Punjab	0.41	6	0.35	12	0.39	12
Maharashtra	0.4	9	0.36	10	0.39	13
Uttarakhand	0.33	17	0.26	19	0.38	14
Assam	0.3	19	0.29	18	0.36	15
Uttar Pradesh	0.35	14	0.34	13	0.35	16
Orissa	0.37	11	0.31	17	0.34	17
West Bengal	0.31	18	0.33	15	0.32	18
Jharkhand	0.4	8	0.38	8	0.31	19
Bihar	0.25	20	0.23	20	0.29	20

Source: Economic Freedom Rankings for the States of India, 2012

[3] Laveesh Bhandari, Bibek Debroy, Ashok Gulati & S.S. A. Aiyar (2012) "Economic Freedom of States of India", 2012

19.3.2 *Poor quality of higher education:* Entrepreneurship, as it is defined here, is directly related to technical education. However, as discussed in Chapter 3, the quality of education, in particular, in higher education, is rather low in the state. It encourages passive learning. Students studying in educational institutions are motivated to learn only so as to get the grades and degrees required for jobs. There is therefore, a direct relationship between good quality education and entrepreneurship.

19.3.3 *Organisational structure:* Social welfare and livelihood approach underline the organisation of most economic activities in the state. The share of the public sector is rather large. The public sector can also follow economic principles, but in Kerala this is not so. The underlying principle is employment security. This is offered even at the cost of losing out on technological advancements. In such a scenario, there is no motivation for entrepreneurship.

19.3.4 *Cultural factors:* It is believed that entrepreneurial behaviour is strongly guided by the culture of the people. There are social and cultural factors that discourage people from starting a business. In Kerala's society, high social status is attached to jobs. Most Keralites aspire for high-status government jobs. There is entrepreneurship, but it is necessity-driven and not opportunity-driven. This could also be due to the fact that the economy is stuck in low-productivity vicious circles. Policymakers need to find ways to adjust policy and programmes which will change attitudes about taking risks and entrepreneurship.

19.4 Strategic Framework

19.4.1 It is envisioned that Kerala will be a knowledge economy by 2030. An economy run on knowledge is characterised by a critical role for knowledge-intensive activity and Information and Communication technology (ICT), rather than tangible capital. Wealth creation increasingly depends upon the generation and exploitation of knowledge to create economic value. This requires entrepreneurship. Entrepreneurship makes economies more competitive and innovative and is crucial for achieving the objectives of all sectoral policies.

19.4.2 The **vision** for Kerala's new entrepreneurship strategy is as follows:

> 'Kerala will be a role model for all developing countries in entrepreneurship development.'

19.4.3 In order to target, design and implement entrepreneurial initiatives to achieve optimum effect, the entrepreneurship strategy will focus on building an "Entrepreneurial Ecosystem". The strategy will clearly define the term, "Entrepreneurs" and provide a major thrust to the target group.

19.4.4 Who are entrepreneurs?

19.4.4.1 Entrepreneurship is a rather broad term. As suggested above, it incorporates all self-employed persons. However, for strategic planning, it is important to define the target group. In what follows, we use different approaches to define the target group:

19.4.4.2 Motivation- based approach

a) There are two types of entrepreneurs: opportunity-driven and necessity-driven. The former are very different from the latter. Opportunity-driven entrepreneurs are those who introduce new products and processes to the market. They drive economic change through innovative ideas. They choose to start a business because of a promising void they see in the market and engage in the calculation of potential gain presented by this opportunity. On the other hand, necessity-driven-entrepreneurs are passive replicative agents, who start new businesses similar to those they see around them. For them, business is a way of earning livelihood. Replicative or necessity entrepreneurship is thus driven by the need to avoid unemployment. Without other options for income and without any particularly compelling business idea, these individuals start businesses—almost exclusively replicative—solely intended to produce income for themselves and their families. While necessity-entrepreneurship may lift individuals and families out of poverty, it is the opportunity-driven innovative entrepreneurship which is the key to long-term economic growth. In fact, this differentiation between the two categories of entrepreneurs is considered to be important from the policy makers' perspective. Entrepreneurs are defined by their sense of drive and determination, their willingness to fail and then try again, and their vision for applying their learning in productive ways. Those also happen to be the characteristics of opportunity-driven entrepreneurship.

b) In developing countries such as India, it is found that necessity entrepreneurs make up a large part of the total set of entrepreneurs; this is relatively less common in developed countries. The Global Entrepreneurship Monitor 2012 shows that the rate of necessity entrepreneurship as a percentage of early-stage entrepreneurship is 18 for developed countries, against 28 for upper middle-income countries and 35 for low-income countries. For the Nordic countries, it varies between 6-7per cent of the early-stage entrepreneurship (less than 42 months) per cent in 2012. One reason for high rates of necessity entrepreneurship in developing countries is the size of the informal sector. To avoid unemployment, workers start low-skill, small-scale, subsistence activities and become entrepreneurs. Both these types of entrepreneurs will be covered in this strategy. There is no data base available on the type of entrepreneurs at the state-level. However, it is expected that entrepreneurship is necessity-driven. However, the new strategy will shift Kerala from the passive to opportunity-driven, innovative and dynamic entrepreneurs who choose to be entrepreneurs to drive economic change and not to avoid unemployment. It is recommended that the state should maintain some database on these

indicators in keeping with the international practice and set the target of achieving the developed country standards.

19.4.4.3 Scope-based approach

a) Following William Lazonick, there are three approaches to define the scope of entrepreneurship:

   (i) The first-a functional approach- is concerned with the dynamic actors that make key decisions on investment, production, innovation, location, research and development. From this perspective, entrepreneurship is a psychological trait referring to dynamism, creativity and originality. This approach also includes managers of multi-national firms, state enterprises or non-profit organizations, and a variety of dynamic entrepreneurs within organizations.

   (ii) The second approach focuses on the firm as the key economic actor. The firms included here are owner-operated firms, incorporated joint stock companies, state-owned firms', joint ventures and subsidiaries of multinationals. These firms are the units that make the key decisions on investment, on branching into new activities or sectors, or relocating to other countries. There exists a large amount of literature on firm-level behaviour in developing countries, which examine firm characteristics, including their economic performance, innovative performance, capabilities and business strategies.

   (iii) The third conceptual approach focuses on owner-operated enterprises. Within this approach, the entrepreneur is the person who is both owner *and* is actively involved in running the business. This relates to mainly small and medium-sized enterprises (SMEs), start-ups and the self-employed.

b) From the policy makers' perspective, it is the third conceptual approach which is relevant in the policy on entrepreneurship.

19.4.4.4 Activity-based approach

Two different types of entrepreneurship are covered in this chapter: Business Entrepreneurship (ownership and/or operation of a business) and Social Entrepreneurship (directing/managing not for profit organisations). The former is related to the creation and operation of a business (business oriented), and the latter focuses on initiating change and improvement within society.

19.4.4.5 Age-based approach

a) While there are definitional challenges, variables such as business entry rates and business density are considered to be good proxies for entrepreneurship. The Global Entrepreneurship Monitor (GEM) project views entrepreneurship as a process comprising

different phases, from intending to start, to just starting, to running new or established enterprises and even discontinuing a business. It distinguishes between

(i) Established businesses: Those that have been in existence for more than three and a half years are termed as established businesses.

(ii) Early-stage entrepreneurship: It comprises two separate categories. Start-up activity is measured as *nascent entrepreneurship*, and is counted as the proportion of the adult population that is currently engaged in the process of creating a business. New firm activity is measured as *baby entrepreneurship*, and is counted as the proportion of the adult population that is currently involved in operating a business of less than 42 months.

b) An interesting interpretation of the spread between nascent-corporate entrepreneurship is to treat it as *entrepreneurship potential*. This reflects the spread between potential formal sector entrepreneurs and existing formal sector entrepreneurs. Table 19.2 presents entrepreneurship indices of select countries in 2012. It indicates that the nascent-corporate and baby-corporate spread is the highest in India. This means that there is a large *entrepreneurship* potential in India which remains un-captured. Most nascent and baby firms do not attain maturity.

Table 19.2: Country-wise classification of Entrepreneurship Indices, 2012

Country	Nascent	Baby	Corporate	Nascent-corporate spread	Baby-corporate spread
Australia	7.32	5.58	6.7	0.62	-1.12
Canada	5.88	3.66	6.35	-0.47	-2.69
Denmark	2.68	2.86	6.04	-3.36	-3.18
France	3.47	1.02	3	0.47	-1.98
Germany	3.16	2.31	0.84	2.32	1.47
Greece	3.92	2.54	0.43	3.49	2.1
Hong Kong	1.61	1.58	10.29	-8.68	-8.71
India	5.42	5.31	0.1	5.32	5.21
Japan	0.96	1.21	3.02	-2.06	-1.81
Mexico	4.59	1.36	6.54	-1.95	-5.18
Norway	4.14	4.11	9.69	-5.55	-5.58
Russia	3.46	1.71	4.69	-1.23	-2.98
Singapore	3.33	2.98	3.03	0.3	-0.05
Spain	2.95	2.97	6.9	-3.95	-3.93
Sweden	1.81	2.37	5.02	-3.21	-2.65
Switzerland	3.49	3.71	2.71	0.78	1

Turkey	2.2	4.01	1.25	0.95	2.76
United Kingdom	3.41	3.07	5.01	-1.6	-1.94
United States	8.12	4.98	2.55	5.57	2.43

Note: Numbers provided are the averages for 2003, 2004 and 2005.
Source: Acs, Desai and Klapper (2008).

c) Kerala cannot be better, given the business environment in the state. The strategy will cover both sets of entrepreneurs.

d) The focus of the strategy will thus be on opportunity-driven individuals who intend to create a business, are engaged in the process of creating a new businesses, or have an established business.

19.5 The Entrepreneurial Ecosystem

19.5.1 The entrepreneurial ecosystem encompasses all the elements that entrepreneurs need to thrive on. This ecosystem has six elements (Figure 19.2):

- Personal enablers,
- Financial enablers,
- Business enablers,
- Professional enablers.
- Economic enablers (economic policies and performance) and
- Social entrepreneurs.

Figure 19.2: The Entrepreneurship Ecosystem

Source: Booz & Co., World Economic Forum

19.5.2 In what follows, we outline in detail what should be done to encourage entrepreneurship in Kerala. Appendix tables provide best government practices across the world towards entrepreneurship promotion.

19.5.3 Pillar 1: Personal enablers:

19.5.3.1 Formal education: Investing in entrepreneurial education is one of highest return investments possible.

- Build knowledge, skills (business basics, creativity, responsibility, initiative, sense of achievement), and interest in entrepreneurship.
- Involve real-world entrepreneurs.
- Make accessible entrepreneurship education at universities to all students, also to those in non-business disciplines.
- Promote entrepreneurial spirit amongst trainees in schools and vocational education.
- Ensure that "entrepreneurship" is embedded into the curricula across primary, secondary, vocational, higher and adult education before the 12^{th} Plan ends.
- Promote entrepreneurial learning in an informal or non-formal learning environment.
- Assess the quality of entrepreneurship education in different regions, nationally and internationally, and learn from successful peers.
- Strengthen competencies and skills by intensifying its E-skills actions to improve leadership skills, scientific and creative disciplines, and managerial and entrepreneurial skills to address new technology and markets.

19.5.3.2 Beyond the transfer of knowledge - Towards involvement in entrepreneurship:

a) Effective and practical education, and the promotion of commercial thinking in universities and the media help promote a strong entrepreneurial culture.

- Establish a guidance framework to encourage the development of entrepreneurial schools and VET institutions. Mini-companies run by students at school deliver a realistic insight into the functionality of the economy and stimulate entrepreneurial attitudes.
- Provide active support for developing university-based entrepreneurial ventures: The incidence of this activity has increased considerably in the last decades, particularly in the developed world. These companies explore applications of knowledge beyond the academic remit, which established firms find commercially uncertain or which conflict with their current activities.

- Invite the most innovative projects by the students and help get them commercialised through enterprising universities, in particular, through spin offs. Most reputed Universities in advanced countries have their spin offs multiplying over the years.
- Prepare a guidebook for promoting university based ventures.

b) Box 19.1 and 19.2 provide selected case studies from Europe as an example. See Appendix table 19A.1 for more case studies.

Box 19.1:Experience from EU
Entrepreneurship out of Science: EXIST

EXIST is a program of the German Ministry of Economy and Technology, which is co-financed by the European Social Fund. Its main goal is to sensitize university students and scientific assistants to entrepreneurship. Support is provided in the form of consulting, coaching and infrastructural help. Other goals of EXIST are:

- Spreading of entrepreneurial spirit
- Improving entrepreneurial climate.
- Enhancement of formation of technology-orientated and knowledge-based companies.

Pillars of EXIST

Source: Promoting Entrepreneurial Spirit: Case Studies

19.5.3.3 Motivation

a) Perhaps the most critical issue is lack of entrepreneurship culture. This needs to be changed keeping in view the interests of the future generation. Kerala has a limited number of known entrepreneurial success stories. This is due to the fact that entrepreneurship has not been celebrated as a preferred career path.

b) The following are necessary to improve the entrepreneurship culture in the state,:
   - Improve communication around entrepreneurs' success stories.
   - Improve perception of business failure.
   - Promote career opportunities offered by entrepreneurship.
   - Increase visibility and emphasize the role of entrepreneurship in creating new jobs.
   - Highlight the role of entrepreneurs in providing innovative products.

c) Despite the fact that entrepreneurs create jobs and power the economy, their successes are not presented as role models in the media. For young people, this makes an entrepreneurial career rank rather low in the list of attractive professions and it is a deterrent to those who might want to become entrepreneurs. An important element to change the entrepreneurial culture is thus a change in how entrepreneurs are perceived, through practical and positive communication about the achievements of entrepreneurs, their value to society, and the opportunities of new business creation or acquisition as a career destination. To achieve this, their visibility as role models must be stepped up, taking into account the diversity of entrepreneurial profiles and paths to success.

d) Awareness must be raised through an information campaign, by promoting success stories, contests and prize award schemes to sensitise entrepreneurs on the changing business landscape and new business opportunities. Appendix Table 19A.2 describes leading practices in select countries.

Box 19.2:Estonia: Leveraging the Hype on Skype

Skype, the company behind the famous software application that allows users to make voice and video calls and chats over the Internet, was founded in Estonia in 2003. Estonia's media and government have seized on this story, continuously broadcasting and boasting about Skype's success and lionizing the founders to the point where they have become nothing short of national heroes. This hype has inspired a wave of entrepreneurs to create their own ventures in a country where the start-up scene is still in its early stages.

Two of the many organizations supporting these Skype-inspired start-ups are: Tehnopol Science Park and the Estonian Start-up Leaders Club. Technopol Science Park is a business incubator that provides facilities and services for start-ups' business development needs, including assistance in drawing up business plans; access to money, partners and clients; mentoring; and business development. The Estonian Start-up Leaders Club allows aspiring entrepreneurs to share experiences and best practices on managing early-stage start-ups, develop and expand their business network and promote entrepreneurship in Estonia by growing the community of start-up founders.

Source: Accelerating Entrepreneurship in the Arab World, World Economic Forum, 2011

3M: Encouraging Home-Grown Innovation

Since its foundation over a 100 years ago, 3M has invested billions of dollars in R&D and developed formal policies to encourage employees across the enterprise to pursue innovation. Leaders vocally support innovation and entrepreneurship, create networking opportunities for employees to discuss projects and ideas, and allow employees to spend up to 15per cent of their time working on their own projects. Employees who make breakthroughs are publicly acknowledged and rewarded with vacations and bonuses.

Source: 3M: 2013 Sustainability Report

19.5.4 Pillar 2: Financial enablers: Micro Finance; Venture capital, institutional loans, Government programmes

19.5.4.1 Without adequate funding and without liquidity, no business can operate, invest and grow. Access to finance is one of the levers for growth for SMEs. But entrepreneurs particularly have difficulties raising finance in the early stages of their businesses. There is need to explore innovative mechanisms and routes to fund new entrepreneurs (Appendix 19A.3 for best government practices in selected countries)

a) Government funding

- Financing investments of innovative start ups is one of the most confounding problems for the small sector. It is hard for small innovative firms to obtain funds because of the inherent riskiness of such projects, information asymmetry and market failures. There is a growing global recognition among the policy

makers that public support to financing SME research is critical. Financial support for testing, demonstrating and piloting new technologies, incubators and loans for high potential SMEs are some of the areas where action is possible.

- Directly fund the most innovative project through competitive bids. The Small Business Innovation Research (SBIR) initiative is perhaps the most successful example of government funding of innovative ventures. As discussed in the previous chapter, this scheme may be instrumental in promoting both innovations as well as entrepreneurship.

- Promote capital markets for the trading of shares of SMEs.

b) Promotion of venture capital funds and micro finance

- An important component of a successful entrepreneurial ecosystem consists of an array of early stage investors (venture capitals and business angels) that provide seed and first round equity investments. These investors use an extensive network of peers and provide valuable knowledge and support about the market and the development of the venture "smart money". These investments may be spurred by fiscal incentives, working with investors in order to increase the flow of venture capital, and crowd-funding into web start-ups.

- Kudumbashree can play a role here by expanding its scope to promote high end women entrepreneurs.

Some of the successful examples of funding are provided in Box 19.3.

Box 19.3

U.S.: Small Business Innovation and Research

The U.S. Scheme of "Small Business Innovation Research"(SBIR) funds the critical start up and development stages and it encourages the commercialization. Since its enactment in 1982, as part of the Small Business Innovation Development Act, SBIR has helped thousands of small businesses to compete for federal research and development awards and introduce new technologies, products and services which, in turn, stimulated the U.S. economy (Qian and Haynes 2012[4]). This scheme has been instrumental in promoting the high-risk, high-growth dynamics of entrepreneurship.

Source: Qian and Haynes(2012) Beyond Innovation: The Small Business Innovation Research Program as Entrepreneurship[1] Policy

http://papers.ssrn.com/sol3/papers.cfm?abstract_id=2140096

Chile: Paving the Way for Foreign start-up entrepreneurs

In the 1990s, Chile's entrepreneurial environment was weak with little foreign participation. But a series of government reforms in the 2000s opened the door to foreigners and welcomed their ideas, jump-starting several key industries. Chile is trying to build on this success with programmes geared specifically towards entrepreneurship. In 2010, the government announced it would pay 10 entrepreneurs US$ 40,000 and give them free living and office space in Chile for six months while they worked on a business venture. This programme and others have had a snowballing economic effect. In 2011, 110 start-ups from 28 countries were given permission to open their doors in Chile and 300 more are expected to do so in 2012. Chile now ranks as the most competitive country in Latin America (and the 30th globally).

Source: Start-Up Chile: Cultivating the entrepreneurial spirit on a global stage **,** The Chilean Economic Development Agency, October 30 , 2012

Foras: A VC Fund Thinking Outside the Box

In Saudi Arabia, a select group of successful businessmen, with the support of the chamber of commerce and industry, is in the process of launching a multi-purpose venture capital fund called Foras. Created as an independent investment company, Foras will shepherd young companies into the complex business environment. More specifically, it will finance entrepreneurs and support them as they build their start-ups; turn around mismanaged enterprises; fund SMEs with growth potential; and co-invest in medium-to-large capital projects through special purpose funds. The fund is led by prominent Saudi and international businessmen. In addition to financing, Foras will provide facilitation (facilities, equipment, professional services) and planning services (advisory, business planning, feasibility studies).

Source: Accelerating Entrepreneurship in the Arab World, World Economic Forum, 2011

Commercial Microfinance Bank

In many countries there has been an evolution in the microfinance framework. Microfinance has been taken within the fold of commercial banking. In Yemen, for instance, Al-Amal Microfinance Bank, the region's first commercial microfinance bank, is a major success in this direction. Traditionally, investors and banks have stayed away from start-ups run by someone under 30 years - deeming leadership too immature and the venture too risky. But it is precisely this age group that has made Amal Microfinance Bank the fastest growing microfinance bank in the region, propelling job growth along the way.

Source: Accelerating Entrepreneurship in the Arab World, World Economic Forum, 2011

19.5.5 Pillar 3: Environmental enablers:

19.5.5.1 Improve business freedom: Currently Kerala is 10^{th} among 18 Indian states in terms of business freedom. Critical issues are: a non-operational single window, long delays in approvals and clearances, frequent strikes, legal, administrative, and tax provisions. Chapter 10 discusses how business environment may be improved. It proposes to implement SMART business

regulations and best practices in this regard (See, Appendix Tables 19A.4 and 19A.5 for case studies).

19.5.5.2 Business organisational transformation: A necessary condition for promoting entrepreneurship is a systematic, growth driven process of organizational transformation in Kerala. There is a need for systematic attempts to drive transformations in the organizational form of economic activity in the economy. The classic cooperative model needs to be carried forward to incorporate elements of corporatisation. The livelihood approach should give way to efficiency and competitiveness. Each sectoral chapter in this report underlines the importance of change in the way economic activities are organised and proposes alternative forms of organisations to trigger competition and elements of entrepreneurship. Organisation does not mean ownership. It means the motivation and approach underpinning the economic activity.

19.5.5.3 Promote competition: A protected economy offers no incentive for entrepreneurs. It becomes a breeding ground for necessity or replicative entrepreneurs. This affects innovations and knowledge production rather adversely. Clearly, the government needs to promote competition in the economy by lowering entry and exit barriers (Box 19.4 for the Korean experience).

Box 19.4: SMEs in Korea: A case study

In Korea, the SME sector which accounts for 99per cent of enterprises and 88per cent of employees, aims at ensuring sustainable growth for the future. The Small and Medium Business Administration (SMBA), founded in 1996, has been a major policy player in promoting the growth of SMEs and the Korean economy at large. SMBA applies more than 100 SME promotion measures. Recently there have been noticeable changes in SME policies of Korea. Over all, the policy concept for SMEs has been directed towards competitive SMEs and away from protection of the weak. Transforming traditional SMEs to high-growth SMEs – in Korean policy terms: "inno-biz" and "global stars" – are the new policy focus. Furthermore, a new category of "mid-sized enterprises" with 300 to 1,000 employees is to be introduced for policy purposes. Korea's SME policies have supported the increase in the SMEs' R&D activity and thus their competitiveness The policies have also supported the growth of the venture business.

Source: SMBA Webiste
http://eng.smba.go.kr/eng/index.do

19.5.6 Pillar 4: Professional enablers:

19.5.6.1 Professional services: Vital professional services can be provided to increase the success rate of new enterprises. Effective support consists of holistic programmes that integrate the essential elements like management training, R&D coaching, and networking with peers, potential suppliers and clients. Entrepreneurs increasingly need advice and support for resource availability and markets for the final products. Many smaller enterprises are also under increasing pressure from the companies to which they supply to meet new standards and design

requirements linked to improved resource efficiency, recyclability or international obligations. There is need to disseminate information about the legal frameworks and policies: and support the networking and exchange of information between agencies providing these services. The Rwandan experience sheds light (Box 19.5) in this regard.

Box 19.5 : Rwanda: Building a Coffee Industry

In 2001, after years of war, the coffee production in Rwanda was falling and was rated below Grade C, the lowest quality level according to international standards. Prices were low, as were the farmers' incomes. The government realized that the country was not leveraging its natural resources and strengths correctly, and that something was needed to be done. That year, the president launched the Rwanda National Innovation and Competitiveness initiative which, in turn, developed several initiatives including the "National Coffee Strategy". Subsequently, the government committed US$ 70 million in three main areas: product development, marketing and promotion, and institutionalization.

Among the initiatives, was one known as "Sustaining Partnerships to Enhance Rural Enterprise and Agribusiness Development" (SPREAD). SPREAD is an alliance of US and Rwandan universities: US and European industries, Rwandan enterprises and institutions: and US and Rwandan NGOs funded by USAID. It helped establish links with over 40 international buyers and coffee roasters, and Rwanda's coffee is now increasingly regarded as a gourmet product. The result has been dramatic: coffee exports now represent more than one-third of Rwanda's export revenue and are growing fast. The value of coffee exports in 2010 exceeded US$ 69 million, as compared with US$ 39 million in 2009. Farmers have enjoyed higher incomes and they can now invest more on improving quality and taste. The entrepreneurial success of these farmers has had positive spillover effects in the local economy, spawning new cafes and factories to treat coffee beans.

Source: New Agriculturist Website
www.new-ag.info

19.5.6.2 Professional services through ICT: Professional services delivered through ICT

- Foster the growth in knowledge base on major market trends and innovative business models, by establishing online Market Monitoring Mechanisms.
- Facilitate networking to support new business: This can be achieved by creating a "Mentors' Network" for training, providing advice and hands-on coaching on how to do business in the digital age, and facilitating "match-making" events among stakeholders to explore new partnerships.
- Launch specific actions for Web entrepreneurs: These will include: a Start-up Partnership to unlock expertise, and providing mentoring, technology and services;

fostering web talent by stimulating the emergence of Massive Online Open Courses; and the setting up of platforms for mentoring and skill building.

Box 19.6:Taiwan: Bringing Entrepreneurs Back Home

The Taiwanese government began a concerted effort to build its entrepreneurship ecosystem in the 1980s. The government organized a series of forums and conferences, invited Taiwanese people working in US technology companies to attend, asked their advice about how to improve the entrepreneurial environment and then launched a series of initiatives based on their collective recommendations. For example, the government created Hsinchu Science Park to convince talent who had set up their companies abroad to return to Taiwan and establish their companies locally. This one park attracted about 350 immigrant Taiwanese per year from the US and as on 20 August, 2013 housed more than 485 high-tech companies, representing about 10per cent of Taiwan's GDP. Overall, the government's attempt to attract Diasporas was dramatically successful: from 1988 to 1998, more than 4,000 Taiwanese engineers returned to Taiwan to start their own businesses and economic activity surged..

Source: Accelerating Entrepreneurship in the Arab World, World Economic Forum, October 2011

19.5.6.3 Networking associations

- Bring together web entrepreneurs and strengthen the web entrepreneurial culture.
- Promote clusters, business networks and other types of associations of enterprises which can provide such supportive environments.

19.5.6.4 Incubators

Technology/Business Incubation is an institutional mechanism to develop an atmosphere for innovation and entrepreneurship; for active interaction between academics and industries; for sharing ideas, knowledge, experience and facilities; and for the development of new technologies and its rapid transfer to industries through the setting up of start-up companies in the emerging areas of technology. In the early 21st century, both industrialized as well as industrializing countries are arguably poised on the threshold of a major economic transition from manufacturing-based economies to knowledge-based economies. Business incubators are increasingly being adopted in order to overcome some of the weaknesses in institutional environments, to maximize the chances of success. Akçomak sets out eight dimensions of good incubator policy including:

1. Clarity of mission and purpose;
2. Clear selection, entry and exit criteria;
3. Managerial capacity and incubator management skills;

4. Engagement in constant monitoring and performance evaluation of participating firms;
5. Strategic selection of services;
6. Minimizing startup costs and red tape;
7. A focus on intangible services rather than tangible services, such as office space or infrastructure; and
8. Promotion of networking as a deliberate strategy and finally financial sustainability. Incubators should eventually become financially self-sustaining.

19.5.6.5 New horizons: Reach out to and mobilise untapped entrepreneurial potential among

- Women
- Senior citizens
- Migrants

19.5.7 Pillar 5: Economic enablers

19.5.7.1 Economic competencies and their structures are vital for entrepreneurship. The mismatch between economic growth and structural change in the economy is a dampening factor for entrepreneurship. Unless a high return on entrepreneurship is ensured, people will look for employment. The demand-side policies should facilitate the emergence of vital and sustainable market conditions that ensure returns on entrepreneurship by:

- Implementing the proposed knowledge-driven, sustainable development strategy: As the economy makes the transition from a traditional to a knowledge economy, there will be increasing returns on knowledge, ideas, innovation and in turn entrepreneurship.

- Offering tax benefits to start-ups: Currently, the government is offering tax concessions on the basis of sector or location. It is proposed here that knowledge-based startup companies should be offered tax holidays for a specified period of time. This will enable their growth. A ten-year tax holiday was instrumental in promoting IT start-ups in the early 2000s.

19.5.8 Pillar 6: Social Innovation and Entrepreneurship

19.5.8.1 Social entrepreneurship can be defined as entrepreneurship that aims to provide innovative solutions to unsolved social problems. Therefore, it often goes hand in hand with social innovation processes, aimed at improving people's lives by promoting social changes. Social entrepreneurs use an entrepreneurial approach in their primary mission to tackle social problems. There has been a proliferation of social entrepreneurs across the world. Yet, their importance is underestimated. Two proposals are made here:

- Scope of entrepreneurs should be extended to include social entrepreneurs: HarVa for instance is a "for-profit organization". It stands for "Harnessing Value" of rural India. It is a rural start-up, that primarily focuses on skill development, BPO, community-based farming and microfinance. Its model focuses on the vast intellectual and infrastructural capital in the interiors, by developing several productive communities that enhance the intrinsic value of villages. Currently it is working in Haryana and other Northern states.

- Social entrepreneurs need to be developed to supplement the governments' initiatives to promote entrepreneurship**.** Social entrepreneurs are instrumental in designing and implementing innovative programmes to promote entrepreneurship. Some case studies are presented in Box 19.7. The Kerala government may draw on these experiences.

Box 19.7:Wadhwani Foundation

The mission of the foundation, which was set up in 2000 by an NRI entrepreneur, Romesh Wadhwani, is to accelerate economic development in India and other emerging economies through entrepreneurship and skill development. The foundation focuses on four areas: entrepreneurship, innovation, skills colleges and policy. Today, about half a million students are getting exposure to entrepreneurship through the foundation's programmes and they are starting their own companies. In 2010-11, 500 students created 230 companies.

Source: Wadhwani Foundation Website

www.**wadhwani-foundation**.org/

INJAZ al-Arab: Educating nearly a Million Entrepreneurs

INJAZ al-Arab, led by the Young Global Leader, Soraya Salti, provides education and training to Arab youth in work readiness, financial literacy and entrepreneurship. Supported by corporate volunteers and working closely with regional ministries of education, the organization aims to equip students with practical business-related skills as part of the regular educational curriculum. Since its inception in 2004, INJAZ al-Arab's programmes have reached 900,000 youth. In 2010 alone, INJAZ al-Arab reached 230,000 youth and engaged 14,000 volunteers. A national board of directors leads each INJAZ country operation and includes a total of 250 chief executive officers, with the INJAZ al-Arab regional board being responsible for directing overall strategy and organizational governance. These bodies include the region's top business leaders who share a common ideal for Arab youth.

Source: Accelerating Entrepreneurship in the Arab World, World Economic Forum, October 2011

Wamda: Connecting Mentors and Entrepreneurs

Wamda was created in 2010 by the private equity group, Abraaj Capital and its subsidiary Riyada Enterprise Development. It focuses on fostering of early-stage entrepreneurship in the region by inspiring, empowering and investing in local entrepreneurs. It offers four pillars: content relevant to entrepreneurs (e.g., breaking news, online videos, webinars, courses, research and surveys); services and tools (e.g., a start-up kit as well as access to business development, legal, PR, recruiting and marketing services); funding (e.g., seed investments and access to angel investors); and networking (e.g., events, mentors and incubators). .

The Lebanese entrepreneur and Young Global Leader, Habib Haddad, who now heads Wamda, says that one offering in particular could significantly improve the entrepreneurial ecosystem in the MENA region viz., Mentor Match, an online platform to connect mentors and mentees and help them build lasting relationships. Given the right environment and alignment of interests, Haddad says successful entrepreneurs, especially expatriates who have thrived abroad, will enthusiastically support aspiring entrepreneurs in their home countries as a way of giving back.

Source: Accelerating Entrepreneurship in the Arab World, World Economic Forum, October 2011

19.6 Conclusion

19.6.1 Entrepreneurs have a crucial role in determining the future prosperity of Kerala. The entrepreneur is someone who drives forward several forces that together stimulate economic growth, such as encouraging innovative technology, offering opportunities for young people, alleviating poverty, and making a positive impact on society. While entrepreneurship is a private sector phenomenon, the government can play a crucial role in promoting an entrepreneurial ecosystem that is conducive to growth. This in turn requires promotion of an entrepreneurship culture by increasing the visibility and emphasizing the role of entrepreneurship in creating new jobs, sparking innovations, and reducing poverty; promoting the perception of entrepreneurship as a career option right from primary school onwards; mainstreaming entrepreneurship in university education; providing specialized training assistance; exploring credit guarantees and banking support; strengthening venture capital and angel investors; offering a direct support scheme; designing impactful, stable and multi-model incentives for entrepreneurs; providing single- window services; simplifying taxes and regulations; and providing professional support through incubators.

****

Appendix Tables: Selection of global leading practices

Table A19.1 EDUCATION AND TRAINING

Small Business Internship Programme (SBIP): Canada The Small Business Internship Programme (SBIP) provides SMEs with financial support to hire a post-secondary student intern to assist them in their adoption of e-business strategies so to increase their productivity and competitiveness. In total, the program assists in the hiring of about 400 student interns annually, to help with information and communications technology projects.
The Impact Microcredit competition : Canada The Impact Microcredit competition is a unique, action-oriented competition that gives secondary school students all across Canada the chance to be entrepreneurs, while raising money for charity. With just one week to do so, teams of three to five attempt to multiply the CAN$100 provided by Impact Microcredit as seed funding, to the maximum possible extent, and donate all of the proceeds to the team's charity of choice. This is a chance for students to prove themselves and win over CAN$10,000 for themselves and their school.
Yuan1.6 billion funds for college students: China The Chinese Government and universities decided last year to create a Yuan 1.6 billion (US$2.44 million) fund to foster innovation and entrepreneurship among domestic college students.
KAB (Know About Business) Programme: China The International Labour Organization (ILO) has developed KAB, which consists of training modules and teaching material for providing entrepreneurial education to university students. In collaboration with the All-China Youth Federation (ACYF), the pilot project was adapted in line with the Chinese National Education Framework. Training of Facilitators (TOF) is an important aspect of the KAB programme. The project aims to adopt KAB in secondary vocational schools in China.

Japan Entrepreneurship Education Network for Higher Education: Japan

The Japan Entrepreneurship Education Network for Higher Education was established in May 2009. The Network implements programmes and events that complement and enhance entrepreneurship education, including a model lecture programme, a visiting lecturers' programme, national entrepreneurship education events and visits to attend lectures at leading schools. Most of these programmes and events aim at university teachers.

Young Entrepreneurship program (YEP): South Africa

This programme gives an opportunity to 25 South African youth graduates, or business owners with a strong business plan, to travel to the US and work with mentors there for six weeks in order to acquire the skills required to set up their own ventures. The one-off fee of R860 is paid by the organizers. The National Youth Development Agency (NYDA) is a prime sponsor for the program, which provides a cross-cultural learning experience, involving both classroom and practical training

Table A19.2 ENTREPRENEURSHIP CULTURE

Canadian Innovation Commercialization Programme (CICP) : Canada The Canadian Innovation Commercialization Program (CICP) is a CAN$40 million initiative. The targets are SMEs, which are an important component of the Canadian economy. Created to bolster innovation in Canada's business sector, the CICP helps companies bridge the pre–commercialization gap for their innovative products and services.
The Accelerator Centre : Canada The Accelerator Centre was established to accelerate the creation, growth and maturation of sustainable new technology companies; to promote commercialization of research and technology coming out of academic institutions; and to generate economic benefit and enhance the strategic importance of the Waterloo Region within Ontario and Canada's broader economy.
The Young Chinese Entrepreneur Award: China The Young Chinese Entrepreneur Award was jointly set up by the China Communist Youth League and the Ministry of Human Resources and Social Security. This award targets entrepreneurs aged 18 to 40, who start businesses themselves from scratch, and have a deep sense of social responsibility. The award may be given to a wide variety of businesses, ranging from media and high technology to animal husbandry. To inspire more people, the Award Organizing Committee publishes the accomplishments of the prizewinners and arranges a lecture tour of China for them.
Teng Fei Award: China The China Western-Returned Scholar Entrepreneur, or Teng Fei Award, was designed to honor and reward overseas–educated Chinese, who had returned to China and grown into enterprise leaders.
Erasmus for Young Entrepreneurs: EU Erasmus for Young Entrepreneurs is a project initiated by the European Union. It aims at helping new entrepreneurs acquire relevant skills for managing an SME, by spending time in an enterprise in another European Union country. It contributes to improving their know-how and fosters cross-border transfers of knowledge and experience between entrepreneurs.
Innovative Regional Growth Cores : Germany The Innovative Regional Growth Cores programme (German: Innovative regionale Wachstumskerne) started in 2001 with the aim of effectively using and developing existent

competences and potential in the New German Länder. It supports alliances of businesses, universities and research institutes, which either already possess a joint, specific platform technology in their region, or have the potential to develop one.

Trade related Entrepreneurship Assistance and Development (TREAD): India

The scheme encourages economic empowerment of women through development of their entrepreneurial skills in non-farm activities.

Saudi Fast Growth 100 : Saudi Arabia

This is a national programme to promote entrepreneurship and innovation in Saudi Arabia that ranks the fastest-growing emerging companies in the Kingdom. The programme and its list of companies are decided by the Saudi Arabian General Investment Authority's (SAGIA) National Competitiveness Center with their joint founding partners, Al-Watan newspaper and All World Network. The selection criteria is based on international standards of competitiveness, originally developed by the Inc. Magazine to create the Inc. 500. The winning companies are divided into two categories: Saudi Fast Growth 100 and Saudi Fast Growth 100 Start-Ups.

Bizjam: South Africa

A business networking portal for young entrepreneurs, where they can find potential buyers and sellers for their products. This network also facilitates identification of potential target markets and sources of capital. Business plans and ideas can be discussed with other entrepreneurs. Bizjam facilitates various forums such as road shows, meetings and Bizjam Fridays. NYDA of South Africa is its official sponsor.

Future 100: South Africa

This is a motivational program to acknowledge and promote young entrepreneurs in South Africa. SAYCC and NYDA, which are the sponsor bodies for this program, determine the selection criteria. This national program targets young entrepreneurs, aged 18–35 with inspiring stories of success in business. The overall winner walks away with a CEO award of R100,000.

Startup America Partnership: US

The Startup America Partnership is focused on bringing the private sector together to maximize the success of America's entrepreneurs and also to maximize America's competitiveness in an increasingly global world. Through quality resources provided by its partners, it aims to help more start-ups smartly to grow their organizations, expanding from dozens of employees to hundreds, and ultimately thousands, to eventually become high-growth firms.

Table A19..3: ACCESS TO FUNDING

Argentina The PR.UEVE aims to encourage technology-based companies that can gain value from applied knowledge. Innovative ideas in products, services, production processes and management, which result in the formation of technology companies, are supported through this programme. Business plan competitions are held and the winners are given support in the form of training and access to grants and loans.
France The SME development bank (OSEO) aims to provide entrepreneurs access to debt markets. In 2010, OSEO-BDPME provided €10 billion, guaranteeing loans of more than 80,000 entrepreneurs. OSEO is headed by a public sector holding company and reports to both the Ministry for the Economy, Finance and Industry and the Ministry for Higher Education and Research.
High-Tech Gründerfonds: Germany This is a public-private VC fund that invests in technology companies at the seed stage. The fund has a value of about €272 million and invests in companies that implement promising research results in industry. The start-up companies receive up to €500,000 each. Fields of support are provision of financing, team-building, knowledge transfer and building of networks
India: Technopreneurship Promotion Programme (TePP) The TePP is India's largest network program supporting independent innovators. The Department of Scientific & Industrial Research, in the Ministry of Science & Technology, runs it. The network, with its 30 outreach centres spread across the country, provides grants, technical guidance and mentoring support to independent innovators. The purpose of this support is to enable innovators to emerge as entrepreneurs, by incubating their ideas and enterprise. The support is provided in two phases: innovation incubation of up to about US$30,000, and enterprise incubation of up to about US$90,000. The TePP provides an opportunity to innovators to fail. The TePP is also the only program that funds the innovator directly, without any repayment obligation. It gives all the rights of on intellectual property ownership and technology commercialization to innovators. It is exclusively aimed at non-IT, non-software entrepreneurs or inventors. The most important condition is that the idea must have a commercial application.

Indonesia: Kredit usaha rakyat (Kur / credit for people's businesses)

This is a programme offering credit facilities that are guaranteed by the Government in cooperation with several local banks. The objective of the KUR programme is to accelerate the development of primary sectors, to empower small-scale businesses, to improve their accessibility to credit and financial institutions, reduce poverty levels and expand job opportunities. KUR may be in the form of working capital or investment loans, with a maximum of Rp500 million (US$60,000) given to micro, small, medium and cooperative-formed units, by a credit insurance company.

Italy: Self-employment

A set of funding measures was put in place in 2000 to favour projects involving self-employment opportunities among the unemployed and those looking for their first job. The projects include: self-employment (projects with investments up to €25,000), micro enterprises (investments up to €130,000) and franchising projects with qualified franchisors. The support is provided via a free grant, special term financing and technical advice. This measure is managed by Invitalia, a government agency specifically intended to favour foreign direct investments and growth of local entrepreneurs.

Japan: Credit Guarantee Corporations' (CGCs') system of sharing of responsibilities with financial institutions

Launched in October 2007, this scheme was introduced to provide an appropriate sharing of responsibilities between the CGCs and the financial institutions. It took a system in which the CGCs had, as a rule, assumed 100per cent of the credit risk, and turned it into a system in which financial institutions were required, in principle, to assume 20per cent of the risk, to foster access to business loans for SMEs. In 2009, about four million SMEs benefited from CGCs.

Table A19.4 : COORDINATED SUPPORT

Australia: Enterprise Connect Enterprise Connect is a part of the Department of Innovation, Industry, Science and Research, and its role is to connect the participant's business to knowledge, tools and expertise necessary to improve productivity, increase competitiveness and enable it to fully capitalize on its growth potential.
Australian Business Number (AuB) As part of the Council of Australian Government's (COAG's) regulatory reform agenda, this initiative aims to develop a seamless online registration process for ABNs (Australian Business Number)and business names, including trademark searching. The system will also deliver online business information services and improve ongoing interactions between government and business. The purpose of business name registration is to allow consumers to ascertain who is "behind" a business name.
EU: Enterprise Europe Network The Enterprise Europe Network was launched in February 2008 by the Commission's Directorate-General for Enterprise and Industry. It builds on the (now closed) Euro Info Centre (EIC) and Innovation Relay Centre (IRC) networks, established in 1987 and 1995, respectively. Bringing together close to 600 business support organizations from 49 countries, the Enterprise Europe Network helps small companies seize the unparalleled business opportunities in the European Union's single market. Closely linked with the European Commission, and including chambers of commerce and industry, technology centers, research institutes and development agencies, the members of the Enterprise Europe Network are linked through powerful databases, sharing their knowledge and sourcing technologies and business partners across all Network countries. Services include: "going international," "access to finance," "European Union law and standards" and "intellectual property."
Mexico: Sistema Nacional de incubación de Empresas — national system of business incubation The system comprises all organizations that follow best practices in business incubation and thereby receive recognition by the Ministry of Economy. The system has a nationwide coverage and aims to strengthen the relationships between its members, so that they can exchange experiences, leading to the creation of more competitive companies.
India: The National Skill Development Corporation (NSDC) The National Skill Development Corporation (NSDC) is a public-private partnership that

aims to promote skills development by assisting in the creation of large, quality, for-profit vocational institutions. The NSDC acts as a catalyst in skills development by providing viability gap funding to enterprises, companies and organizations that provide skill training. The NSDC's role is to stimulate and coordinate private sector initiatives in the skills development sector

Russia: RCSME (SME resource center)

RCSME developed a unique service (website and mailing system) for regional business support organizations and SMEs that facilitates information exchange between the regions as well as between federal and regional business support organizations. The system is one of the most helpful and efficient for SMEs and SME support organizations.

South Africa: National Youth Development Agency (NYDA)

The National Youth Development Agency (NYDA) is a South African youth development agency, aimed at creating and promoting coordination in youth development matters. NYDA was formally launched on 16 June 2009 by President Jacob Zuma at a special Youth Day commemoration event, on the merger of Umsobomvu Youth Fund (UYF) and the National Youth Commission (NYC).

Turkey: Support for business development centers

The program aims to increase the productivity and efficiency of business development centers, to create an entrepreneur-friendly environment. These centers act as incubators. KOSGEB, the Small and medium Enterprises Development Organisation of Turkeyprovides financial support in the form of fixed expenses as well as company expenses to these centers.

UK: Local Enterprise Partnerships

The Local Enterprise Partnerships are locally owned partnerships between local authorities and businesses. They play a central role in determining local economic priorities and undertaking activities to drive economic growth and create local jobs. The Local Enterprise Partnerships are better placed to determine the needs of the local economy and also possess a greater ability to identify barriers to local economic growth.

Table A19.5 : REGULATION AND TAXATION

Australia: business.gov.au The business.gov.au website is an online government resource for the Australian business community. Businesses using the site are able to comply with government requirements more simply and conveniently.
Brazil: Individual Entrepreneur Law The Individual Entrepreneur Law aims to help informal sole-trader entrepreneurs (who do not have a share in any other business and who have an annual income of up to R$36,000), to formalize and thereby gain access to social benefits such as pension,, medical aid and workers' compensation. To simplify the registration of these entrepreneurs with the Individual Entrepreneur Law, the Ministry of Development, Industry and Commerce (MDIC), which oversees the development of small businesses, launched an internet portal in 2009, where entrepreneurs looking to formalize can sign up. The Law also reduces the number of steps (from forty-one to seven) that an entrepreneur is required to follow to register. It also reduces the amount of information to be supplied and offers them lower taxation.
Brazil: Lei Geral Policy The Brazilian Government's policy on small businesses is contained principally in Lei Geral, a law that has, among other things, simplified taxes and boosted government procurement for small and micro enterprises. Through this law, small businesses with a turnover up to R$2.4 million are taxed less and receive prioritized government procurement of up to R$80,000.
Brazil: SiMPLES tax regime SiMPLES is a special tax regime for small, medium, and micro enterprises (SMMs) that aims at reducing the tax burden, simplifying tax accessory obligations and combining all Brazilian taxes into one single computation and collection. Brazilian taxes are generally computed based on either the profit or the gross revenue of the company. The tax rate ranges from 5per cent to 25per cent. Under the SiMPLES program, the tax amount due is calculated with a single (and lower) tax rate based on the revenue earned by the company.
Canada: BizPaL (Business Permits and Licenses) BizPaL is an online service that simplifies business permit and license processes for entrepreneurs, businesses, governments and third-party business service providers. Users simply answer a series of questions on their type of business and BizPaL will automatically

generate a list of permits and licenses from all levels of government (federal, provincial, territorial and municipal), with basic information on each, as well as link them to government sites where users can learn more and, in some cases, apply online.

Canada: One Stop Business registry

The Ministry of Small Business, Tourism and Culture and Western Economic Diversification, Canada offer the One Stop Business Registry program. An easy-to-use computer programme, it allows business owners to complete important government applications quickly and efficiently, at one time and at one location.

Canada: Red Tape Reduction Commission

The Government of Canada has created the Red Tape Reduction Commission with the following mandate:

- Identify irritants to businesses that stem from federal regulatory requirements and review how those requirements are administered, in order to reduce the compliance burden on businesses, especially small businesses. The focus is on irritants that have a clear detrimental effect on growth, competitiveness and innovation.
- Recommend options that address the irritants and that will control and reduce the compliance burden on a long-term basis, while ensuring that the environment, health and safety of Canadians are not compromised in the process.

China:Measures to lure potential Chinese entrepreneurs from overseas

Enterprises started by Chinese entrepreneurs, who have returned from overseas, can receive substantial support, such as a proportion of their start-up capital during the start up phase.

EU: Small Business Act for Europe

During the Spring Council of 2006, the national governments agreed to a series of simplifications, to make setting up of a company faster and cheaper anywhere in Europe. These simplifications called for cheaper and faster procedures and instituting a one-stop shop for all administrative procedures required while starting a company. This commitment has been renewed in the Small Business Act for Europe, in which European Union countries have also committed themselves to reducing the time required for obtaining business licenses.

France: One-stop online business registration system

Setting up a company is now much easier, thanks to the one-stop online business registration system (Le Guichet Unique de la Création d'Entreprises). This website, which targets current and new entrepreneurs, helps the setting up a company faster than normal.

France: The "self-entrepreneur" status

The self-entrepreneur status is meant for those who want to operate a one-person business (entreprise individuelle) of a commercial, skilled trade or professional nature (whether full-time, part-time or in addition to any another occupation) and with an annual turnover below:

- €80,000 excluding VAT (2009 level) if the business activity entails the purchase or resale of goods, the sale of goods or services to be consumed on the premises or the provision of accommodation.
- €32,000 excluding VAT (2009 level) if the business is providing services.

Italy: Law 99/2009

Law 99/2009 charges the Government with coordinating all the legislative arrangements related to globalization, including exports, promotion of investments and agreements between public organizations and the bank system using foreign bank services.

Italy: The reduction of Administrative Burdens (Law 133/2008)

This law obliges the Government to measure the administrative costs of all deliverables receivable from enterprises. On the basis of these measurements, plans for simplification or abolishment is to be prepared.

Japan: Revision of angel tax programme

This tax system provides preferential tax treatment to individual investors in companies that fulfil certain requirements when angels invest in or sell the stock of the companies.

Russia: One-stop shop system for new projects

The Nizhny Novgorod region has implemented a start-up scheme to provide guidance for investment projects as well as a one-stop shop system for prospective investors. Nizhny Novgorod is the fifth largest city in Russia. The investment project start-up system is based on the one-stop-shop principle, which means that, to get a land site, the investor has to contact only one office, the Ministry for Investments. With this policy, the new investment projects can minimize the "unofficial relations," which cause unnecessary delays for new projects.

Russia: The Simplified Accounting System

The Simplified Accounting System offers tax advantages for taxpayers who opt for the new system. They file and pay their first-category and global-complementary tax on the basis of their earned annual net income (earnings minus expenses). In this system, one can choose how to pay corporate tax: either 6per cent from the entire turnover or 15per cent from the net income (income minus expenses). In addition, the payment of VAT is not required, and the social funds' expenses from staff salaries will also be reduced twice

Saudi Arabia: "10 by 10"

Saudi Arabia rose from 67th in the World Bank's 2004 'Doing Business' rankings to 11th in the 2010 rankings. To foster new business creation, King Abdullah, in 2005, launched an ambitious "10 by 10" group of initiatives. The aim was to reduce the impact of regulatory burden on start-up companies and to position Saudi Arabia in the top 10 of the 'Doing Business' rankings by the end of 2010. The Saudi Arabia General Investment Authority was formed to monitor the progress and set up a system of key benchmarks to evaluate the implementation of the "10 by 10" initiatives. It was also charged with the responsibility of advocating further reforms.

Source: Entrepreneurs speak out: A call to action for G20 governments, The Nice Côte d'Azur 2011 Entrepreneurship Barometer, Produced for the G20 Young Entrepreneur Summit, October 2011

******

CHAPTER 20
DIASPORA AND MIGRATION POLICY

Due to migration, there is increase in remittances which increase consumption, economic growth as well as have had some salutary effects on the current account balance. However, it constrain the long term growth prospects by creating a resource-curse like situation (Dutch disease) in Kerala. And it has also been observed that remittances reduce the work incentive and entrepreneurship of recipients of remittances in the home economy. In case of permanent emigration, Kerala loses direct benefits from the skills and work of an emigrant forever. Vulnerability of the migrants coming from other part of countries arises due to differences in language, culture, legal protection, social setting and loss of the support system that they have in their native place. The proposed strategy is to mainstream the three categories of migrants: NRKs, return emigrants, and in-migrants, in the development agenda by creating an enabling environment into which the migrants are effectively integrated and able to make significant contribution to the development of the country. The main thrust is therefore, to harness the diaspora (including return migrants) and in-migrants as a resource for development.

20.1 The Background

20.1.1 Whilst migration has long been an inherent characteristic of societies, the last two decades have witnessed the mass mobility of populations around the world. The total number of international migrants has increased over the last 10 years, from an estimated 150 million in 2002 to 214 million persons in 2010[1]. In other words, one out of every 33 persons in the world was a migrant in 2010. Remittances have also increased exponentially; up from USD 132 billion in 2000 to an estimated USD 514 billion in 2012, even with a slight decline due to the current economic crisis. The actual amount, including the unrecorded amount flowing through formal and informal channels, is believed to be significantly large. These remittances offer a vital lifeline for millions of people and can play a major role in an economy's take-off. There has thus arisen a need for a "diaspora strategy" to put in place legal mechanisms to manage the international movement of people and remittances for the mutual benefit of society, migrants and the state. The term "diaspora" has been used to describe people who have migrated from their countries of origin.

20.1.2 Diaspora strategies although traceable back to the 1960s and earlier, have gained renewed attention worldwide in recent years. A diaspora strategy is an explicit and systematic policy initiative or series of policy initiatives aimed at developing and managing relationships with a diaspora. Traditionally, diaspora strategy is conceived as the national policy. But in

[1] World Migration Report, 2011, International Organization for Migration

recent years, different tiers of the state are actively involved in formulating diaspora strategy.

20.1.3 India is the largest recipient of remittances in the world, receiving $69 billion in 2012 which represents over 4% of India's Gross Domestic Product. India is followed by China ($60 billion), the Philippines ($24 billion), Mexico ($23 billion) and Nigeria and Egypt ($21 billion each)[2]. Within India, the major proportion of the expatriate population comes from Kerala. The number of emigrants from Kerala living abroad in 2011 was estimated to be 2.28 million, up from 2.19 million in 2008, 1.84 million in 2003 and 1.36 million in 1998. In 2011, remittance by the NRI population in Kerala was to the tune of Rs. 49,965 crores (as discussed in Chapter 1). This constituted more than 22% of the GDP of the State and more than 60% of the state's public debt. This huge remittance by NRIs from Kerala is the backbone of Kerala's economy, and has remained so for the last three to four decades. The role of diaspora in the development of Kerala therefore becomes increasingly important.

20.1.4 Amidst increasing migration out of the state, Kerala is also facing issues related to return- and in-migration. The global economic recession has accentuated the pace of the return migration from labour receiving countries and it is likely to increase with recent efforts by some countries to localize employment. The complexities involved with the "return migrant" and in-migrants in labour sending societies are multifold. Thus, the policy issues are diverse and a diaspora strategy is perhaps best thought as an overarching framework of providing a level of coherence to the range of initiatives.

20.2 Diaspora in Kerala

20.2.1 Out-migrants

20.2.1.1 Trends and patterns of migrants

a) Kerala had been a net in-migrating state until the 1930s when the onset of economic depression reversed the trends. Increasing educational attainment and better health status made it possible for the young population to seize job opportunities outside Kerala, primarily to other states. Increasing population pressures due to falling mortality rates further contributed to this trend. The lop-sided growth process in the post formation period helped the continuation of the out-migration phenomenon.

b) Initially, a significant part of this migration was to other parts of India. However, in the 1970s as a result of oil boom in Arab countries, a large-scale emigration of unskilled or semi-skilled persons with basic educational qualifications and training began, on a massive scale. Out-migrants thus fall into two categories: emigrants (EMI) or usual residents of a household who had migrated out of Kerala and were

[2] Migration and Development Brief, April 2013, World Bank

living outside India; and out-migrants (OMI) or usual residents of a household who migrated out of Kerala and were living outside Kerala but within India. According to a survey conducted by the government (Table 20.1) in 1980, 5.10 lakh Keralites were working outside the state: 3 Lakh in other states and 2.1 lakh outside the country, in particular in the Gulf countries (1.87 lakh). The number of migrants increased to 6.8 lakh (34% increase) in 1986. Of this, 3.3 lakh (61% increase) were working in foreign countries (3 lakh in gulf countries alone) and 3.5 lakh were working in other states. Over time, the patterns reversed and the increase in the number of emigrants (EMI) outpaced that of those working within India (OMI). In 2011, corresponding to 100 households in the state, there were 29.1 emigrants and 11.9 out-migrants[3].

Table 20.1: Trends and patterns of migrants from Kerala 1980-2011

Year	Emigrants (Lakh)	Migrants to other states within India (Lakh)	Total (Lakh)	% share of emigrants in total migrants
1980	2.1	3	5.1	41.2
1986	3.3	3.5	6.8	48.5
1998	13.6	6.91	20.51	66.3
2003	18.4	11.15	29.55	62.3
2008	21.9	9.14	31.04	70.6
2011	23.3	9.31	32.61	71.4

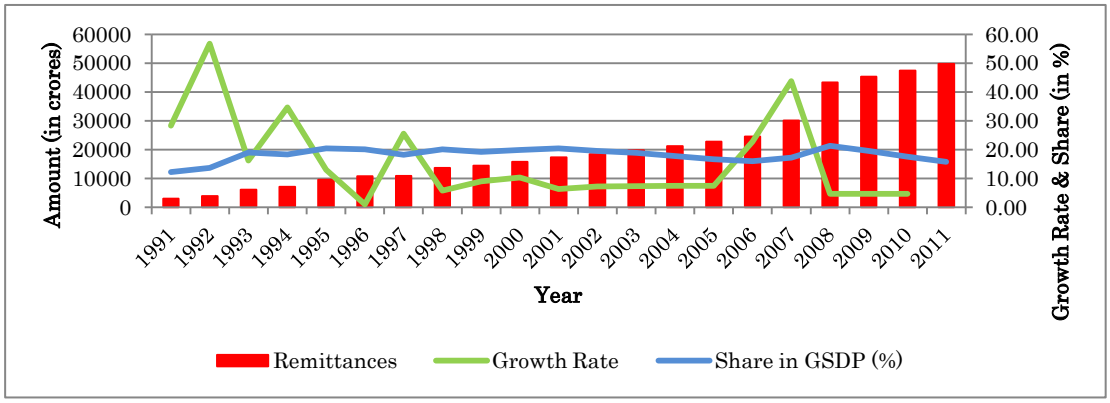
Source: Sekhar (1993)[4] & KMS surveys

20.2.1.2 Remittances

a) Remittances started swelling in the late 1980s. Between 1991 and 2011, remittances grew at a trend growth rate of 16.7%. The share of remittances in the Kerala GSDP increased steadily from 12% to 21% during the same period (Figure 20.1). Average annual remittances per household were Rs. 57,227 in 2008 and Rs. 63,315 per household in 2011.

[3] Zachariah,K.C. and I.S. Rajan (2012) Inflexion in Kerala's gulf connection, Report on Kerala Migration Survey 2011,CDS working paper 450, Thiruvanthapuram.
[4] T.V.Sekhar (1993) Return migrants in rural Kerala , PhD thesis submitted to ISEC Bangalore

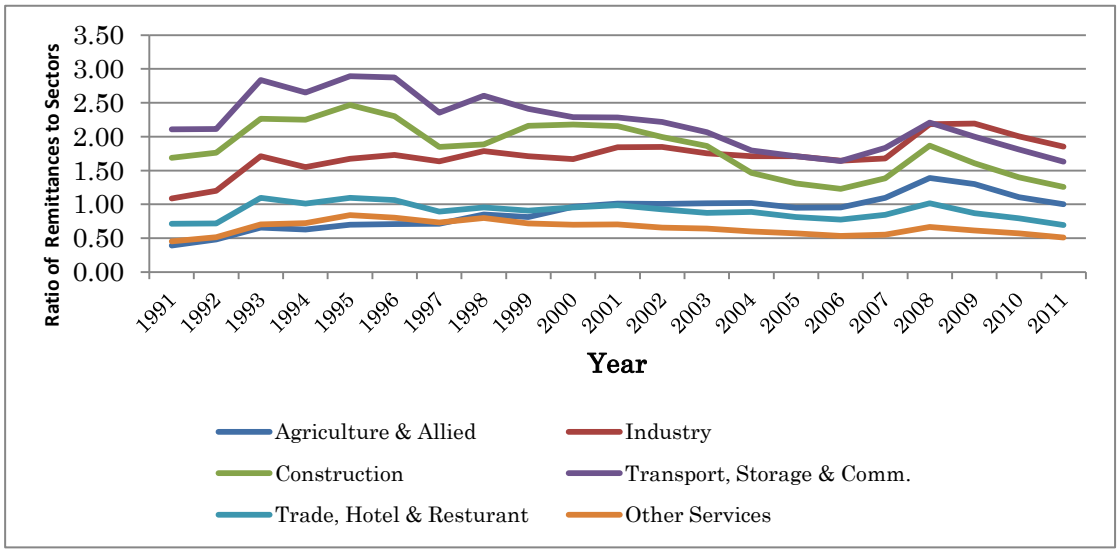
Figure 20.1: Inflows of remittances: 1991-2011



Source: Rajan (2011) & GSDP-Directorate of Economics & Statistics

b) The inflows of remittances have been larger than even the GDP contribution of the whole of agriculture and industry sectors and some of the service sub-sectors. Figure 20.2 presents the ratio of remittances to the sectoral GSDP. It turns out to be greater than one for all the sectors except "other services" (mainly health and education). It hovered around one for "trade, hotel and restaurants". This indicates the potential of "remittances" as a driver of economic development.

Figure 20.2: Ratio of remittance to sectoral GSDP (1991-2011)

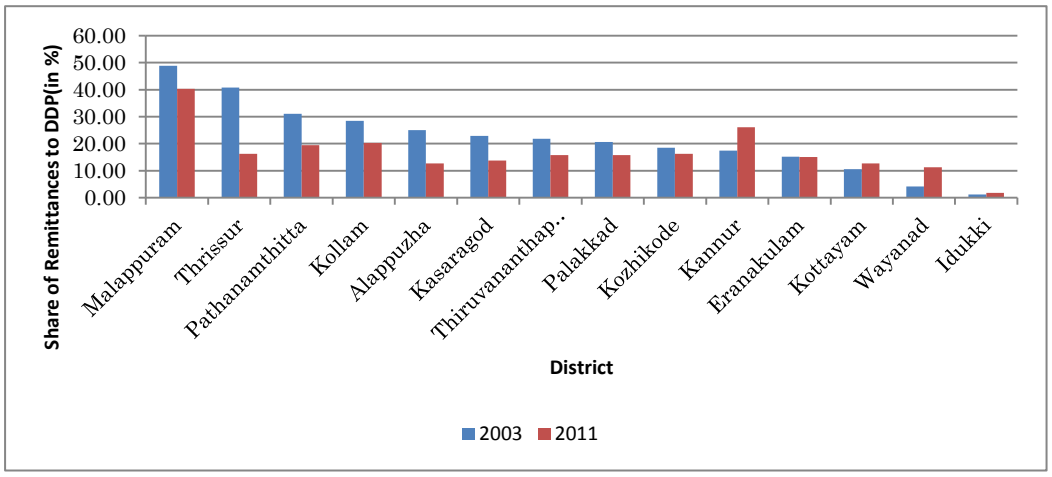


Source: Computations by NCAER based on data-Rajan (2011; Department of Economics & Statistics, Kerala

c) Growth in remittances has been accompanied by spatial diversification of the origin of migrants within the state. The districts that had a low share in remittances in 2003 performed better in 2008, as shown in figure 20.3. The largest number of emigrants

originated from Malappuram district, a position it retained from the beginning. However, its share of the pie has shrunk a bit in recent years, from 21.8 % in 1998 to 17.9 % in 2011. The phenomenon spread to other centres, such as Pathanamthitta, Thrissur, Kannur, and Kasargod. The coefficient of variation in the inflows of remittances has declined from 60% in 2003 to 50% in 2011. There are thus, clear indications of convergence *albeit* weakly.

Figure 20.3: Distribution of remittances by districts: 2003 and 2011 (% in total)



Source: Computations by author based on data- Rajan (2011) & District Domestic Product- Directorate of Economics & Statistics, Kerala

d) Acceleration in the inflows of remittances in the post-reform period was an outcome of the reforms in the foreign currency management system. Prior to the early 1990s, rupee's effective rate was placed on a controlled floating basis. Under this system, the rupee was overvalued due to India's emphasis on import substitution. This discouraged the migrants from remitting foreign exchange to the country through official routes. In 1993, this system was completely replaced by the system of market-determined exchange rate. In 1998, the "Foreign Exchange Regulation Act" was also repealed, which relaxed restrictions on foreign exchange dealings and hence, provided a major thrust to remittances. Another reason for a rise in remittances was the improvement in the profile of migrants. In the 1980s, over 85% of migrants from Kerala to the Gulf countries had only basic level of education, with skills in manual work such as construction, building maintenance, driving and related occupations. In the 1990s, the profile of migrants upgraded (Table 20.2). The share of workers with below-primary education declined from over 48% in 1998 to 5% in 2010, while that of those with above-primary and secondary education increased from 4% to 47% over the same period. This means that the proportion of white collar workers-clerks, typists, store

keepers etc. increased during this period. In 2011, almost half of the migrants were equipped with tertiary education.

Table 20.2: Education status of migrants (in %)

Education Level	1998	2003	2007	2011
Below Primary	5.20	3.00	10.70	9.40
Primary, Below Secondary	54.30	46.70	45.20	49.80
Secondary	30.00	30.90	28.80	22.40
Degree	10.50	19.40	15.30	18.40
Total	100.00	100.00	100.00	100.00

Source: Rajan (2010) & Zachariah & Rajan (2012)[5]

20.2.2 Return migrants

20.2.2.1 Return emigrants have become a demographically, politically and economically significant component of Kerala's population. There are two categories of return migrants. A flow of return emigrants to the state started in the 1980s consequent upon the completion of some major projects, increasing competition from migrants from other Asian countries, fall in wages, and restrictive policies towards migrant workers by the governments of Gulf countries. By 1986 almost 40,000 migrants had returned. By 1998, the number increased to 7.4 lakhs. Return of emigrants from the Gulf countries assumed large dimensions in Kerala in the early 1990s.

20.2.2.2 According Zachariah and Rajan[6] (CDS Working paper 443, 2011), one out of every 29 persons in Kerala, one out of every 22 adult population of Kerala (15+), one out of every 19 working age population of Kerala (15-59 years), and one out of every 9 working age male population of Kerala are return emigrants. Corresponding to every 100 households in Kerala, there are 16 return emigrants; 12 of them have at least one return emigrant. About 1.3% households have more than one return emigrant. At present, there are roughly over 1.3 million return emigrants in Kerala. It has been estimated that there were about 1.157 million return emigrants, according to the Kerala Migration Survey, 2008. In 1998, the number was 7.4 lakhs for return emigrants. The number of return emigrants is expected to increase to about 1.6 million by 2015.

[5] Zachariah K.C. and I.S.Rajan (2012) Inflexion in Kerala's Gulf Connection: Report on Kerala Migration Survey 2011, CDS Working paper 450, September,2012.

[6] Zachariah K.C. and I.S.Rajan (2011) From Kerala to Kerala via the gulf emigration experiences of return emigrants, CDS Working paper 443, 2011.

Table 20.3: Number of Migrants & Return-Migrants in selected years between 1980-2011 (in lakhs)

Year	Return Emigrants	Return Migrants from other states within India	Total
1980	0.0	-	0.0
1986	0.4	-	0.4
1998	7.4	9.6	17.0
2003	8.9	9.9	18.8
2008	11.6	6.9	18.5
2011	11.5	5.1	16.6

Source: Zachariah K.C. and I.S.Rajan (2011)

20.2.2.3 Malappuram which has the highest number of emigrants (15.3 %), has the largest number of return emigrants as well (19.0 %). Trivandrum is the second largest district with respect to emigration and is also the second largest with respect to return emigration. The propensity to return is greater in Trivandrum than in Malappuram when we measure the return emigrants as a % of total number of emigrants. On that basis, it appears that the preferred districts for resettlement of Kerala's return emigrants are (in order of importance) Trivandrum, Malappuram, Thrissur, Kollam and Ernakulam. The share of Muslims in emigrantsis relatively higher. disproportionately over-represented among the emigrants. The propensity to return is also highest among the Muslims. Return emigrants as a proportion of emigrants are about 56 % among the Muslims compared to 47 % among the Hindus and Christians[7].

20.2.3 In-migration

20.2.3.1 Despite the high unemployment rate in the state and migration out of the state, Kerala is witnessing a large inflow of migrant labour also from different parts of the country in recent years. There is no statistics available on in-migration. Unlike China, migrants are not required to be registered in India, either at the place of origin or at the place of destination. In the absence of such a system, the two major sources of data on internal migration in India are the Census-2001 and the National Sample Survey of 1999-2000 (NSS). But they capture only permanent and semi-permanent migration. They fail to capture the short duration migrants fully. One way of categorizing the migrants in the Census of India is by place of birth. According to the 2001 census, 1.3% of population in Kerala were migrants. While 67.8 % of those who have migrated to Kerala from other states had their place of birth in

[7] http://shamnadn.blogspot.in/2012/02/return-migration-from-uae-case-of.html

Tamil Nadu, 13.5 % had their place of birth in Karnataka. Other regions from where people have migrated to Kerala include Maharashtra (4.5 %), Andhra Pradesh (2.3 %), Pondicherry (2.1%), Uttar Pradesh (1.4 %) and West Bengal (1.0%). Labourers from states as far as Bihar and Orissa also recorded their presence. Detailed data from the census 2011 is not yet available. But, this number is likely to have exploded due to a rapid growth in the construction sector over the past one decade.

20.2.3.2 Higher wages for unskilled labour in the state, large opportunities for employment for unskilled labour and their shortage, led to the massive influx of migrant labour to the state. With signs of rapid growth of the state's economy and the increase in activities particularly in the infrastructure and construction sectors, the in-migration is expected to grow faster in the coming years. While a relatively small section of the migrants from other states are professionals and skilled workers, a large majority of them are unskilled or semi-skilled workers engaged in construction, road works, pipe laying etc. Of late, the migrants have also entered into agriculture, labour intensive sub-sectors of industry and many services.

20.3 State government initiatives

20.3.1 At the national level, India has a full-fledged Ministry to take care of diaspora – The Ministry of Overseas Indian Affairs – dedicated to matters relating to the Indian-born migrants who reside in over 110 countries worldwide. The Ministry operates with various instruments of engagement, including: consulting the diaspora through worldwide annual meetings; encouraging investments from overseas; fostering philanthropy; promoting knowledge transfer and knowledge networks; supporting overseas education; and cultivating and building social and cultural identities. The Indian government has already granted "Overseas citizenship" to NRIs. In a significant move recently, they have also been granted "voting rights".

20.3.2 In order to ensure the welfare of the Non-Resident Keralites, redress their grievances and safeguard their rights, the Government of Kerala also set up the Department of Non-Resident Keralites Affairs (NORKA) in 1996. Since then, NORKA has been playing a vital role in safeguarding their interests. "Norka-Roots" is the field agency of the Department of NORKA, set up in 2002. It acts as an interface between the Non-Resident Keralites and the Government of Kerala and serves as a forum for addressing the NRKs' problems and rehabilitating the returnees. The initiatives taken by NORKA can be classified into three broad categories: Funding, cultural exchange, and professional services.

20.3.3 Funding schemes

- **The Chairman Fund offers** financial assistance to deserving NRKs with the approval of the board.
- **Karunyam** extends financial assistance to legal heirs for repatriation of the mortal remains of the NRK who expires abroad or in India, outside Kerala.
- **Pravasi Welfare Fund under the** NRK Welfare Act 2008 ensures relief, pension, and other benefits to them. The age limits is 18 yrs to 55 yrs.
- **Santhwana financial assistance is a** Distress Relief Fund for NRK returnees which offers financial assistance of Rs 10,000 to 20,000 to meet the medical treatment expenses of the NRK or his/her dependent family members,; death compensation to the family members of the NRK; marriage expenses of the daughter of the NRK returnee; assistance to buy artificial limbs, crèches, wheel chair or other aids to overcome the physical disability of the NRK or his or her dependent.

20.3.4 Cultural exchange

- **Promotion of Malayalam language and culture:** To encourage the usage of Malayalam among the Malayalees diaspora, NORKA has set up a website www.entemalayalam.org for online teaching.
- **Cultural Exchange Programme between the Natives and Malayalees Settled Abroad:** It aims at imparting more information about the native land of Kerala among the third generation NRKs..
- **Promotion of Regional Development with the Active Participation of NRKs:** To ensure that the NRKs contribute their mite for the development of their villages, NORKA has launched a scheme called "My Village, My Dream".
- **Organization of Meets for NRKs :** NORKA-ROOTS has conducted an annual meet of NRKs called 'Samavayam' in 2001, 2002 and 2005. The Marunadan Malayalee Meet (Samanvayam) was held in 2003 and 2005. Similarly, the annual meet for returnees (Samagamam) was held in 2002 and 2005. "Keraleeya Pravasi Sangamam" was held in 2008. The annual meets organized have given a new insight into the problems of NRKs, which will help in the formulation of their welfare programmes.
- **Recognition of Malayalee Associations:** Norka-Roots grants recognition to Malayalee Associations functioning overseas and in other states in India, having more than three years of existence.

- **Heritage Village:** Heritage Village, a new initiative for NRKs is proposed to be set up at Kappil near Varkala, with the active involvement of NRKs and other departments of the state government.
- **International School:** An International school of global standards for the children of NRKs is being planned by Norka-Roots.

20.3.5 Professional services

- **Certificate Authentication Centres:** Three attestation centres have been set up f**or** attesting the educational certificates of job seekers going abroad. The Ministry of Human Resource Development,the Ministry of External Affairs, and the Embassy attestations are obtained from a single office.
- **Pre-Departure Orientation Programme**: This programme is intended to make overseas job aspirants aware of the general job situations abroad and to impart essential information related to visa, emigration rules, employment contract, travel formalities etc.
- **Manpower Recruitment**: Norka-Roots obtained recruitment license in the year 2006 from Ministry of Overseas Indian Affairs to recruit manpower from India to overseas countries.
- **Norka News:** NORKA-ROOTS is publishing a multi-colour quarterly Newsletter, with a view to propagate the activities of NORKA and NORKA-ROOTS among the Non Resident Keralites residing in India and abroad. It proposes to act as a wider platform for interaction among NRKs.
- **NRK Identity Card-project:** The government of Kerala has entrusted NORKA-ROOTS with the task of issuing photo identity cards to non-resident Keralites working for a minimum of 6 months in a foreign country.
- **Data Bank of NRKs:** A sector-wise Data Bank of NRKs, for both emigrants and returnees, is under preparation.
- **Helping trace the Missing Keralites:** A number of Keralites are reported to be missing abroad. As a nodal agency for the cause of NRKs, Norka-Roots helps tracing the missing ones abroad by taking the help of Government and other agencies.
- **The Norka Centre** co-ordinates the activities of the Department of NORKA, its field agency Norka-Roots, and the attestation centre.

These initiatives notwithstanding, diaspora is not mainstreamed in the development process. Further, there has been a focus on “diaspora” to a comparative neglect of return migrants. In-migrants find little mention in the policy. KPP 2030 call for a

comprehensive "Migrants Policy" that encompasses different constituents of migrants and is broad based.

20.4 Challenges

20.4.1 The effects of a diaspora and remittances have not been unambiguous on Kerala economy. Migration has had a positive impact on unemployment. A Kerala Migration study of 1998 notes that the unemployment rates in Kerala state has reduced by about 3 percent as a consequence of migration (Zachariah et al. 2002[8]). In a more recent study, Zachariah and Rajan have concluded, "Had there been no migration, the unemployment rate in Kerala would have been 16 per 100 in the labour force[9]. With the extent of migration that took place, the actual unemployment rate was only 10.5". Further, the amount of remittances from emigrants has been associated with increase in consumption, economic growth, and alleviation of poverty in the economy. It has been shown in Chapter 1 that reduction or decrease in the rate of growth of remittances in future can severely affect the rate at which the economy has been growing. They also have had some salutary effects on the current account balance. In general, it is believed that emigrants can account for significant inflows of FDI in the home economy (*a la* China) due to ethnic advantage, good connection with business and government, and patriotism. In Kerala, however, FDI enhancing effects of emigration could not be captured.

20.4.2 Effects of remittances are not unambiguous. The inflow of remittances might constrain the long term growth prospects by creating a resource-curse like situation (Dutch disease) in Kerala, as discussed in Chapter 1. It has also been observed that remittances reduce the work incentive and entrepreneurship of recipients of remittances in the home economy. In case of permanent emigration[10], Kerala loses direct benefits from the skills and work of an emigrant forever. This may pose a serious problem in future as the economy makes a transition from a traditional to a knowledge economy. The main challenge before the government therefore, is to maximize the benefits and minimize the negative effects of migration.

20.4.3 Another major challenge is to create employment opportunities for the return emigrants on the one hand, and harness their skills and financial resources for development of the State, on the other. It is observed that the return emigrants' contribution to the development of the state has fallen below expectations, considering the resources at their

[8] Zachariah K.C., E.T. Mathew and I.S. Rajan (2002) Consequences of Migration: Socio-economic and demographic dimensions in K.C. Zachariah, K.P. Kannan and I.S. Rajan eds Kerala's Gulf connections: CDS studies on International Labour Migration from Kerala state in India, 13-45.

[9] Zachariah and Rajan (2012, p.56), see footnote 3

[10] Temporary migration is beneficial for the economy because the returned migrants are expected return with enhanced skills and financial assets.

disposal. With the financial resources at their disposal, the skills and disciplined work culture they had acquired, and the contacts they had established, it is expected that Kerala emigrants could make a more significant contribution to the state's development. However, they have not risen to the challenge or risen to the occasion. The investment activity of the return emigrants was minimal. Very few had tried to start any kind of economic activity. Other than a few trading shops, taxi services or agricultural processing establishments, the return emigrants of Kerala did not get involved in any sort of investment activity. The challenge before the policy makers is to create conditions for capturing their assets for promoting investment and generating employment opportunities.

20.4.4 Vulnerabilities of in-migrant workers pose yet another serious challenge before the policy makers. An inflow of migrants is likely to accelerate in the economy in the coming years due to acceleration in infrastructure development and construction activities. These workers bridge the gap between demand for and supply of unskilled labour in the state and can contribute significantly to the economy. Vulnerability of the migrants arises due to differences in language, culture, legal protection, social setting and loss of the support system that they have in their native place. Their position may even be more vulnerable than that of international emigrants because, they are intra-country migrants and their voices may not be heard by the governments in their states on origin. Social non-acceptability in the local communities may add to their vulnerabilities. Finally, in view of the host state's failure in recording their presence, they are barely considered in the policy making and they are not entitled to the benefits offered to the permanent residents of the state. This calls for a strategic migration policy[11].

20.5 The strategic approach [12]

20.5.1 The overriding objective of the proposed strategy is to mainstream the three categories of migrants: NRKs, return emigrants, and in-migrants, in the development agenda by creating an enabling environment into which the migrants are effectively integrated and able to make significant contribution to the development of the country. The main thrust is therefore, to harness the diaspora (including return migrants) and in-migrants as a resource for development. The specific objectives of the long terms strategies will be to:

- develop comprehensive multi-dimensional strategies to harness the goodwill and resources of both resident and returnee diaspora for development purposes:
- enhance protection of the migrants in order to safeguard their basic rights and standards; minimize the negative effects of remittances and migration;
- secure maximum dialogue and cooperation from the migrants.

[11] http://csesindia.org/admin/modules/cms/docs/publication/29.pdf
[12] http://www.riinvestinstitute.org/publikimet/pdf/50.pdf

20.5.2 The mission is to:

- nurture, protect, regulate, and police new and emerging diasporic connections;
- identify potential engagements and champions/leaders and mobilize and cultivate them;
- work with and re-energize existing diaspora organizations and networks;
- address the vulnerabilities of in-migrants.

20.5.3 There is no "one-size-fits-all" mechanism in formulating and implementing a diaspora strategy. Different countries have adopted different approaches, related to the nature of government within states (in particular the history of state institutions), the scale, nature, timing, and geography of the diaspora. Globally, there are three examples of successful adoption of diaspora-led growth strategy. These are from Ireland, Israel and Armenia. In all these countries, a comprehensive diaspora policy was accompanied by widespread reforms to establish business-friendly environments and flexible financial systems, which set the stage for remittances to fuel growth. Kerala's challenges are multi-dimensional. The strategy needs to cover not only the diaspora in host countries, but also returnees and in-migrants. In addition, as Kerala traverses the proposed growth trajectory to achieve economic standards of developed countries, it will also have diaspora from other countries called, affinity diaspora. In what follows, we propose a multidimensional strategy for all types of migrants. There are thus four components of this strategy:

- Diaspora in host countries.
- Affinity diaspora.
- Returnees.
- In-migrants from other states.

20.5.4 Diaspora in host countries

20.5.4.1 Pillar 1: Know the diaspora

a) *Define diaspora:* Clearly delimit the specific populations that constitute the nation's diaspora. A meaningful diaspora strategy depends upon a clear understanding of who belongs to the diaspora. This is, in part a pragmatic manner: any strategy needs to ration limited resources through careful planning and targeting.

b) *Researching the diaspora and providing a research- and- evidence base for diaspora strategy:*

   (i) A crucial step is to know the diaspora. This involves:

   - serious data collection;
   - mapping the diaspora;

- creating skill inventories;
- understanding what they can offer, what they are willing to offer and what they aspire to get in return from the government.

(ii) How a country interacts with its diaspora is often underpinned by research and consultative exercises. Most often this is conducted on an ad hoc basis, through in-house or contracted research. In some cases, countries have established dedicated research units to study the diaspora. For example, The Jamaican Diaspora Foundation and its operational arm, the Jamaican Diaspora Institute, were established in 2008. A key responsibility of the Foundation is to conduct research on diaspora related matters and to create pertinent databases. In Scotland and Ireland, universities have established research centres to study the diaspora, both with strong cultural and historical foci – in Scotland, the Scottish Centre for Diaspora Studies at Edinburgh University; and in Ireland, the Global Irish Institute at the University College, Dublin. Currently, NORKA is funding this research in collaboration primarily with CDS. It needs to step up research in this area.

20.5.4.2 Pillar 2: Trust Building

a) Develop infrastructure connecting diasporas and homelands:

(i) Creating and supporting information flows and portals to foster communication between homelands and their diaspora is becoming an important policy priority. There are two predominant modes of communication: from the homeland to the diaspora, and vice-versa.

- **From homeland to diaspor**a: Many countries seek to inform the diaspora as to what is happening in their home country through newsletters and websites (For example, the Indian government produces a monthly e-magazine, "www.overseasindian.in"; and the Scottish government produces a quarterly e-magazine, "Scotland". Website portals, both state-sponsored and run by NGOs or private organizations or even individuals, detailing useful information to the diaspora and also about the home country, are seen by many in the diaspora and serve the diasporic community as vital infrastructure.

(ii) The state government of Kerala can go ahead to set up a state-sponsored channel , which would aim specifically at the diaspora as a constituent group.

- **From diaspora to homeland:** Some countries have set up formal arrangements in consultation with its diaspora. For example, Jamaica has

established the Jamaican Diaspora Advisory Board. Its members are elected and it meets twice a year to discuss diaspora related matters. In addition, a diaspora conference of invited delegates meets every two years, with regional conferences held in the interval between the biennial conferences. The Indian government has established the Prime Minister's Global Advisory Council of Overseas Indians, and also hosts events to meet with its diaspora twice a year, in India in each January and overseas each September. Kerala can follow the example. In Kerala, there have been NRK meets, but that is not a regular annual feature.

b) Provide embassy and consular services

(i) The most obvious way that countries service their citizens abroad and their descendants is through their embassy and consular services, and through political lobbying with their host countries. Some countries, such as Ireland and Lithuania, actively seek to provide funding for specialist services and support workers to cater for their diaspora. For example, the "Irish Abroad Unit" funds 220 welfare officers mainly in the UK and to a lesser extent in the USA to work with vulnerable Irish populations living there. It also endows Irish societies, clubs, sporting, and heritage activities. The Lithuanian and the Chilean government also work proactively with emigrants, to ensure they know and receive their local rights and entitlements in the host country.

(ii) Welfare strategies are promoted in particular for vulnerable groups, which would include the elderly, the sick and infirm, undocumented migrants, the poor and the unskilled, and prisoners. This will need data on the extent to which their diasporic populations remain disadvantaged and marginalized, and perhaps even subject to racism and discrimination. This remains an enormous challenge.

(iii) As described above, the Kerala government has also devised welfare schemes for the diaspora. To institutionalize it, the government can appoint officers-in-charge within NORKA to coordinate with the Indian embassies in selected countries where Kerala's diaspora is prominent.

c) Building diasporic patriotism through supporting social and cultural activities, education and language learning:

(i) A prerequisite for a successful diaspora strategy is a motivated diaspora, willing and enthusiastic to contribute to its own native land. The State can play a role in incubating, fostering and building social and cultural networks of diaspora. This is often done as a part of wider national cultural strategy. The four instruments recognized for this are:

- **Provision of supports from the homeland:** Many diaspora groups have established homeland specific social, cultural and sporting clubs and networks, most accompanied with physical infrastructure such as meeting places. Countries often support these groups through direct and in-kind funding (such as supporting cultural visits by artists and performers), as a way of maintaining cultural identity. The Government of Kerala may provide such groups with specific services related to cultural identity such as learning of Malayalam, culture and history. For example, the Irish Department of Community, Rural and Gaeltacht Affairs supports teaching of the Irish language at third-institutions outside of Ireland. Similarly, the Lithuanian government funds Lithuanian schools to teach the Lithuanian language and cultural heritage to the descendants of Lithuanian emigrants (Box 20.1). The Ministry of Diaspora in Armenia has established a virtual Armenian Studies University, which is supporting Armenian students across the world, and has established a Committee on Curriculum for Armenian educators. In addition, it has established a diaspora museum highlighting the diversity of the Armenian diaspora and its achievements.

Box 20.1 Lithuania: building bridges with diaspora

The Department of National Minorities and Lithuanians Living Abroad (DNMLLA) plays a very proactive role in safeguarding and promoting the identity of the Lithuanian community overseas. Through the strategies of a) long-term state relations with Lithuanians living abroad, and b) the inter-institutional programme for cooperation with Lithuanian communities abroad, it is seeking to preserve and build patriotism towards Lithuania, Lithuanian education, language, and culture, and the image of Lithuania overseas. In so doing, it aims to promote awareness of and protect the welfare rights of Lithuanian citizens in destination countries (ensuring, for instance, that they secure access to the services they are entitled to). What makes this approach so interesting, is the fact that the Department is simultaneously responsible for overseeing foreign-born minorities in Lithuania as well as Lithuanian citizens overseas. Coupling the two in this way provides for expertise and an elevated degree of sensitivity, which might otherwise have been lacking.

Source:National University of Ireland Website

www.nuim.ie/nirsa/**diaspora**/PDFs/**lithuaniandiaspora**policy.pdf

- **Buttressing local groups in the diaspora:** Local diaspora networks for support and community building in host countries have been run by the diaspora and for the diaspora, receiving little or no support from their

homeland. Some countries have recently started giving financial and other support for their work. The Irish government has been involved in the funding of these events outside of Ireland. KEA, a diaspora network (New Zealand), initially set up by two individuals and privately funded, is now the recipient of state grants, alongside funds from private sector companies and membership fees.

- **Honours and awards:** These awards and honors are an important component of trust- building exercises. India annually presents the Pravasi Bharatiya Samman Awards to up to 20 members of the Indian diaspora who have made significant national and global contributions. In 2006, KEA New Zealand started the World Class New Zealand Awards to honor the New Zealanders making a significant international contribution in the following classes: supreme awards (for instance Nobel Prize); information and communications technology; creative industries; biotechnology; manufacturing; research, science, technology and academia; finance, investment and business services.

(ii) Kerala may initiate this practice for its diaspora.

- **Promoting short-term visits and bonding:** Many countries target members of the diaspora through marketing campaigns of tourism, to encourage them to return home to visit family members or to simply take a holiday. Homecoming 2009 – a flagship campaign of Scotland; and the Aisling Return to Ireland Project are steps in this direction. The Armenian Ministry of Foreign Affairs has recently made systematic efforts to facilitate diaspora travel to Armenia, creating special interest tours (pilgrimages) and supporting upgrade in tourism infrastructure.

20.5.4.3 Pillar 3: Mobilisation of diaspora and remittances

a) Develop remittances through philanthropy

(i) Philanthropic activities from the diaspora to the homeland can be a very important source of income for states. Diaspora members mostly establish philanthropic foundations, either individually or collectively. They may work with state organizations, but how they choose to allocate and spend their funds is at their discretion. Some philanthropic foundations, such as the International Fund for Ireland (IFI), have been established by the states themselves.

(ii) Set up a Kerala Fund : The State may set up a "Kerala Fund" to raise money from its diaspora, through key social and networking events and, more generally, by

prospecting for funds from wealthy donors. It can tie key donors to specific projects, in which they have a keen personal and professional interest (for instance, education fund, health fund, social protection fund etc.).

b) Develop Business networks

(i) Business networks play a critical role in the emerging knowledge economy. Diaspora knowledge networks are overseas networks that mobilize the skills, expertise, contacts, knowledge, business acumen, and financial and political resources of the diaspora, as a collective resource, to benefit the local and global diaspora as well as the homeland. Four kinds of diaspora knowledge-networks are: global, specialist, professional and transnational.

(ii) Global knowledge networks are transnational networks linking global regions with the homeland, including trade missions, business forums, mentoring, advice and access to decision makers. A few case studies are presented in Box 20.2.

Box 20.2: Business network strategies: Some case studies

GlobalScot: Scotland's Global Connections Strategy

Scotland's Global Connections Strategy has been the creation of GlobalScot, an elite, global business network. GlobalScot targets high achieving members of the Scottish diaspora, who are specially selected and invited to join them. GlobalScot is not limited to one sector or area of the world and seeks to involve a broad range of talent and expertise. The scheme works by partnering GlobalScot members with Scottish companies, with the former providing mentoring, advice, contacts and so on to the latter, which will help them in expanding their business globally. A recent development has been the Saltire Foundation that enables citizens to undertake placements in GlobalScot companies as a way of kick starting or advancing their business careers.

ChileGlobal: Chile

Like GlobalScot, ChileGlobal is an elite, global business network of successful overseas Chileans. ChileGlobal is a classic example of a business network that learns from best practices and tries to rework their learning into another context. As such, it provides something of a test bed for the global circulation and transfer of diaspora policies. ChileGlobal is shaped on the basis of the GlobalScot model. ChileGlobal has 130 members in a wide range of business sectors spread across the USA/Canada (principally), Latin America to a lesser extent, and to a small degree, Europe. It supports the placement of student interns, mentoring programmes (including a plan to roll out a business Angel model), and business development through lubricating contacts, knowledge transfer, and investment. The study of

these two models can provide important insights on how the same model can be adapted in different cultural and institutional environments.

New Zealand

KEA's mission is to connect New Zealand with its large global talent community and to 'contribute to the growth, development, and future prosperity of New Zealand by sharing knowledge, contacts and opportunities with its diaspora. It presently employs four fulltime regional managers to conduct its operations in different parts of the world.

Source: Relevant websites

(iii) **Specialist knowledge networks**:

- These are sector-specific (for instance biotechnology, ICT, law) and generate dense and specific ties to the homeland, to aid the expansion of specific sectors, for instance through providing knowledge, mentoring, expertise and financing (venture capital). Ireland has taken this approach, seeking to create and maintain a wider base of participation in less targeted and focused networks. It has created region specific networks:
  - The Asia Pacific Business forum which links 11 Irish business groups in Asia Pacific and the Gulf to facilitate an exchange of ideas and resources and to leverage reputation and connections.
  - The Irish Chamber of Commerce, USA is a transnational economic network with 13 chapters across the United States.
  - The Irish Technology Leadership Group in Silicon Valley (an elite network of Irish corporate leaders who support the Irish ICT sector through the soliciting of Irish business ideas in a Dragon's Den format), Biolink (a network of biotechnical professionals spread across the USA), and Techlink, UK (a network of Irish scientists based in London looking to commercialize laboratory breakthroughs). In the Irish case, additional examples include, the Irish Network of New York, the Irish Network of San Francisco, and the Irish Professional Network of London.

- Advance Australia (AA) has created a number of industry specific, but geographically dispersed networks in academic/research, media arts/entertainment, financial services, life sciences, and technology. AA seeks to enable Australians abroad with information about

'ambassadors-at-large', who open doors and opportunities for Australia and Australians across the globe.

(iv) **Professional knowledge networks**:

- These are networks of professionals and highly skilled expatriates located in cosmopolitan cities. The focus is upon both social and business networking and the exchange of contacts, skills, advice and ideas.
- Armentech (Armenian High Tech Council of America) seeks to use its collective expertise to promote and support the creation and development of technology-based businesses in Armenia through inward investment and venture capital, building linkages, expanding outsourcing, improving the image of Armenian IT firms, and providing training. These networks are most often supported by specialist state services that focus on the development and globalization of indigenous firms, inward investment, domestic exports and marketing. Examples include, Fundación, Chile; Scottish Networks International, Enterprise, Ireland; and the Armenian Development Agency. These organizations also provide direct advice to the diaspora wanting to invest in the homeland or those who are interested in developing business-to-business partnerships.

(v) **Transnational business networks**:

- They aim to foster economic ties between the place in which the diaspora resides and the homeland. The network resources produced include knowledge of markets, cultural knowledge and access to transnational opportunities. The Overseas Indian Facilitation Centre is a one-stop shop for investment advisory services and business-to-business partnerships. Similarly, the Armenian Development Agency runs a one-stop shop agency for foreign investors.
- The Government of Kerala organized 'Emerging Kerala-2012' - a Global Investor Connect in the State" at Kochi. It is decided to organize it every alternate year. The objective is to showcase those sectors that have the highest potential for investment in the State. The Government assures all necessary support to investors for setting up suitable projects in these sectors. Some of the targeted sectors are: IT and IT Enabled Services, Tourism, Healthcare, Knowledge/Education, Trade and Retailing, Food and Agro Processing, Energy including Green Energy, Biotechnology/ Nanotechnology, Water & Inland Waterways, Ports, Ship building and related industries & Infrastructure development. Given the weak private

investment climate, more proactive initiatives are required.

- The NORKA may create a cell targeting Kerala entrepreneurs abroad and setting up networks. It may adopt a plural approach that aims to foster a number of business networks and to grow a wide base of contacts and expertise. It will focus not only on well-known diaspora businessmen, but encourage the promotion of business networks in selected countries.

20.5.4.4 Pillar 4: Reverse Brain and capabilities

a) While it is widely recognized that a country's diaspora can make a valuable contribution to the homeland, excessive brain drain and skills shortages create the need for reversing brain and capabilities, to harness them as discussed above. Return migration was a central feature of first-generation diaspora/ migration strategies back in the 1960s, but later it was displaced by a new interest in harnessing talent from destination sources. As part of the move towards the knowledge economy, programmes designed to encourage brain incubation or circulation may be initiated.

b) Kerala will need to give attention to better understanding the circumstances that bring talented diaspora home, to work on temporary positions to contribute to their native land. Traditionally, two forces may attract them to such positions: one, economic opportunity with occupational status and the level of responsibility; two, family and lifecycle, including a desire to return to look after, spend time with and care for an elderly parent or relatives. The new strategy will have to be built on this understanding.

   (i) Encourage return of highly skilled migrants by offering financial incentives and advertising "important vacant development temporary positions" such as researchers, and policy analysts for those contemplating spending time in the state;

   (ii) Country officials can institute innovative policy strategies to reach out to this skilled migrant pool. Chairs and visiting fellow opportunities may be instituted in higher education institutions. China and the Republic of Korea woo expatriate researchers back home with science "parks" designed to concentrate high-tech industries or science-related businesses. The proposed knowledge hubs (Chapters 2,3,4) may prove to be instrumental in creating opportunities for top professionals and highly skilled researchers, university professors and policy analysts to spend time in Kerala to contribute to its prosperity.

20.5.5 Affinity diaspora

20.5.5.1 Kerala has significant diaspora overseas but it will also be the recipient of other nations', as well, as regions' skilled diaspora as it makes transition to the knowledge economy and sets up education hubs. It will thus have a potential affinity diaspora, which is the circular diaspora from other countries/regions who stay temporarily in the state. This will also need to be tapped. Scottish Networks International runs a scheme that seeks to build partnerships between postgraduate students and Scottish companies for work placements. By developing a relationship with the company, it is hoped that if and when the students leave Scotland, they will help their partner company and other Scottish companies to do business wherever they settle. In effect, they will continue to work for Scotland regardless of where they reside in the world. Other countries tend to seek goodwill amongst other populations in two ways. First, by creating and fostering country to country business networks that seek to build mutual cooperation and dependencies. For example, the Ireland Turkey Business Association (ITBA) creates links between Turkish business people in Ireland and Irish businesses and also helps Irish businesses seeking to do business in Turkey. Second, by undertaking international development work that aims to help a nation and its people, whilst at the same time creating visibility, new markets and opportunities for the country's enterprises.

20.5.6 Nurturing of return migration

20.5.6.1 The conventional wisdom about return migrants is that they are failures or retirees who always intended to return to their country of origin. They are generally not expected to contribute significantly to their home countries' development. Today, however, returnees reflect new migration circumstances that are evolving due to a globalized world. The globalizing effect of easy travel, fluid citizenship status, and rapid communications are key factors driving this change. As a result, returning migrants are becoming increasingly younger, and more highly trained. Many of them are circular migrants, as they go out for a short period of time. In the case of Kerala, it has been observed that a large part of them are in the working age group.

20.5.6.2 A number of issues remain as governments continue to explore migration for development options. Three key considerations include:

a) **Pillar 1: Database and profiling of their skills:** There is a need for setting up right mechanisms to create and maintain databases on return migrants. This will require a legal framework to be in place, which standardizes definitions, procedures, scope and quality standards. It will create an administering infrastructure for compiling and maintaining the database. EU, for instance, has a Regulation on "Community statistics

on international migration, citizenship, residence permits and asylum" which has detailed guidelines on the compilation of this database.

b) **Pillar 2: Adopt facilitation measures for those contemplating return:** Some of the leading practices may be reviewed here to elaborate on this strategic direction.

(i) Jamaica, implemented a Charter for Long-Term Returning Residents in 1993, aiming to reduce the costs (importation of belongings) and the bureaucracy for returnees, and establishing the Returning Resident Facilitation Unit. The unit was later upgraded into a department and a Minister for Diaspora Affairs was appointed in 2002.

(ii) Lithuania, as part of its programme to preserve Lithuanian identity amongst migrants, also recognizes the need to create Lithuanian schools abroad, to ensure that the children of return migrants are quickly integrated into the domestic school system. At present, they fund over 200 weekend schools worldwide. Ireland and Scotland have both set up relocation services.

(iii) The Irish Abroad Unit (within the Department of Foreign Affairs) provides a range of administrative and legal information to potential returnees. It provides information through its 'Returning to Ireland' service on the statutory services and entitlements available to those 'coming home'. Both this Department and the Department of Social and Family Affairs, fund organizations in the voluntary sector that provide advice and services to the Irish abroad, including those who are considering relocation to Ireland. The Safe Home Programme (funded by the Department of Environment, Heritage and Local Government), was established to help the elderly and the most vulnerable within the Irish community abroad to settle back in Ireland. The Irish Department of the Environment, Local Government and Heritage, provides funding to voluntary housing bodies to make available up to 25% of accommodation to elderly returning emigrants, who satisfy the eligibility criteria under the "Safe Home" Programme.

(iv) Scotland's Fresh Talent Initiative includes a Relocation Advisory Service through which those who want to relocate can secure information and advice using a dedicated web portal (www.scotlandistheplace.com) and phone line. Information is also provided by the organizing committee of the flagship Homecoming Scotland 2009 event.

c) **Pillar 3: Generate new alternative strategies to mobilize emigrants' knowledge and expertise in support of development:** Returnees bring with them tangible (i.e. financial capital) and intangible (i.e. contacts, relationships, skills, acquaintances) resources that have been accumulated during the migration experience abroad. Returnees do not often invest their tangible resources to create widespread employment or larger benefits for others. Instead, they tend to use it for consumer spending, payment of debts, long-term investments such as individual education, and the building and improvement of homes. A large proportion of returnees are in the working age group. It is important to harness the skills and financial resources of the returnees. Governments need to ensure that migrants are able to make real contributions to the country's development by mobilizing their resources.

(i) **Create an investment cell within NORKA:** It may be the single-point contact for investment advice. In the Philippines, for example, the government's Overseas Workers Welfare Administration supports an inter-government agency referral system, called the Replacement and Monitoring Center. The Center offers returnees job placement services, skills training, livelihood programs, and job opportunity assessments, and gives employers a database of skilled migrant workers.

(ii) Encourage returnees to spend or invest through partnerships with the government and the private sector.

(iii) Encourage returnee-initiated programmes that build local skills among the general population.

(iv) Explore ways to invest in the infrastructure of the professional sectors, from which the returnees originally came. For example, while Ghana badly needs nurses, lack of infrastructure and inadequate investment in that country's health sector means that Ghanaian nurses who are trained abroad are unable to find employment back home.

d) **Pillar 3: Reintegrate returnees into the society**

(i) Reintegration of returnees into the society is a major issue for the policy makers. Given the dissimilarities in values and norms between the host and home countries, cultural conflicts are bound to arise. The severity of this problem is related with the time spent in the adopted countries. Forced return may also aggravate adjustment problems. This may also contribute to social problems. Evidence suggests that returnees sometimes become the target of social envy, because they are more successful. Their initiatives are not easily acceptable. Any preferential treatment given to them can create further tensions in the society.

(ii) There needs to be a greater understanding of these issues. The government will need to explore these issues and identify the areas that need to be addressed before formulating policies.

- Build a broad network of national experts from the region, representing all principal disciplines focused on human migration, labour mobility and national development issues (e.g. demography, law, economics, sociology, political science).
- Organize discussions among relevant state bodies, NGOs dealing with immigration on issues relating to improving the web information systems.
- Clarify issues relating to integration and improvement approaches of various information systems and technical peculiarities for realization of such approaches.
- Develop legislation on the integration and improvement of various info systems containing information relating to return of citizens living abroad.

e) **Pillar 4: Participation by NGOs to overcome constraints to reintegrating return migrants:** Some sending-country NGOs have worked with their government to establish networks of expatriates in a host country that support migrant savings and alternative investment programmes. In the Philippines, for example, local NGOs have helped migrants establish small-business ventures and local churches have launched microenterprise activities. These efforts reveal how important it is for social development workers, policymakers, and implementers, as well as migrants and their families, to work together to ease reintegration and harness development potential.

20.5.7 In-migration

20.5.7.1 In-migration is essentially executed through an elaborate network of recruitment agencies, which operate in the poverty-stricken areas that according to them are the best "catchments zones". In many cases advance money has been paid to the family of the migrant much before they depart their homes. The agents are also meeting the cost of travel and other incidental expense. Once the migrants arrive in Kerala, they are being allocated to construction sites. They live in poor condition. In most of the cases, they shared accommodation with several inmates in small room having their own cooking facilities. Due to the language factor, the migrant labour is unable to directly communicate with the native people. The Kerala government has an obligation to provide them with good living conditions, and as a labour –sending economy itself, it needs to set an example of being a good host state.

20.5.7.2 The state government already has a welfare scheme, "Inter State Migrant Workers Scheme", in place since 2010. Under the scheme, each registered worker will be getting up to

Rs 25,000 for in-patient health care in empanelled hospitals. There is also a provision of Rs 3000 per annum for the education of migrant workers. The Kerala Construction Workers' Welfare Board has implemented the scheme. This scheme has failed to enroll a large number of migrant workers due to lack of information about the scheme. Most advertisements are in Malayalam, which is not understood by different language-speaking population. Further, since the Construction Welfare Board implements it, migrant workers employed elsewhere remain outside the purview of the scheme.

- Build database through compulsory registration: A compulsory registration system should be introduced for them to maintain records.
- Provide low cost housing: A low cost housing project may be initiated for them. Alternatively, they may be covered under the EWS housing schemes.
- Increasing migration may lead to intolerance towards migrants. However, government must initiate policy measures to address these fears, by building public opinion in their favour. This will help transform Kerala into a multi-culture society, rich in social capital.
- Local bodies to ensure that the migrant workers are extended legal protection by revamping their enforcement mechanisms.
- Government to initiate some awareness campaigns and programmes to reach out to the migrant workers. A cell within NORKA may be dedicated to the 'Inter-State Migrant Workers' that can overcome language barriers and set up communication channels with them.

20.6 Implementation and Measuring the success of diaspora strategies

20.6.1 Strengthen NORKA

20.6.1.1The principle agency is NORKA. The main problem being faced by NORKA and NORKA -ROOTS are:

- the absence of a legal framework,
- lack of institutional structure,
- shortage of trained and experienced staff in handling migration related issues.

20.6.1.2It is proposed above that the state should have its own "Migration Policy" with well-defined objectives and strategic directions, covering all the constituents of migrants (namely, emigrants, return migrants, and in-migrants). Further, NORKA should be restructured with three well-defined organs covering NRKs, returnees, and in-migrants. Each organ should have specialized officials for tackling different dimensions of the policy (as suggested above). Each one should have its helpline/call centre. Non-resident Keralites throughout the country should also be connected with NORKA through the helplines. Finally,

we propose mainstreaming of education on migration at the university level and in management courses, to promote the tackling of such issues by trained manpower.

20.6.2 Resource Allocation

20.6.2.1 Budget allocation: Budget allocation should be in some proportion to remittances received by the state.

20.6.2.2 Matching Funds: Under the matching funds schemes, different levels of government allocate a dollar or more for every dollar that migrant organizations invest in their communities. The most frequently cited examples come from Mexico (where matching programmes were pioneered and popularized), among which, the state of Zacatecas's Tres Por Uno or 3x1 program is the most celebrated. *Considered by many observers as a best practice, the 3x1 program has been replicated across Mexico, throughout Latin America, and around the world.*

20.6.2.3 Use of existing structures: Capitalize on existing consular networks and link with other government offices, both at the national and local level.

20.6.2.4Partnerships: Partnership with the private sector, other governments and international community may be strengthened to amass resources.

20.6.3 The Role of NGOs needs to be strengthened: NGOs can play an important role. In Chile, for instance, there are five specialist NGO agencies working with the Chilean diaspora (Chile Global; BIONEXA; Pyme Global; ChileTodos; Euro Chile). Advance (Australia) and KEA (New Zealand) are not-for-profit NGOs working independently of governments, to provide select services to the diaspora. Industry associations and private sectors may also be crucial elements in providing such services and need to be involved in policy formulation.

20.6.4 Monitoring and evaluation of the programmes

20.6.4.1 Finally, operating diaspora programmes often involves significant investment by states and other organizations in staffing and infrastructure, programme content development and delivery, and on-going evaluation and expansion. As a result, agencies running programmes seek to measure their success with respect to the investment made. Measures of success can focus on both tangible and intangible outcomes, and in the case of business-related ventures, it can be on an economic assessment of the return on investment. Both countries, and schemes within countries, differ in how they measure success, varying with respect to tangible/intangible outcomes and the time period of evaluation. Since there are no defined targets and associated tangible metrics for measuring progress and success, nor a defined period in which to reach certain targets, government measures are evaluated by a mix of tangible and intangible measures, for example,

- The quality and strength of the network, based on the feedback from clients and number of quotations and contracts.
- Investment in the state by NRKs.
- Temporary visits by highly skilled professionals.
- Success of annual meets.
- Investment activity by returnees.
- Unemployment rate among returnees.
- Basic amenities provided to in-migrants.
- The level of satisfaction through perception surveys.

20.6.4.2 Evaluation of the programmes may be conducted using the above indicators periodically to assess their success.

20.7 Conclusion

20.7.1 Policymakers have increasingly recognized the value that diaspora population brings to the development efforts at home. Most governments take an extra step in institutionalizing their engagement with the diaspora, by creating special offices or directorates within government agencies. Kerala has also created specialized institutions: NORKA and NORKA -ROOTS to engage diaspora on a formal basis. These institutions need to be strengthened, with a clear mandate and a well-defined policy framework. The strategic policy framework outlined in this chapter is based on the following principles:

- The government that knows its diaspora well is more likely to succeed in engaging with them.
- Trust-building, by strengthening social and cultural networks, is critical for economic privileges.
- A diaspora strategy needs to be mutually beneficial for both the domestic economy and the diasporic population.
- The diaspora must be mobilized to act as a development partner in the economy.
- Capacity building is an important aspect of the strategy. Institutional and human resource capacities need to be strengthened to design and implement the strategy.
- Creating innovative institutions, leveraging the existing structures, and establishing partnerships with various stakeholders can overcome the problem of inadequate funding.
- Evaluations are necessary to assess whether the policy is on track.

*****

CHAPTER 21

MAINSTREAMING ENVIRONMENT

Abstract

Water pollution is a serious problem in Kerala, as biological, toxic, organic, and inorganic pollutants contaminate almost 70 per cent of its surface water resources and a growing percentage of its groundwater reserves. Wastes are generated at various stages, such as production, transportation, storage, distribution and final consumption. Solid waste management has thus emerged as a major issue in Kerala. Thus, Kerala faces a serious deterioration in the environment quality due mainly to land and water pollution. This in turn poses a threat to its bio-diversity. Kerala has been undertaking several green management initiatives, both at the state and the local government level. The proposed knowledge-driven sustainable development strategy seeks to identify and develop actions to enable Kerala to achieve continuous improvement in the quality of life of its people. The underlying principle of the new strategy is "mainstreaming environment". Throughout the KPP 2030 all strategies are being proposed which take into environmental management whether it is developing infrastructure or agriculture (integrated farming) or adopting clean production systems in industry.

21.1 Introduction

21.1. Kerala's distinctive environment is one of its most valuable assets. It is important in its own right and for the range of vital services it provides to the people of Kerala. To build a sustainable future, Kerala will need to manage the environmental pressures more effectively and address new challenges that are likely to be posed by a sustained growth rate. The Environment Strategy recognizes the importance of environment for Kerala and explains how the challenges it is facing can be tackled over the next 20 years. It sets out the vision that, Kerala will be having a thriving environment by 2031 that will contribute to the economic and social wellbeing and health of all of the people of Kerala.

21.2 Relatively speaking, Kerala has fewer sources of pollution. The industrial production process is one of the main contributors to pollution; but, Kerala is not a heavily industrialized state (Chapter 9). Typically mining is another major source of pollution. This source of pollution is almost absent in Kerala. The available statistics indicate that hazardous industrial waste also is not a challenging issue in Kerala, in relative terms. Generally speaking, hazardous waste (HW) refers to mainly solids, semi-solids and other industrial wastes, which do not come under the purview of the Water (Prevention and Control of Pollution) Act, 1974 and the Air (Prevention and Control of Pollution) Act, 1981. Because of the nature of this type of waste, its storage, transportation, treatment and disposal is required to be controlled in an environmentally sound manner. As per the Central Pollution Control Board's (CPCB's)

data of 2009, there were 36,165 nos. of hazardous waste generating industries in India, generating 62,32,507 Metric Tonnes of hazardous wastes every year (MTA)[1]. In that year, Kerala was not a large contributor of hazardous waste. Its share was only 1.33% of the total hazardous waste produced in India, with a rank of 13 in the list of 30 states/union territories. According to the State inventory of hazardous waste generating industries prepared by the Kerala State Pollution Control Board, Kerala generated about 71,050 metric tonnes of hazardous waste in 2009-2010, which was 15% less than the 83,000 metric tonnes of waste generated in 2007. Of the total HW in 2009-10, 30% was either recyclable or incinerable.

21.3 Kerala seems to be in a comfortable position relative to its neighbouring states, even in terms of the common Treatment, Storage and Disposal Facilities (TSDF) (Table 21.1).

Table 21.1: State-wise Nos. of TSDF/ Individual facilities for Management of HW (Existing TSDF/Incineration)

Selected States	Safe Land disposal Only	Incineration Only	Both (SLD & Incineration)
Andhra Pradesh	-	Individual - 23 Nos	TSDF - 2 No.
Karnataka	1	Common - 3 Nos. Individual - 7 Nos	Nil
Kerala	TSDF - 1 (under Construction)* Individual - 17 Nos.	Common - 1 Nos. Individual - 1 Nos	Nil
Tamil Nadu	TSDF – 1	Nil	Nil

*Installed by Cochin Economic Zone Processor, Cochin to incinerate the Hazardous Wastes of Industries of that particular association only.

Source: CPCB (2009) "National Inventory of Hazardous Wastes Generating Industries & Hazardous Waste Management in India," February.

21.4 Further, it is evident (Table 21.2) that Kerala has a surplus capacity in respect of incinerable waste as on 2009. The latest available data of 2009-10 indicates generation of incinerable waste to the tune of 183 Metric Tonnes per Annum (MTA). So, the capacity of disposal is not a problem.

[1]CPCB (2009) "National Inventoryof Hazardous Wastes Generating Industries&Hazardous Waste Management in India," February.

Table 21.2: Status of Incineration Capacities vis-à-vis Incinerable Waste Generation in Selected South Indian States

States	Nos. of common hazardous waste incinerations	Capacity in MTA	Nos. of captive hazardous incinerations in MTA	Capacity of captive incinerations in MTA	Total capacity in MTA	Incinerable waste generation in state MTA	Surplus Capacity
Andhra Pradesh	2	18000	26	29823	47823	31660	16163
Karnataka	3	5100	7	2743	7843	3713	4130
Kerala	1*	250	1	1500	1750	233	1527
Pondicherry	-----	-----	1	2700	2700	25	2675

*Access is limited to members only

Source: CPCB (2009) "National Inventory of Hazardous Wastes Generating Industries & Hazardous Waste Management in India," February

21.5 Kerala is a moderately polluted state, with few highly polluted industrial regions. But given the fragile nature of its ecology, it needs to be controlled and it should make a long-term plan to further reduce the pollution levels. Industries, particularly large industries, are more or less found to follow the abatement norms through the installation of pollution control devices. Small industries situated in industrial clusters are installing common effluent treatments plants. But, these are inadequately addressing the environment issues.

21.2 Challenges

21.2.1 An overview

21.2.1 Of late, the Central Pollution Control Board (CPCB) has been measuring the status of 88 major industrial clusters in India. Among them, only Kochi in Kerala figures in the list. The scores are given separately for different sub-indices of air, water and land environment as well as an overall score of the "Comprehensive Environmental Pollution Index" (CEPI). Table 21.3 presents the summary statistics of these scores in 12 most polluted clusters in South India: six in Tamil Nadu (Coimbatore, Cuddalore, Erode, Manali, Mettur, Tirupur); five in Karnataka (Bidar, Bhadravati, Raichur, Pinia, and Mangalore) and one in Kerala (Kochi). Generally speaking, the CEPI score of more than 60 shows a critical level of pollution in the respective environmental component, whereas a score in the range of 50–60 shows a severe level of pollution with reference to the respective environmental component.

Table 21.3: Comprehensive environmental pollution scores of air, water, and land and soil quality

Source of pollution	Cluster	A	B	C	D	CEPI
Air	Kochi	15	7	20	15	57
	Average	24.2	7.4	15.4	11.2	58.2
Water	Kochi	25	9	20	10	64
	Average	16.4	10.5	17.2	11.5	55.7
land and Soil	Kochi	15	9	20	10	54
	Average	13.8	8.2	15.9	11.7	49.5

A : Pollutant Score based on the presence of toxin and scale of industrial activities

B : Pathway Score based on pollutant concentration , impact on people, and impact on eco-geological feature

C: Receptor Score, constructed using potentially affected population; level of exposure, and risk to sensitive receptors

D= Additional High Risk Element

CEPI=A+B+C+D

Source: Based on CPCB (2010) Comprehensive Environmental Assessment of Industrial Clusters, Ecological Impact Assessment, Series: EIAS/5/2009–2010

21.2.2 The table reveals that the position of Kochi cluster is in the critical to serious range in terms of all dimensions of pollution: air, water and land. The CEPI score for water pollution is above 60 (critical). The cluster also scores high on all the three sub-indices of water pollution, namely pollutant score, pathway score, and receptor score. Its performance in terms of land and air pollution is no better either. Its scores for land and air pollution are 54 and 57 respectively. Both show severe levels of pollution. The scores for most sub-indices have also been higher than the average score.

21.2.3 Table 21.4 gives the overall CEPI score, which combines the indices of air, water, and land in decreasing order. It shows that Kochi cluster has a value of 75.08 and occupies the third position among the top most polluting industrial clusters of the South Indian states. Among all the 88 industrial clusters of India, Kochi occupies the 24th position. While air pollution is relatively less, water and land pollution are the major issues being faced by this cluster. Clearly, Kochi cluster needs policy attention.

Table 21.4: Combined CEPI Scores of Industrial Clusters in South Indian States

POSITION/ INDUSTRIAL CLUSTERS	***CEPI SCORES***			***OVERALL***
	AIR	***WATER***	***LAND***	***CEPI***
1. Cuddalore (Tamil Nadu)	54	65.25	64	77.45
2. Manali (Tamil Nadu)	64	59	58	76.32
3. Kochi, Greater (Kerala)	**57**	**64**	**54**	**75.08**
4. Mangalore (Karnataka)	61.75	57.75	54	73.68
5. Coimbatore (Tamil Nadu)	6235	58.75	45.5	72.38

POSITION/ INDUSTRIAL CLUSTERS	*CEPI SCORES*			*OVERALL*
	AIR	*WATER*	*LAND*	*CEPI*
6. Bhadravati (Karnataka)	62.75	56.5	45.5	72.33
7. Tirupur (Tamil Nadu)	56.75	50.75	53	68.38
8. Raichur (Karnataka)	59.75	46.5	44.5	68.07
9. Bidar (Karnataka)	58.75	49	44	67.64
10.Mettur (Tamil Nadu)	46	58	46.5	66.98
11.Pinia (Karnataka)	56.75	46	42	65.11
12. Erode (Tamil Nadu)	47.38	47.25	43.5	58.19

Source: CPCB (2010) Comprehensive Environmental Assessment of Industrial Clusters, Ecological Impact Assessment, Series: EIAS/5/2009–2010

21.2.4 The upshot is that Kerala faces a serious deterioration in the environment quality due mainly to land and water pollution. This in turn can pose threat to its bio-diversity, which is a unique advantage of Kerala. In what follows, we examine the three dimensions of pollution, namely land, water and air, and other environmental challenges in detail.

21.2.2 Land and soil pollution

Urban Wastes

21.2.2.1 **Sewerage and solid waste volume:** Economic prosperity and the associated changes in consumption patterns, production technology, and scale, together with population growth and increasing urbanisation have resulted in the generation of an ever-increasing volume of waste of various kinds. Wastes are generated at various stages, such as production, transportation, storage, distribution and final consumption. Solid waste management has thus emerged as a major issue in Kerala. This problem is likely to aggravate in Kerala's journey to prosperity. During the Perspective Plan period of 20 years, the urban population is projected to increase from 15.9 million in 2011 to 23.1 million in 2021 and further to 24.1 million in 2031. This massive increase in urban population is likely to put tremendous pressure on urban infrastructure. Massive investment in domestic water supply, sewerage network and solid waste management is needed to meet the requirement of the growing population. Further with the rising income of people, demand for infrastructure services, namely, sewerages, solid waste treatment and even water supply would increase.

21.2.2.2 By multiplying population projections by the average of the per capita solid waste generated in different types of towns/ cities, we projected the volume of sewerage and solid waste generation. An annual growth of 1.3 percent per year is added to the projections, to take into account income growth and changing consumption pattern. The final estimations are presented in Table 21.5. It shows that by 2030, the sewerage generated and water requirement will increase 1.4 times of the current levels; the increase in solid waste generation will be almost 1.8 times.

Table 21.5: Domestic Water requirement and sewerage and solid waste generated per year

Years	Sewerage		Solid waste		Biomedical Waste (BMW)	
	Water requirement*	Total Sewerage generated**	Total municipal solid waste***	Of which organic waste*****	Projected no. of bed[i]	Projected BMW per day kg[ii]
	(in 10000 kilolitre)	(in 10000 kilolitre)	(in 1000 kg)	(in 1000 kg)		
2011	215	180	5,582	4242	171005	51302
2020	262	219	7,635	5803	178165	53450
2031	300	251	9,961	7571	179825	53948

*Water requirement is assumed to be 135 lpcd;

**Sewerage generated is 113 litres per person per day (80% of the domestically used water, 6 litre infiltration from underground to pipe)

***Municipal solid waste generated per person per day (average for different class of cities/ towns) is 0.35 kg;

****Average organic solid waste is 76% of the municipal solid waste.

(The sources of these norms are drawn from Report on Indian infrastructure & services (RIUFS), Government of India, 2011)

i. Based on the international norm of 5 beds per 1000 population (based on Gujarat Study. See footnote 3)

ii. Waste is generated at the rate of 300 gms per bed per day

Source: NCAER's projections

Biomedical Wastes (BMW)

21.2.2.3 Hospitals in general, generate waste at an average rate of 1 Kg/bed/day[2]. Based on a study conducted by the government of Gujarat, it turns out to be 300gms/bed/day[3]. A part of this waste is toxic and harmful not only to the staff and patients, but also to the general public at large. The improper management of Bio-medical waste causes serious environmental problems in terms of air, water and land pollution. It finds its way to the common plains along with the common household wastes, as a diluent. Rapid growth of the health care sector, particularly, hospitals, testing laboratories, blood bank etc is accompanied by even faster growth of biomedical wastes, a significant part of which is highly hazardous to human health. Biomedical wastes need special system of collection (using particular types of packages) and treatment before dumping. A few specialty hospitals have the treatment facility, but their quality remains unknown. Table 21.5 presents the estimation of the BMW generation in 2020, assuming that Kerala remains constant at the minimum international norm of 5 beds per 1,000 population. This provides the bare minimum so as to give a perspective as to how much waste will be generated. Even with the minimum norms, Kerala

[2] Sreekumar P R and and Nair A S K : Bio medical waste disposal and its status in Kerala http://210.212.24.72/~kscsteuser/digital-library/digital/KSC/ksc19/04-Health%20Science/04-GENERAL/04-20.pdf

[3] http://www.spipa.gujarat.gov.in/images/bio_medical_waste_report_surat.pdf

will generate 53,948 kg of BMW per day!

Rural Solid Waste

21.2.2.4 The key driver of degradation of ecosystems in rural areas is increasing nutrient loading - particularly of nitrogen (in the form of reactive nitrogen) and phosphorus. There have been unprecedented changes in the global nitrogen cycle due to the introduction of excess reactive nitrogen into environmental systems in the process of fertilizer production/consumption and fuel combustion. Further, rural areas generate solid wastes, particularly at the harvesting stage when the useful part of the plant is harvested leaving the remaining as waste; at the post-harvest processing stage; and at the stage of consumption of fruits, vegetables, and grains. Finally, with the development of communication, rural people are increasingly consuming urban packaged goods, which generate toxic waste causing severe harm to the environment.

Hazardous waste

21.2.2.5 Kerala does not contribute significantly to hazardous waste in India, as discussed above. However, Table 21.6 reveals that Ernakulam district is the hazardous waste capital of Kerala. The district is the top contributor of the amount of hazardous waste generated in the State, producing about 45,560 metric tonnes of hazardous wastes annually. Ernakulam is followed by Kollam (18,302 metric tonnes) and Thiruvananthapuram (2,679 metric tonnes). The extent of waste generation has declined over time in most districts, possibly due to improved use of technology; but in Ernakulam it has increased.

Table 21.6: Hazardous waste generated in Kerala by district: March 2007 and 2009-10

District	*Total Quantity (MTA)*		*Disposal in landfills (MTA)*		*Recyclable (MTA)*		*Incinerable (MTA)*	
	Mar-07	*2009-10*	*Mar-07*	*2009-10*	*Mar-07*	*2009-10*	*Mar-07*	*2009-10*
Alappuzha	3107	883.59	2697	294.67	380	559.27	30	29.65
Ernakulam	41506	45560.81	14531*	28518.86	18718	13059.79	190	147.16
Idukki	23	19.9	0	0	23	19.9	0	0
Kannur	479	383.42	155	148.09	324	235.33	0	0
Kasaragod	556	19.67	15	0.32	541	19.35	0	0
Kollam	30831	18302.68	30790	18265	41	37.68	0	0
Kottayam	859	916.99	27	2.4	832	914.59	0	0
Kozhikode	544	541.83	101	100.34	441	440.99	2	0.5
Malappuram	97	151.83	8	30	89	121.83	0	0
Palkkad	780	1212.69	164	944.45	616	265.88	0	2.36
Pathanamthitta	57	56.16	34	0	23	15.75	0	0

District	*Total Quantity (MTA)*		*Disposal in landfills (MTA)*		*Recyclable (MTA)*		*Incinerable (MTA)*	
	Mar-07	*2009-10*	*Mar-07*	*2009-10*	*Mar-07*	*2009-10*	*Mar-07*	*2009-10*
Thiruvananthapuram	2626	2679.49	1887	1857.3	738	823.1	1	0
Thrissur	1398	281.67	1114	86.97	284	191.05	0	3.65
Wayanad	36	47.23	1	1	35	46.23	0	0
Total	82,899.00	71,057.95	59,591.00	50,249.41	23,085.00	16,749.72	233	183.32

Note: MTA – Metric tons per annum *__Includes other categories of waste__
Source: The Hindu, Feb13,2012 & Kerala Pollution Control Board

21.2.2.6 Kochi is projected to be a global city in Kerala by 2030. But, the quality of environment in the city may pose a major challenge for it to meet the target.

21.2.2.7 Overall, land and soil pollution is not only polluting the environment of the state, but is also threatening the coastal ecosystems through coastal erosion.

21.2.3 Water Pollution

21.2.3.1 Water pollution is a serious problem in Kerala, as biological, toxic, organic, and inorganic pollutants contaminate almost 70 per cent of its surface water resources and a growing percentage of its groundwater reserves. In many cases, these sources have been rendered unsafe for human consumption as well as for other activities, such as irrigation and industrial needs. This shows that degraded water quality can contribute to water scarcity, as it limits its availability for both human use and for the ecosystem. Since backwaters based tourism and marine resources provide livelihood to a significant proportion of Kerala's population, water pollution can have a wide ramification on its economy.

21.2.3.2 The irrational and unsustainable water withdrawal from groundwater sources, tanks and reservoirs are on the increase. As a result, a large number of habitations are affected by water quality problems. Table 21.7 provides a snap shot of the water quality affected habitations in Kerala and its selected neighbouring states. As the table shows, fluoride, nitrate, iron and salinity affected sizeable population and habitats in Kerala. Incidentally, many of these habitats are located in tribal dominated areas.[4] Efforts are being made to cover all the affected habitats in Kerala with safe drinking water with central funding[5].[6] Construction of check dams can help to overcome many of these problems.

[4]www.indiastat.com
[5] Under the Govt. of India's plan, 90 per cent quality affected habitations in these categories are covered through surface water alternate sources and 10 per cent through treatment by low cost technologies. In respect of iron, however, 30 per cent quality affected habitations will be covered by surface water sources and 70 per cent by treatment. In regard to nitrate-affected habitations, 100 per cent habitations are covered through surface water alternate sources.
[6]Urban habitats are generally provided by safe drinking water by municipalities.

Table 21.7: Contamination wise number of Habitations and affected Population in the selected states: As on 01/04/2012

		Andhra Pradesh	Karnataka	Kerala	Maharashtra	Tamil Nadu	India
Fluoride	Habs (% of total)	83.8	47.8	11.3	28.9	0.9	17.3
	Pop.(lakh)	2.1	30	2.1	11.8	0	111.7
Arsenic	Habs (% of total)	0	0.3	0	0	0	4.1
	Pop.(lakh)	0	0.3	0	0	0	46.4
Iron	Habs (% of total)	0	16	62.6	20.2	76.7	53.9
	Pop.(lakh)	0	7.7	12.8	4.9	1.8	238
Salinity	Habs (% of total)	16.2	12.5	19.9	20.5	21	23
	Pop.(lakh)	0.7	7.7	3.4	6	0.5	86.2
Nitrate	Habs (% of total)	0	23.5	6.1	30.5	1.3	2.6
	Pop.(lakh)	0	13.5	1.3	12.7	0	33

Note:

1. Habitations With Any Contamination Including Arsenic Are Counted Under 'Arsenic' Row
2. Habitations With Any Contamination Including Fluoride And Without Arsenic Are Counted Under 'Fluoride' Row

Source: CPCB website

21.2.3.3 Expectedly, infrastructure for drinking water testing is needed if habitats are to be provided with safe drinking water. Compared to other neighbouring states, Kerala is slow in this respect (Table 21.8).

Table 21.8: Number of drinking water testing laboratories in selected states: 2008-09 to 2011-12

States/UTs	2008-09	2009-10	2010-11	2011-12*
Andhra Pradesh	0	0	27	0
Karnataka	43	15	10	1
Kerala	**0**	**9**	**1**	**0**
Maharashtra	9	0	0	1
Tamil Nadu	30	0	44	0
India	**91**	**64**	**257**	**123**

*Up to 16.3.2012

Source: www.indiastat.com

21.2.3.4 The picture seems to be too dismal in respect of water quality testing laboratories (Table 21.9).

Table 21.9: Number of water quality testing laboratories and manpower in district laboratories in selected states: 2010-2011

States/UTs	No. of District Water Testing Laboratories	Manpower in District Laboratory	No. of Sub-Divisional Laboratories set up
Andhra Pradesh	51	259	27
Karnataka	41	261	71
Kerala	**14**	**93**	**16**
Maharashtra	30	232	381
Tamil Nadu	63	126	46
India	**691**	**2176**	**814**

Source: www.indiastat.com

21.2.3.5 Lately, the centre has been providing funds to research institutions/universities/State Pollution Control Boards under the National Water Quality Monitoring Programme. Kerala seems to have made considerable progress in obtaining funds under this scheme (Table 21.10).

Table 21.10: Central Pollution Control Board (CPCB) funds to under National Water Quality Monitoring Programme in selected states: 2006-07 to 2009-10 (% in All India allocation)

States/UTs	2006-07	2007-08	2008-09	2009-10
Andhra Pradesh	5.5	6.4	7.5	12
Karnataka	5.2	7.6	4.9	4.1
Kerala	**5**	**6.9**	**10.3**	**8.5**
Maharashtra	6.9	11	9.2	12
Tamil Nadu	5.4	5.6	4.8	3.6
India	100	100	100	100

Source: Central Pollution Control Board

21.2.3.6 Water cess is one source of supplementing finance for pollution control activities. As Table 21.11 indicates, Kerala has collected only Rs 113 lakhs from water cess during April, 2007-December, 2008. This is only 0.06% of the state's NSDP (Table 21.11).

Table 21.11: Water cess collected in selected states

(Rs. In Lakhs)

States	Collection of Water Cess from April, 2007 to December, 2008	As percentage of states NSDP	Amount of Water Cess Reimbursed till date against these Collections
Andhra Pradesh	5025.49	1.31%	866.13
Karnataka	600.61	0.23%	88
Kerala	**113.84**	**0.06%**	**34.1**
Maharashtra	5692.54	0.84%	1066.1
Tamil Nadu	1465.43	0.41%	299.88
India	**37416.6**		**8179.9**

Source: www.indiastat.com

21.2.3.7 With regard to polluted river stretches in India, there are in total 150 such stretches in India (Table 21.12), out of which, 3 are in Kerala. One of the main causes of such pollution is that only 50% of all wastes are being treated in Kerala. The rest is dumped in ponds, land etc, part of which mix in rivers and backwaters.

Table 21.12: Number of polluted river stretches in selected states (As on June, 2010)

States	River	No. of Polluted Stretches
Andhra Pradesh	Godavari, Krishna, Manjira, Musi, Maner, Nakkavagu, Pennar and Tungabhadra	9
Maharashtra	Bhima, Godavari, Mula&mutha, Pawana, Panchganga, Patalganga, Indrayani, Koyna, Kundalika, Kalu, Kanhan, Kolar, Mithi, Tapi, Girna, Nira, Weinganga, Wardha, Krishna, Purna, Nira, Chandrabhaga, Venna river, Ulhas, Rangavali and Bhatsa	28
Tamil Nadu	Adyar, Coovum, Cauvery, Noyyal, Vaigai, Tambiraparani, Bhavani and Palar	9
Karnataka	Bhadra, Tunga, Tungabhadra, Laxmantirtha, Kali, Krishna, Hundri, Kundu, Arkavati and Malprabha	11
Kerala	Karamana, Puzhackal and Kadambayar	3
India		**150**

Source: www.indiastat.com

21.2.3.8 Water pollution in Kerala has a significant cost for her inhabitants, ecosystems and biodiversity. The principal source of water pollution is industry. During a study, it was observed that even though many industries have effluent treatment, they did not comply with prescribed pollution standards (Murthy, 2011)[7]. Further, in Kerala, there are a significant number of small-scale industrial units contributing to almost 30-40 per cent of the industrial water pollution. Due to the presence of scale economies in water pollution reduction, it is uneconomical for these units to have effluent treatment plants (ETPs) of their own (Murthy et al. 1999)[8]. Thus, steps need to be taken to reduce this source of water pollution. Of course, small-scale units located in many industrial estates have gone for common effluent treatment plants (CETPs), but these are inadequate. SMEs need financial assistance and technical guidance for their installation.

21.2.3.9 Agricultural run-offs affect groundwater and surface water sources as they contain pesticide and fertilizer residues (Murthy, 2011). Fertilizers have an indirect adverse impact on water resources. By increasing the nutritional content of water courses, fertilizers allow organisms to proliferate. These organisms may be disease vectors or algae. The proliferation of algae may slow the flow in water courses, thus increasing the proliferation of organisms and sedimentation. In Kerala, the level of fertilizer/pesticides is lower compared to other Indian states (Chapter 5). However, the pattern of rainfall in Kerala is intense. So, the possibility of pollution from agricultural run-offs exists.

21.2.3.10 Finally, Kerala's construction boom may have its economic spin-offs, but has had a disastrous impact on its water resources, due to illegal mining from the rivers, river banks and paddy lands. Attempts to regulate it through the district administration and police have not been able to curb this menace. It must be recognized that sand mining is directly related to the construction industry.

21.2.3.11 Polluting rivers and ponds have a direct implication for the wetlands of Kerala, which is an important part of the ecosystem of Kerala. As mentioned in Chapter 1, they serve as buffer or food, water and drainage, function as groundwater recharge sites, offer habitat for a variety of plants and animals, breeding sites of several aquatic species, help in maintaining the local microclimate and help in carbon sequestration. However, this ecosystem is subjected to severe quality degradation in the state due in part, to land and water pollution. The problem has assumed alarming dimensions due to the filling up of wetlands and paddy growing areas and their conversion into built-up areas. Protecting this important ecosystem from further degradation will be a challenge for the government.

[7]Murthy, M.N. and Kumar, Surenda (2011) "Water Pollution in IndiaAn Economic Appraisal," Chapter 19, India Infrastructure Report, 286-298.
[8]Murty, M.N. and U.R. Prasad (1999) 'Emissions Reductionand Influence of Local Communities in India', in M.N.Murty, A.J. James, and SmitaMisra (eds), Economicsof Industrial Pollution Abatement: Theory and EmpiricalEvidence from the Indian Experience, Oxford UniversityPress, Delhi.

21.2.3.12 The effects of water pollution are thus serious on the inhabitants. It causes a high incidence of water borne diseases, with rising health expenditure, physical disabilities/death in extreme cases, and loss of work due to ill health.

21.2.4 Air Pollution

21.2.4.1 Air pollution is relatively less serious in Kerala. A major source of Greenhouse Gas (GHG) emission is production of electricity through coal–based thermal power stations. In this respect, Kerala is fortunate due to a high proportion of hydropower generation (see, Chapter 15 on Energy)

21.2.4.2 However, it is likely to increase in future. Table 21.13 provides our estimates of GHG emission in Kerala over the period under observation, i.e. 2010-11 to 2030-31. As Table 21.13 shows, per capita emission of Kerala would rise from 1.5 tonne in 2010-11 to 5.33 tonne in 2030-31. One of the assumptions is that the share of hydro-power energy will drop to 20% from the current 81% in the business-as-usual scenario. The fall in share of hydroelectric electricity will partly be responsible for the steep rise in GHG emissions (see, Appendix 21A for the methodology and Table 21A.1 for sectoral GHG emission)

Table 21.13: Forecasted GHG emission in Kerala

Sectors	Emission in Preferred Scenario (Tonnes of CO2 Equivalent)				
	2010-11	2015-16	2020-21	2025-26	2030-31
Total	50084439	61625092	86183590	121126830	174579604
Per Capita Emission	1.5	1.83	2.54	3.57	5.33

Note: Emission of CO2, CH4, and N2O are accounted for.

Source: NCAER's Estimate

21.3 Financing pollution abatement

21.3.1 The biggest problem in cleaning up or abatement of water pollution is finance. Neither the municipal bodies, nor the state pollution control board have the funds to carry out clean up activities. Given the poor state of affairs of state finance, the government is unable to fund such activities. The total requirement of funding will further increase over the next 20 years. We have projected funding requirements for pollution abatement and presented it as under:

Cost of solid waste and sewerage management

21.3.2 The state generates a large volume of municipal wastes and biomedical waste. These wastes, with the rise in population, income, urbanisation and changes in consumption pattern would increase substantially in the future. The state has to make substantial investment for their proper disposal. Table 21.14 presents:

- The amount of capital required to be invested in sewerage network, treatment plants, and solid waste management to meet the incremental demands in 2020 and 2031 and the additional capital investment required to meet the current backlog. The capital cost of solid waste management involves collection; transport, treatment and disposal equipments/ vehicles; storage and annual operations; and maintenance (O&M) costs ;

- The cost of treatment of biomedical wastes (BMW). It is estimated to be around Rs 26 per kg, which can be substantially reduced to Rs 10 per kg by an innovative method used in Surat[9].

Table 21.14: Investment requirement of waste management*(Rs Crore) (2011-12 prices)

	Total Solid waste management		Sewerage network and treatment plant		Bio-medical waste (BMW)	
Year	Total Capital cost	Total Operational and Maintenance Cost (O&M) costs	Total Capital cost	Total O&M costs	Annual cost of treatment of BMW @ Rs 26 per kg	Annual cost of treatment of BMW @ Rs 10 per kg
2020	1173	353	6523	879	48.79	18.76
2031	1345	405	8146	1008	47.03	18.09

**See Appendix 21B for assumptions*
Source: NCAER's estimates

21.3.3. Sewerage network and treatment infrastructure costs to meet the requirement of the urban population of 2020 would be Rs 6,523 crores and that of 2031 would be 8,146 crores at 2011-12 prices. Correspondingly capital costs for solid wastes management are projected to be Rs 1,173 crores and Rs 1,345 crores respectively. Operations and maintenance costs of sewerage management and solid waste management would be no less costly. The annual cost of treatment of biomedical waste based on conventional method is projected to be Rs 48.8 crores in 2020 and Rs 47 crores in 2031 (Table 21.14). These figures are substantially reduced when the innovative Surat-based techniques are applied. It is shown in the table that the annual cost of treatment of BMW would be Rs 18.8 crores in 2020 and Rs 18 crores in 2031.

21.3.4 Given the poor state of finances of the municipalities, local bodies, etc, it is always a problem for them to find funds for capital expenditures; and operation and maintenance expenditures for disposal of urban waste.

[9]http://www.spipa.gujarat.gov.in/images/bio_medical_waste_report_surat.pdf

The cost of industrial water pollution abatement

21.3.5 Table 21.15 quantifies industrial water pollution abatement costs. According to our estimate, Rs 200 crores is required in the base year (2010-2011) for industrial water pollution abatement, assuming that 50% of the industrial establishments need investments for water cleanup. Clearly, if industrial GSDP increases, more finance would be required. Of course, non-industrial GSDP is also another source of water pollution. To that extent, the cost of water pollution abatement would rise. In this context, it may be noted that the cost of avoidance is much lower than the damage costs[10]. So, it is in everybody's interest that a 100% water pollution abatement policy is adopted.

Table 21.15: Cost of Water Pollution Abatement

Indicator	Gross State Domestic Product (GSDP) at Factor Cost	Assuming 50 % of industrial GSDP need investment for controlling water pollution	Assuming 25 % of industrial GDDP need investment for controlling water pollution
	2010-2011	2010-2011	2010-2011
	Rs Crores	Rs Crores	Rs Crores
Industrial GSDP (Manufacturing)	16014.96	8007.48	4003.74
Finance required for Clean-up		200.19	100.09

Source: Calculated by NCAER

Non-compliance

21.3.6 Finally, non-compliance of the stipulated environmental rules also appears to be a challenging issue (Table 21.16). It is noteworthy that the non-compliance rate has been the highest in Kerala, with 16-18% of the firms not complying with the 'set-up standards' during 2009 and 2010[11]. The national average is 10-13%. Tamil Nadu seems to have an edge, with the non-compliance rate being as low as 0-4%. Thus, it seems that Kerala needs to improve the compliance rate also.

[10] Parikh, J. (2004), 'Environmentally Sustainable Development in India', available at http://scid.stanford.edu/events/India2004/JParikh.pdf last accessed on 23 August 2008.

[10]Murthy, M.N. and Surender Kumar (2002), 'Measuring Cost of Environmentally Sustainable Industrial Development in India: A Distance Function Approach', Environment and Development Economics, Vol. 7, pp. 467–86.

[11]http://www.indiastat.com/environmentandpollution/11/pollutingindustries/216/stats.aspx

Table 21.16: Status on Grossly Polluting Industries: Kerala vis-à-vis Selected States (Number)

Time period	Status	States/Uts				
		Karnataka	Kerala	Maharashtra	Tamil Nadu	India
July, 2009	Complying	114	25	367	190	1940
	Not Complying	7	9	61	0	296
	Closed	9	15	68	30	479
	Total	130	49	496	220	2715
December, 2010	Complying	119	24	237	215	1924
	Not Complying	9	8	8	9	345
	Closed	12	17	69	9	339
	Total	140	49	314	233	2608

Source: IndiaStat.com

21.4 The government initiatives

21.4.1 Kerala has been undertaking several green management initiatives, both at the state and the local government level. To highlight a few: the participatory resource mapping programme; regulatory support and services for pollution control; environment management initiative for various development sectors (for instance, agriculture, industry, tourism); protection of ecosystems of Kerala; and the coastal zone management.

21.4.2 The Kerala State Environment Policy 2009 highlights the state vision for environmental upgradation and has suggested the approach, strategies and action plan for achieving the implicit and explicit objectives for realising the vision. The vision of the Policy is:

21.4.3 "To ensure clean air, water, soil and food to the people of Kerala and its sustainability for a healthy living condition"

21.4.4 It sets the following objectives:

- Ensure conservation of natural resources, including species, ecosystems, and genetic wealth of the State.
- Ensure equitable access and sustainable use of resources, for all sections of the society, particularly the poor, whose survival depends on the availability of natural resources.
- Optimise the efficiency in environmental resource use.
- Promulgate guidelines and policies for waste disposal, especially for those emanating from industrial and municipal sources.

- Integrate environmental concerns in economic and social development.
- Apply the principles of good governance (transparency, rationality, accountability, reduction in time and costs, participation, and regulatory independence).
- Create environmental awareness for all sections of the society.

21.4.5 It also proposes action plans to achieve the objectives. However, the proposed action plans are essentially implemented through project-mode operations. Further, the action plans are based on the end-of-the- pipe approach. The way forward is "environment mainstreaming". This is the underlying principle of the environment strategy proposed in this document.

21.5 Environment mainstreaming: The way forward

21.5.1 The proposed knowledge-driven sustainable development strategy seeks to identify and develop actions to enable Kerala to achieve continuous improvement in the quality of life of its people, through the creation of sustainable communities that are able to manage and use resources efficiently, able to tap the ecological and social innovation potential of the economy, and in the end, able to ensure environmental prosperity.

21.5.2 The underlying principle of the new strategy is "mainstreaming environment". 'Environmental mainstreaming' is the informed inclusion of relevant environmental concerns into sectoral development strategies, rules, plans, investment and action. It means systematically integrating environment concerns, based on informed trade-offs, into policies and strategies of all sectors. Environmental mainstreaming is a major, practical component of sustainable development. It results in a better understanding of the capabilities of environmental assets, the consequences of environmental hazards, and the real or potential impact of development on the environment. This is a proactive way of addressing environment.

21.5.3 The **vision** of the strategy is to**:**

21.5.4 "Achieve economic prosperity, which is characterized by "ecosystem resilience". Ecosystem resilience can be defined as the capacity of an ecosystem to tolerate disturbance, without destabilizing the environmental conditions. This means that Kerala will shift towards a resource-efficient, ecosystem-resilient, and low-carbon economy which ensures clean air, water and living environment to both the present and future generations of the people of Kerala."

21.5.5 Thus the mission is to achieve economic prosperity, which is enjoyed by both the present and the future generations.

21.5.6 The **targets** are to:

- Boost economic performance, while reducing resource use.

- Upgrade ecosystems, biodiversity, and resources, through sustainable production and consumption patterns.
- **Increase energy efficiency** to save **20**% of Kerala's energy and water consumption per unit of production by 2030.
- Maintain recycle targets of 60-75% of waste generation, depending on the type of waste.
- Identify and maximise the use of sustainable resources (renewable energy, for instance).
- Protect wetlands and coastal zone.
- Conserve the World Heritage biodiversity of Western Ghats.

21.5.7 The **pillars** of strategy are:

- Clean production systems.
- Sustainable production and consumption patterns.
- Land planning and protection of eco-systems.
- Solid waste management.
- Climate change and Carbon Finance.
- Promotion of R&D and innovations.

Pillar 1: Clean Production Methods (Promotion of circular economy)

21.5.8 Cleaner Production means an integrated production system, which reduces risks to humans and the environment. It includes, conserving raw materials and energy, eliminating toxic raw materials, and reducing the quantity and toxicity of all emissions and wastes before they leave a process. It is based on the principle of 3Rs: reduce emission of pollutants and waste; reuse resources; and recycle by-products. It is implemented at three levels:

- **Enterprise level:** At the first level, increase resource efficiency within an enterprise, to contribute to the goal of creating more value while using fewer resources. Cleaner production is achieved by applying know-how, by improving technology, and by changing attitudes. Tools are developed to monitor, benchmark and promote resource efficiency, taking into account a life-cycle perspective.
- **Local production level:** The second level is to reuse and recycle resources within industrial parks, and clustered or chained industries, so that resources circulate fully in the local production system.
- **Regional level:** The third level is to integrate different production and consumption systems in a region, so that the resources are circulated among industries and urban systems. This level requires development of municipal or regional by-product collection, storage, processing, and distribution systems.

21.5.9 The economy based on the principle of 3Rs is known as the "circular economy", where waste produced in one segment of the economy is the raw material for another segment. The Perspective Plan document has already proposed strategic elements of cleaner

production systems for each sector in the respective chapters (Chapters 3-16). In a nutshell, these are as follows:

- Integrated production systems for agriculture and allied sectors (Chapters 5-8).
- Clean Production Technologies, and eco-friendly parks for industries (Chapter 9).
- Waste management, energy and water conservation practices in tourism (Chapter 11).
- E-waste policies in ICT (Chapter 12).
- Energy saving and energy composition (Chapter 15).
- Water conservation, recycling and reuse (Chapter 16).
- Clean, compact and smart cities and rural areas in spatial strategies (Chapter 13).
- Reduce, recycle and reuse solid waste management strategy (Chapter 13).
- Green transportation in the transport sector (Chapter14).

21.5.10 Capacity building initiatives will be undertaken for producers and other economic agents to optimise their production processes, reduce environmental impacts, and make more effective use of resources, with an effective coordination between the Department of Environment and other departments.

21.5.11 In order to fully tap its potential for improving resource efficiency of production processes, the action plan will be as under:

Regulatory instruments

- mandatory take-back for enterprises;
- minimum recycled content standards;
- secondary materials utilization rate requirements;
- energy efficiency standards;
- disposal bans and restrictions;
- materials bans and restrictions; and
- product bans and restrictions.

Economic instruments

- advance disposal fees;
- higher taxes on new materials
- removing subsidies for virgin materials;
- environmentally-preferable products procurement.

Direct measures

- raising awareness through conferences and seminars;
- organizing training for producers, with industrial organization playing an important role;

- provision of cleaner production technologies in all public facilities;
- development of eco-friendly parks to move to second and third levels of its implementation (as mentioned above).

21.5.12 There have been International agencies such as the UNEP (UN Environment Policy) and the UNIDO (United Nations Industrial development Organisation) that have produced a series of reports on government strategies and policies for cleaner production, as well as case studies of cleaner production worldwide. UNIDO has also established a network of 24 National Cleaner Production Centers since late 1994, including one in India. GUJARAT has its own Cleaner Production Centre, which plays an important role in educating, and permeating and providing knowledge and expertise, to tackle various environmental issues. It is actively engaged in the promotion of Cleaner Production (CP)/Clean Technology (CT), through its various activities like, Orientation Programme, CP Assessment Projects, CT Assessment Projects etc. It has taken up demonstration projects in many industries belonging to various sectors, i.e. Dyes & Dye Intermediates, Pharmaceuticals, Textile, Fish Processing, Petrochemicals etc. The results of these projects are very encouraging. It is proposed that the Kerala government should also take proactive steps in this direction.

21.5.13 We propose that along with other environment-specific policies, there is need to have a "Clean Production Policy", with specific rules on resource efficiency and recycling, so as to promote circular economy.

Pillar 2: Sustainable production and consumption patterns

21.5.14 The strategy aims at expanding the green economy, by inducing environmentally sustainable production and consumption patterns. A range of policies are recommended to promote such patterns:

- **Set standards for energy efficiency:** Establish a framework for setting ecological design requirements for energy-using products and addressing specific aspects of the life cycle of products, such as waste. The scope of the Directive on energy-using products will be extended to cover all energy-related products. Minimum requirements will be set for products with significant environmental impacts, focusing on key environmental aspects. To provide markets with information on best performing products, advanced benchmarks of environmental performance will also be identified. Periodic reviews of minimum requirements and advanced benchmarks will take place, to adapt them to technological change and provide businesses with a long-term perspective of future regulatory environment. It is also important that the share of renewable energy is increased in total energy production (see, Chapter on Energy in this report).
- **Public procurement of resource-efficient products:** Implement incentives and public procurement, to stimulate the production of, resource-efficient products. For instance, implement regulations to encourage state authorities to purchase office equipment meeting specific levels of energy efficiency. Under the new

NMP (National Manufacturing Policy), provisions are there to use public procurement as a policy tool to encourage local value-addition in specific areas. Kerala can use this aspect to give a message to producers that policy-makers prefer clean production process or green goods, which are produced within Kerala. For instance, if public procurement from SMEs within Kerala were made conditional upon their adoption of environmental friendly measures, they would have an incentive to control pollution.

- **The Labeling of Products:** Labeling will be used for indicating, on the one hand, energy consumption/savings and, on the other hand, any other relevant and significant environmental parameters of the product. It will act as a "label of excellence", signaling to consumers that the product has taken into consideration many environmental criteria, over its life-cycle. Labeling criteria will continue to cover a broad range of environmental aspects. Furthermore, 'Eco label criteria' may also be developed to cover those products for which eco design requirements have not yet been set. Labeling of products will include:

  - seal-of-approval types of environmental labeling (Green Seal, Blue Angel);
  - environmental information labeling (energy efficiency labeling, CFC use);
  - product environmental profiles for the whole life cycle of materials;
  - product hazard warnings;
  - product durability labeling.

- **Raising awareness among consumers and producers:** A range of other actions will be implemented together with retailers and producers to "green" their own activities and supply chains; raise consumer awareness at large and make them more proactive. For example, the proposed actions would increase the current rates of home refurbishment that use better performing windows and improved insulation, thus enabling households to reduce their energy consumption, direct and indirect greenhouse gas emissions and save on heating.

- **Fiscal Incentives:** A possible fiscal incentive mechanism may be developed, to encourage the production and consumption of green products.

- **Consistent data and methods on products:** To implement this policy, consistent and reliable data and methods are required, to assess the overall environmental performance of products, their market penetration, and to monitor progress. Data on products and related environmental impact required and collected by using different tools, should be shared, wherever useful. Such methods also need to be cost-effective and easy to apply, for policy makers and for industry.

- **Work with Retailers and Consumers:** Retailers are in a strong position to influence more sustainable consumption through their own operations, supply chains, and consumer behaviour. Retailers and producers are increasingly

recognizing sustainability as a considerable opportunity for their businesses to grow, compete and innovate. However, further effort is needed to reduce the environmental footprint of the retail sector and its supply chain, promote more sustainable products, and inform consumers better. To achieve this, other stakeholders, such as producers as well as consumers, and other non-governmental organisations, will also be involved.

- **Supporting eco-innovation:** Innovation in the area of environmental goods and services is central to the successful implementation of this Plan, and plays a key role in its innovation policy. Innovations leading to reduced expenditure in this area would give impetus to a clean environment. In this respect, one can learn from the experiences of other countries, particularly those in the developed world. One of the available indicators to measure the level of innovation is the number of patents in a certain area. According to the OECD, eco-innovation patents in the EU are on the rise, and the best- performing Member States have been granting 3.5 patents per billion GDP (in Euro) annually. The S&T Department of Kerala needs to initiate projects and collaborate nationally and internationally to promote green innovations

- **Technology licensing:** It is also important that the Department of S&T scouts the globe for identifying the best green technologies; acquires them and adapts them to their requirement (see, Chapter 18). An Israeli company called Arrow Ecology Company, for example, has developed an ArrowBio system that provides the most innovative solution for waste disposal. This takes trash directly from collection trucks and separates organic and inorganic materials through gravitational settling, screening, and hydro-mechanical shredding. The system is capable of sorting huge volumes of solid waste, salvaging recyclables, and turning the rest into biogas and rich agricultural compost. The system is currently used in California in the US, Australia, Greece, Mexico, United Kingdom and Israel. An ArrowBio plant that has been operational at the Hiriya landfill site since December 2003, serves the Tel Aviv area and processes up to 150 tons of garbage a day. Given the scarcity of landfill sites in Kerala, this may be introduced in its big cities. Under the *technology acquisition and development* fund of the new NMP, green energy development and use of green equipments are encouraged. However, the awareness level of various aspects of this scheme is low. The Kerala government has a role to play in this respect.
- **Industrial policy initiatives for environmental goods and services producing industries:** The environmental goods and services sector (EGSS), also called 'environment industry' or 'eco-industries' consists of a heterogeneous set of producers of goods and services aiming at the protection of the environment and the sustainable management of natural resources. These industries contribute to improving the energy efficiency and environmental performance of the economy. To increase their uptake by other industries, initiatives will have to be developed to promote the former. For this purpose, a comprehensive screening of regulatory

barriers and market failures that hamper the competitiveness of environmental industries, and their uptake by other sectors of the economy will be carried out. This will address issues such asthe expansion of internal markets , better regulation, standardisation and access to finance. The potential of information and communication technologies to deliver sustainable solutions will be explored. Specific attention will be given to priority areas identified by the Lead Market Initiative.

- **Helping SMEs:** Lack of information, insufficient expertise and scarcity of financial and human resources make it difficult for SMEs to fully exploit the business opportunities offered by sound environmental management.

Pillar 3: Land planning: Protection to biodiversity and eco sensitive areas

21.5.14 Mainstreaming biodiversity

- Mapping of resources.
- Creating data on biodiversity.
- Raising awareness of biodiversity conservation.
- Encouraging individuals and private organisations to participate in biodiversity conservation.
- Integrating biodiversity into decision-making, so that it becomes everyone's business and is part of every relevant transaction, cost and decision.

21.5.15 Land Planning

- Integrate protection of biodiversity and wetlands in land planning, as suggested in Chapter 17.
- Develop Coastal Zone Protection Plan based on the categorization of the coastal zones under the CRZ (2011) notification (also see, Chapter 7 on Fisheries).

21.5.16 Enhance strategic investments and partnerships

- Cooperation between different parts of the community is essential for effective biodiversity conservation. Increasing investment in biodiversity conservation by the private sector and collaboration between government and other sectors will enable them to make best use of the financial and practical resources that are available to address biodiversity decline. Markets and market-based instruments also provide a way to value biodiversity, so that it can be considered alongside economic and social factors. These mechanisms are emerging as an effective means of creating incentives for long-term investments in biodiversity conservation, as a complement to regulatory measures.

Pillar 4: Solid waste management

21.5.17 Kerala needs to make a long-term plan and adopt policies and programmes with separate targets for household, municipal, medical, electrical/electronics, industrial, construction and demolition wastes generated in massive quantities every year. This is essential in order to protect the highly fragile ecology of its coast, backwaters, rivers and forests; and also to protect human health. As already indicated, since wastes are of different types and generated at different stages, such as in production, distribution/ transportation and consumption/ usage, different approaches would be needed for their treatment, collection or disposal. Within the broad strategic framework prepared by the State government, the local government, based on the local urban needs, will undertake planning for solid waste management. Local governments need to be encouraged to undertake city-wide strategic planning, to design and implement integrated solid waste systems that are responsive to dynamic demographic and industrial growth. The strategy and action plan should identify a clear set of integrated actions; responsible parties; and the required human, physical and financial resources. This strategic framework should include the following strategic elements:

21.5.18 Engaging an affordable mix of appropriate technical options to Reduce, Reuse, Recycle & Reject

- Promotion of waste reduction at the source of generation.
- Separation of waste at source of generation.
- Take-back schemes
- Composting & home gardening.
- Research into anaerobic digestion.
- Scientific handling of clinical and hazardous waste.
- Door-to-door collection of household waste.
- Setting up polluter pay system for special waste, like, demolition waste, some hazardous waste etc.

21.5.19 Involving all major stakeholders in the implementation

- Creation of Institutional mechanisms, such as working groups and regular city consultations, to involve the residents individually and collectively.
- Conducting of community-based civic education programmes.
- Setting up Ward level Environment Management Committees, with the participation of residents' and shopkeepers' welfare associations.
- Setting up of School Environment Committees to get involved in social mobilization.
- Promotion of urban horticulture.
- Recognition and facilitation of the private informal sector.
- Engagement and facilitation of NGOs and CBOs.

21.5.20 Promoting Private-Municipal Partnerships

- Street beautification through private sector participation.
- Assistance to recycling industries.
- Stricter environmental appraisal of construction plans.
- Stricter fines for breaches of Solid Waste Management (SWM) regulations.
- Promotion of social entrepreneurs in waste collection and reprocessing.
- Creation of a Vigilance Squad on Environment involving.

21.5.21 Strengthening institutional SWM capacity

- Capacity-building for Decentralized SWM.
- Staff mobilization, training and education.
- Strengthening the Municipal powers.
- Publication of an Annual Report on the Status of city environment.
- Formulation and follow-up of a Strategy Implementation Plan.
- Computerized Complaints Redress System.
- Improved Management & Monitoring.

21.5.22 Enforcing laws and policy

This can be achieved by offering incentives to municipal authorities to deliver better services, recover more costs from users, and cooperate with neighboring municipalities to achieve economies of scale. Kerala may draw on the international experience. EU, for instance, has an elaborate institutional set-up for environment. Box 21.1 describes the institutional framework for solid waste management.

Box 21.1 : EU institutional framework for solid waste management

The Environment Action Programme of the EU proposes to 'decouple' waste generation from economic growth. EU legislations on waste generation and treatment started in 1975, and till date there are more than 20 pieces of legislation relating to waste management. These laws intend to bring about major changes in the traditional practice of widespread dumping of waste in landfills. The wastes are now imaginatively exploited - re-used, recycled or treated, to produce energy as well as organic compost. The 1999 Landfill Directive directed the member states to reduce the amount of biodegradable material going to landfills to 75 per cent by 2006, to 50 per cent by 2009 and to 35 per cent by 2016. The Waste Framework Directive of 2008 also contains specific targets: Member states have to take necessary measures 'designed to achieve' a target of recycling 50 per cent of waste from households by 2020, and a target of recycling, reusing or recovering 70 per cent of non-hazardous wastes generated through construction and demolition by 2020. According to the 2002 Directive on Waste Electrical and Electronic Equipment (WEEE), and subsequent agreement in February 2012, member states, from 2016, must recycle 45 per cent and after 2019, 65 per cent, of the weight of all EEE put on the market in the previous three years. WEEE generated from businesses and households amounts to about 11 kg per person in the UK.

It was emphasised that higher landfill charges would reduce the amount of waste sent to landfill and would tend to push waste for recycling and composting. EU waste legislation is calculated to have the potential to generate 400,000 jobs, apart from substantial environmental cost reduction.

In the EU27, according to the latest estimates, in 2010, around 38 per cent of municipal waste was landfilled, 25 per cent recycled, 22 per cent incinerated and 15 per cent composted. Recycling is most widely practiced in Germany (45 per cent) and Belgium (40 per cent). The highest rate of waste treated by recycling and composting is found in Austria (70 per cent). Thus, EU waste legislations have resulted in significant successes.

Further, in order to incentivize, annual awards or prizes to highlight and celebrate good waste management practices and progress were introduced, which motivated authorities to improve performance. In 2009, the Commission also introduced a central registry, called CHAP, for the registration and management of complaints from the public that would speed up the EU institutions' responses and improve their answerability to the public. All this have favourable impact on waste management.

Pillar 5: Outcome-Oriented Research and development:

21.5.23 This is the key driver of sustainable development. The government of Kerala has undertaken several initiatives to promote R&D in environment preservation. There are seven R&D centres under the umbrella of the Kerala State Council for Science, Technology and Environment (KSCSTE) that have been assigned specific domains for their R&D work. Of them, five are directly related with environment:

- The Centre for Earth Science Studies (CESS) is established to promote modern scientific and technological research and development studies in earth sciences (problems related to land, sea and atmosphere);
- The Centre for Water Resources Development and Management (CWRDM) focuses on the field of water management;
- The Kerala Forest Research Institute (KFRI) is established to undertake research in areas like forestry, biodiversity etc;
- National Transportation Planning and Research Centre (NATPAC) is undertaking research and consultancy work in the fields of traffic engineering and transportation planning, highway engineering, public transport system, inland water transport, tourism planning, rural roads, environmental impact assessment and transport energy;
- Tropical Botanic Garden and Research Institute (TBGRI) works in conservation and sustainable utilization of plant biodiversity.

21.5.24 Further, environmental education has been integrated in the curricula of various levels of education, as part of the capacity building programme. Finally, the Council also supports research projects in thrust areas under the scheme, "Ecology and environment".

21.5.25 However, there is no evaluation of these programmes. The outcomes need to be made more visible. We propose that the KSCSTE supports outcome based research. Our recommendation is to institute a Kerala Small Business Innovation Research (SBIR) programme to support the most competitive research proposals in thrust areas through competitive bids (see, Chapter 18 for details). Awards under the scheme will be monitored throughout their life cycle and will be commercialized with the help of the Council.

Pillar 6: Climate change and carbon finance

21.5.26 Clean environment does not come cheaply. Adopting a path of green growth concomitant with clean environment implies choosing clean technologies in all spheres of life or adaptation of existing technologies, so that the deleterious effects in the process of production or consumption become minimal. While air quality is not seriously depleted in Kerala, there has been evidence of climate change in Kerala in terms of rise in sea level and sea surface temperature, and increasing monsoon variability[12]. This has had its impact on agriculture, coast erosion, and aquatic life and has increased vulnerabilities related to climate change in the state.

21.5.27 A comprehensive clean production policy, as discussed above, will have to be enforced strictly to address the issue. Generally, these technologies are more costly than the existing ones, which are more polluting. The question is what would be the source of finance. Given the limited financing options for a state government, it is not possible for the state to subsidise these technologies. In this context, clean development mechanism (CDM) may be an avenue for stimulating growth of clean technologies in Kerala.

21.5.28 India has been an active player in CDM projects since its inception under the Kyoto Protocol. The National Clean Development Mechanism Authority (NCDMA), under the Union government's Ministry of Environment & Forest has, so far, approved 2,827CDM projects in the country. Table 21.17 provides summary data of these projects for selected top implementing states along with Kerala. The total Certified Emission Reductions (CER) credits earned by these are around 72.3 crores.. Of the total CDM projects approved in India, almost 13% are based in Maharashrtra, Tamil Nadu and Gujarat each. As this table shows, Kerala has performed miserably with respect to earning CERs, relative to these states. Only 18 of the CDM projects are located in Kerala, amounting to 6.4 lakhs of CERs..

[12] Report of the Working group on Climate Change for the formulation fo the Twelfth Five Year Plan, Submitted to Kerala State Planning Board, 2011.

Table 21.17: Approved CDM Projects in India

me of States/Country	No of Projects	CER upto 2012 (Crore)
Maharashtra	369	6.2
Tamil Nadu	366	5.2
Gujarat	357	12.7
Karnataka	252	7.0
Rajasthan	225	6.3
Andhra Pradesh	209	8.7
Uttar Pradesh	163	3.8
Chattisgarh	105	2.7
Kerala	18	0.1
Others	781	19.7
Total	2827	72.3

Source: www.CDMindia.gov.in/reportslist

21.5.29 Table 21.18 provides the list of 18 approved CDM projected located in Kerala. As this table shows, barring one, all of them are small. Moreover, most are promoted by the private sector. While this has been the trend in other states, there is evidence that in some sectors, state bodies take the lead in promoting CDM projects. Notable among them is the area of waste handling and disposal. Most of the urban centres in India face difficulties in locating new landfill sites for waste disposal. The existing ones have limited spare capacities. In this context, many state bodies have promoted CDM projects with two objectives. First, they earn CERs from the projects and thus supplement their own finance. Second, in the process, part of the waste is converted to compost (organic manure), which is sold as fertilizer, earning them extra revenue. In most cases, methane gases are captured and supplied to units with additional value generation. Above all, this will create space in the existing landfill sites. Generally, more than 50% of solid waste generated in landfill sites is of organic nature, which can be converted to compost. Most of the municipalities in Kerala are facing problems in finding land for waste disposal. Thus, it makes economic sense to develop CDM projects in waste handling and disposal in the large municipal bodies. Moreover, this helps to reduce water and air pollution, since untreated waste percolates through soil leading to water pollution.

Table 21.18: List of Approved CDM Projects in Kerala

Switching fossil fuel in an industrial facility at The Kerala Ceramics Ltd, Kerala .	Small
3 MW Iruttukanam Small Hydro Electric Project, Kerala, India at Viyyat Power Private Limited	Small
Methane recovery from wastewater generated at Paper manufacturing unit of Sree Sakthi Paper Mills Ltd,	Small
Vilangad Small Hydroelectric Project	Small
Kakkayam Small Hydroelectric Project	Small

Kollam Solid Waste Composting Project	Small
Waste heat based power generation at the carbon black manufacturing facility in Kochi	Large
Chathankottunada Stage II SHEP	Small
Renewable Electricity Generation Project at Kerala by M/s Gensol Consultants Pvt. Ltd	Small
Energy efficiency initiative of KDHP by replacing ICLs with CFLs at Munnar, Kerala state, India	Small
9.75 MW Bundled wind power project by M/s Zenith Energy Services (P) Limited	Small
Supply side energy efficiency improvement project implemented by KDHP, at Munnar,	Small
Bundled project for replacement of fuel oil and electricity with biomass gasifier for heat generation by M/s Rubber Research Institute of India (RRII) .	Small
Bundled methane recovery project from sheet processing effluent by M/s Rubber Research Institute of India (RRII).	Small
2 x 3.5 MW Ullunkal Hydro Power Project in Kerala, India in Chittar village, Pathanamthitta District.	Small
Fuel switch project from Furnace Oil to Woody Biomass at Nitta Gelatin India Limited, Kochi,	Small

Source: www.CDMindia.gov.in/reportslist

21.5.30 Renewable energy is one area where a large numbers of CDM projects have been approved. We can see from Table 21.18 that quite a few projects in this area, albeit of small size, have been approved.

21.5.31 Wind power is one area where Gujarat and Rajasthan have made considerable progress. Even though Kerala has wind speed sufficient to generate power, the Kerala government has not shown enough initiative to tap the potential. This is one area where it is easier to earn carbon credits. Kerala can explore wind energy as it has a large potential in the hilly and coastal regions. In many countries and regions with strong winds, particularly in the coastal and hilly areas, electricity is generated by installing wind turbines. For instance, in Portugal, which has a long coastline and large hilly tracts, numerous wind turbines are installed. These meet a significant part of the country's electricity demand. Further, installations of turbine poles are made by the private entrepreneurs on land owned by the communes, who get rent for leasing out their land. This system helps the local governments to raise finances for local developmental works. Kerala can follow such a model, and additionally it can get further benefit through CDM.

21.5.32 The manufacturing sector has maximum number of approved CDM projects. This is basically in the domain of the private sector. As private sector is slow to tap CDM benefits, policy-makers have to sensitise them regarding ways to earn CDM benefits.

21.5.33 Mass transport is one area where the government/semi-government authorities/bodies of other states have benefited from CDM finance. For instance, the Delhi

metro has earned CERs. Kerala does not have a mass-rapid transport system. So, it cannot earn CERs in this area. One avenue could be the introduction of biofuel in the transport sector in Kerala, which may help earn CERs along with reducing air pollution in the urban areas of Kerala. In this context, it may be noted that Kerala, unlike other states, has not made any effort to develop the biofuel sector in the state. It must be mentioned that India has decided to achieve 20% blending target for biofuel by 2017 (Government of India, 2009).[13] According to the ADB's (2011) study, this would create an additional 33.3 million jobs by 2017 for unskilled workers in India. Most of these jobs would be created in the rural areas.[14] If Kerala does not make any efforts to develop the biofuel sector in the state, it will have to forego a major source of job creation in rural Kerala, apart from not earning CERs for biofuel feedstock cultivation, production and use. The policy-makers need to take notice of this fact.

21.5.34 Green buildings are also a sure way to earn carbon credit. Though the other states have made progress in this area, Kerala's progress has been slow. The policy-makers may educate the public regarding the benefits of the same. Since the climatic conditions jn Kerala demand air-conditioning in private/government commercial buildings, green buildings will help in reducing electricity bill. However, given the shortages of skills in the construction of green buildings, the government has to undertake skill development of construction engineers/architects of Kerala.

21.5.35 To conclude, the action plan is to integrate environmental and sustainability considerations into the sectoral strategy, policy and programme formulation; to work in partnership with other agencies, businesses, community groups and individuals; and to work towards sustainability by balancing economic, social and environmental considerations for both present and future generations.

21.5.1Implementation

21.5.1.1 There are two conditions of implementing environment mainstreaming:

21.5.2.2 *Condition 1: Institutional framework*

- Develop simple environmental guidelines / standards for each sector.
- Establish 'environmental units' for sectoral departments. These units will be responsible for mainstreaming environment in policies and rules; exploring environmental alternatives (Box 21.2) and implementing them along with the Department of Environment.

[13] Government of India (2009) National Policy of Biofuel. Ministry of New and Renewable Energy, New Delhi.
[14] Asian Development Bank (2011) India: Study on Cross-Sectoral Implications of Biofuel Production and Use, Project Number 42525.

Box 21. 2 : Environment alternatives: Trucks vs tractors

Waste hauling distances from the towns to the final disposal sites are all quite short, (typically 3 km to 10 km). Where haul distances are short, tractors have proven to be much more cost effective than trucks due to their lower capital and operating costs; lower fuel and maintenance costs; and longer life expectancy. Typically, it has been found in developing countries that tractors fitted with low loading height are more efficient than trucks, where there are haul distances of up to 20 km, or even in some situations 30 km. The annual cost (fuel, maintenance, and depreciation) of the tractor is only about one-third of that of the truck. Typically, the economic life of a truck is only 7-8 years, as compared to 10 years for a tractor. Moreover, the cost of a tractor is significantly lowers than that of a truck.

- Strengthen the Department of Environment
- Introduce new tools, especially policy changes to resolve a number of critical issues, such as biofuels, waste management, and new mining development. Recently, an innovative solution of garbage collection has been introduced in Taipei. The city government charges households and industries for the volumes of rubbish they produce. Waste will only be collected by the city council if it is disposed in government-issued rubbish bags. This policy has successfully reduced the amount of waste the city produces and increased the recycling rate.

21.5.2.3 *Condition 2: Improve capacity for environment management*

- The capacity of the environment authorities in Kerala needs to be strengthened, to enable them to collaborate with all other departments mainstreaming environment, in developing and implementing strategies.
- The capacity of the finance and planning ministries and the local government needs to be strengthened as key 'entry points' for environment authorities to work with.
- Enable the sectors to integrate positive and negative environmental issues.

21.5.2.4 *Green National accounting*

Green National Accounting extends conventional national product measures, by providing better indicators of economic welfare, as it takes into account the sustainability of the national product. Conventional national accounts measure the size of the market or commercial activities, but do not necessarily measure how these activities translate into welfare. Green national accounts are concerned with issues related to the environment. For example, production of certain goods that generate market value contributes to national income, but if the production generates undesirable pollution as a byproduct, say air pollution,

the contribution to welfare might be actually less. Conventional national accounts ignore the reduction in air quality, since air quality is not traded on markets and is left out from conventional national accounts. There have been efforts to model "sustainable development" through the green national accounting system. Substantial progress has been made in this direction. International agency UNESCAP, Bangkok has initiated a global project in this direction. Over the period of 20 years, Kerala will need to shift to a green accounting system to assess its economic prosperity.

21.5.2.5 *Monitoring and evaluation*

21.5.2.6 Effective governance and monitoring of progress are essential to ensure that Kerala achieves the targets set for itself. The governance and monitoring will take place within the framework of the strategy proposed in the Kerala Perspective Plan 2030 and will integrate the relevant elements of the Sustainable Development Strategy in order to ensure overall coherence. It will be based on an analysis of policies across various sectors. It will require baseline surveys, mapping and inventory of its natural resources and a well-defined set of indicators to assess its "environment policy framework". European Environment Agency (EEA) maintains an extensive set of over 200 environmental indicators. These may be examined. Some of them may be adopted to set targets to evaluate the performance of the policy.

Table 21.19: Indicators of environment

Environment dimension	Indicator
Climate change	CO2 and greenhouse gas emission, intensity per capita
	CO2 and greenhouse gas emission, intensity per unit of GDP
OZONE LAYER	Ozone depleting substances: consumption of CFCs and halons
AIR QUALITY	SOx and NOx emission intensities (per unit of GDP)
BIODIVERSITY	Threatened species: Birds, mammals and plants as a percentage of total varieties
WASTE GENERATION	Municipal waste generation intensities per capita and per unit of consumption
FRESHWATER QUALITY	Waste water treatment
FRESHWATER RESOURCES	Intensity of use of water resources
FOREST RESOURCES	Intensity of use of forest resources
ENERGY RESOURCES	Intensity of energy use

Source: European Environment Agency (EEA)

21.6 Conclusion

21.6.1 Although Kerala does not contribute significantly to the hazardous waste in India, it faces a serious deterioration in the environment quality mainly due to land and water pollution. The biggest challenge to cleaning up the environment is lack of adequate funding and non-compliance of stipulated environment rules. The state must, however, strive to improve the quality of the environment and that of the life of its people by 'mainstreaming environment' into its sectoral development initiatives. It must aim at achieving economic prosperity through concerted measures for creating "ecosystem resilience". The pillars of this strategy will include enabling clean production systems; sustainable production and consumption patters; land planning and protection of ecosystems; solid waste management ;outcome oriented research and development; and promotion of R&D and innovations. In order to implement 'environment mainstreaming', the related institutional framework and the capacity of institutions to undertake environmental management has to be strengthened. Green National Accounting has to be adopted by the state. Also, effective monitoring and evaluation of the progress against specific targets have to be undertaken**.**

Appendix A21.1

Methodology for emission forecast (Table 21.13)

In emission terminology, it is customary to take into account emission of three important gases, namely CO_2, CH_4, and N_2O. We have also assessed the pollution multiplier of various sectors in terms of these gases. Each sector has a direct emission coefficient which is nothing but the amount of pollution generated for each level of output produced by the production activity. However, the production of any output requires various inputs whose production also gives rise to pollution. Thus, it is important to take into account both direct and indirect effect of emission in assessing the pollution multiplier of various sectors. The methodology for driving these direct and indirect effects is described below:

Let A (nxn) be the input-output coefficient table of Kerala, X (nx1) be the matrix of sector-wise gross output and Y (nx1) be the matrix of exogenous final demand. So, we can write:

$$X = AX + Y \quad (1)$$

Or

$$X = (I - A)^{-1}Y \quad (2)$$

If we denote the $(I–A)^{-1}$ matrix as M (nxn), then Equation (2) can be written as

$$X = MY \quad (3)$$

To link this multiplier with the environmental indicator, we have estimated the pollution trade-off multiplier. Here we have used the method described by Robert Koh (1975). The pollution trade-off multiplier measures the direct and indirect impact on pollution generation level due to exogenous changes in sectoral output, household income etc. The mathematical expression of the pollution trade-off multiplier is given as follows:

$$E = P * X \quad (4)$$

Where, E (nx1) is matrix of sector wise emission,

P (nxn) is the sector-wise emission coefficient matrix, whose off-diagonal entries are zero and diagonal entries quantifies the amount of GHG emission in tons per unit of output

Replacing equation (2) into equation (4),

$$E = P * (I - A)^{-1} * Y \quad (5)$$

$$\frac{\partial E}{\partial Y} = P * (I - A)^{-1} = T \quad (6)$$

Here T is the pollution trade-off multiplier matrix, which indicates the impact on emission due to any exogenous changes into the economy.

We have used for our analysis the input-output table prepared by Kolli (2012). The pollution coefficients are the author's estimate based on data from Indian Network on climate Change Assessment (INCCA), Government of India (2010), and adjusted with appropriate weights as per sectors of Kerala's Input-Output Table. Of course, as mapping between sectors of input-output tables and INCCA is not one to one, we had to use our judgment using supplementary information of NATCOM, IPCC.

Table A21.1: GHG emissions Tonnes / lakhs of Rs of Output

Sectors	CO_2 Emission	CH_4 Emission	N_2O Emission	Total CO_2 Equivalent Emission
Food grains	3.06347	0.25217	0.00155	3.31718
Coconut	0.52525	0.01226	0.00192	0.53943
Tea	0.50259	0.0139	0.00192	0.51841
Coffee	0.53392	0.01157	0.00192	0.54741
Rubber	0.56054	0.00827	0.00193	0.57074
Fruits	0.63624	0.00467	0.00193	0.64284
Vegetables	0.6642	0.00645	0.00193	0.67259
Other crops	0.91835	0.01008	0.00197	0.9304
Livestock	2.51258	0.47996	0.00009	2.99263
Forestry and logging	0.47663	0.00115	0.00002	0.4778
Fishing	0.51885	0.00103	0.00003	0.51991
Mining	1.75827	0.00254	0.00006	1.76087
food, beverages	3.24597	0.03244	0.00039	3.2788
Tobacco products	2.12801	0.00455	0.00012	2.13268
Textiles	3.00551	0.00628	0.0002	3.01199
wood and paper	3.50018	0.01091	0.00013	3.51122
leather apparel and tanning products	3.46429	0.01251	0.00025	3.47705
POL, rubber, plastic	3.16188	0.00357	0.00015	3.1656
Chemicals	3.58081	0.00752	0.00062	3.58895
non-metallic mineral products	3.92421	0.00515	0.00013	3.92949
other manufacture	4.13143	0.00475	0.00012	4.1363
Electronics and communication equip	4.60108	0.00519	0.00012	4.60639
Medical, precision &optical instruments	4.57526	0.0057	0.00014	4.58111
Gems and jewellery	3.00791	0.00292	0.00009	3.01093
Construction	3.07202	0.00429	0.00009	3.0764
Electricity, gas and water supply	55.48916	0.07619	0.00086	55.5662
Railway transport services	6.14926	0.00748	0.00037	6.15711
Land transport including via pipeline	4.12832	0.00536	0.00023	4.13391
Water transport	3.07261	0.00421	0.00015	3.07697
Air transport	11.85955	0.0037	0.00037	11.86362
Supporting and aux. tpt activities	5.06212	0.00784	0.00021	5.07016
Storage and communication	2.19061	0.00304	0.00005	2.19369
Trade	0.84581	0.00176	0.00003	0.8476
Hotels and restaurants	1.4841	0.02992	0.0002	1.51422
Financial services	1.17444	0.00243	0.00003	1.1769
Real estate and business	1.12731	0.00224	0.00003	1.12958

services				
Education and research	0.29275	0.00105	0.00002	0.29383
Medical and health	1.19498	0.00524	0.00015	1.20037
other services	1.07743	0.00178	0.00003	1.07924
Public administration	0.00714	0	0	0.00714

Source: Authors Estimation

Table 21B.2 provides our estimates of GHG emission in Kerala over the period under observation, i.e. 2010-11 to 2030-31. As shown in the table, per capita emission of Kerala would rise from 1.5 tonne in 2010-11 to 5.33 tonne. The fall in share of hydro electric power is partly responsible for this trend.

Table A21.2Forecasted GHG emission in Kerala

Sectors	**Emission in Preferred Scenario (Tons of CO2 Equivalent)**				
	2010-11	2015-16	2020-21	2025-26	2030-31
Agriculture	1769082	1740978	1773540	1815612	1895856
Forestry & Logging	0	0	0	0	0
Fishing	57	61	67	71	72
Mining & Quarrying	12055	14111	16858	19200	21464
Manufacturing	6350430	8010863	11745053	17222067	26292341
Construction	2154	2717	3983	5840	8916
Communication	11433	14963	20575	27007	35856
Banking & Insurance	10558	13319	18827	26860	39886
Public Administration	6555	8269	10854	13595	17054
Other Services	15723	22131	34577	50235	78117
Electricity, Gas and Water supply	1678402	1519400	2405732	5343633	6472701
Railways	40113968	50130772	69937538	96290649	139240138
Transport by other means	66	83	116	159	230
Storage	27823	34771	48509	66788	96578
Trade, Hotel & Restaurant	17902	22372	31211	42972	62139
Real estate ownership, Business,	40113968	50130772	69937538	96290649	139240138
Total	50084439	61625092	86183590	121126830	174579604
Per Capita Emission	1.5	1.83	2.54	3.57	5.33

Note: Emission of CO2, CH4, are N2O accounted for.

Source: NCAER's Estimate

WHO has defined a permissible limit of concentration of nitrates of 45 mg/L of NO3, which is also accepted by the Indian Council of Medical Research (ICMR).

APPENDIX A21.2

Assumptions for forecasts in Table 21.14 on Investment requirement of waste management

Solid waste management

Assumption for Estimation:

Capital cost:

i. Per capita costs of collection & transportation = Rs 303
ii. Per capita costs of solid waste treatment = Rs 196
iii. Per capita cost of solid waste disposal = Rs 105
iv. Per capita total cost of solid waste management =Rs 604

The norms are drawn from RIUFS, 2011
O&M unit costs = Rs 1405 per ton, of which Rs 1171 is for collection & transportation and Rs 234 is for disposal

Sewerage

Assumptions for capital cost estimation:

i. Sewerage infrastructure drainage network cost per capita = Rs 3615
ii. Per capita cost of Sewerage treatment plant=Rs 2089
iii. Network plus treatment plant cost per capita =Rs 5704

Backlog is assumed to be around 50% (Source: RIUFS, 2011)

Per capita O&M cost of sewerage network and treatment plant is estimated at Rs 453.

Bio-medical waste

Rao, Ranyal, Bhatia and Sharma (2004) have estimated capital costs per bed to be Rs 343 at 2001-02 prices or Rs 402 at 2011-12 prices[15]
** We have assumed international norm of 5 bed per 1000 persons
[ii] Corresponding to hospital beds, there are other biomedical waste generating organisations such as general dispensaries, pathological labs and collection centres. Considering all this, we have estimated BMW per bed per day to be 300 gm in Kerala (Source: Surat's study)
[iii]Daily treatment cost is assumed to be Rs 26, taken from Surat's study and this rate is still prevailing

[15] Rao, Ranyal, Bhatia and Sharma (2004) "Biomedical Waste Management : An Infrastructural Survey of Hospitals," Medical Journal Armed Forces India, vol. 60, pp. 379-382.

CHAPTER 22

PLANNING FOR THE SOCIALLY MERGINALISED GROUPS

Although the growth process in Kerala has been more inclusive than in other states of India, there are historical inequalities that have persisted over time and remain a potential source of conflict within the state. The state develops a strategy for the socially marginalised groups. It proposes a different strategy for SCs and ST. While SCs should be brought into the mainstream, STs, culture needs to be celebrated. However, the SC and STs need targeted interventions in education and health to lessen historic inequities.

22.1 Social justice

22.1.1 The World Summit for Social Development, which took place in Copenhagen in March 1995, provided an important opportunity for the world community to focus its attention on the nature and roots of current social problems and trends. In particular, the agenda of the Summit specified three areas of concern: the reduction of poverty, the generation of productive employment, and the enhancement of social integration. In the face of seemingly intractable problems of institutional breakdown and mass exclusion in various parts of the world, the subject of social integration has assumed increasing importance in public debate.

22.1.2 Meaningful progress towards sustainable economic development can be better achieved through measures that promote social inclusion and protect human rights of all. The marginalisation of any social group can have a significant detrimental impact on poverty reduction, democratic governance, environmental sustainability and conflict prevention. It may lead to social tensions, and socio-political instability, which will in turn reduce investment and hence growth also[1]. Overcoming the marginalisation of socially excluded sections has thus direct benefits for national development processes and the achievement of inclusive growth. Social exclusion has its roots in India's historical divisions along lines of caste and tribe. The exclusion of certain groups has kept them trapped, unable to take advantage of opportunities that economic growth offers. Culturally rooted systems have perpetuated inequality traps which prevent these groups from breaking out. This is because these socially excluded groups experience greater challenges in accessing rights, entitlements and opportunities, and in moving out of poverty. Although the growth process in Kerala has been more inclusive than in other states of India,

[1] Alesina and Rodrik 1994, Birdsall, Ross and Sabot 1995, Sylwester 2000, Easterly 2000 all obtain a negative partial correlation between income inequality and economic growth using data over a long time span .

there are historical inequalities that have persisted over time and remain a potential source of conflict within the state.The state therefore must focus on developing a policy approach to address marginalization of socially excluded groups. This chapter focuses on two of these social groups:

- Scheduled castes
- scheduled tribes,
- Artisans, and
- Fishermen.

22.1.3 While artisans and fishermen are covered in relevant chapters on fishery and handloom industry, this chapter focuses on scheduled castes and scheduled tribes.

22.2 Status of Socially Deprived Castes

22.2.1 *Scheduled tribes (STs)*

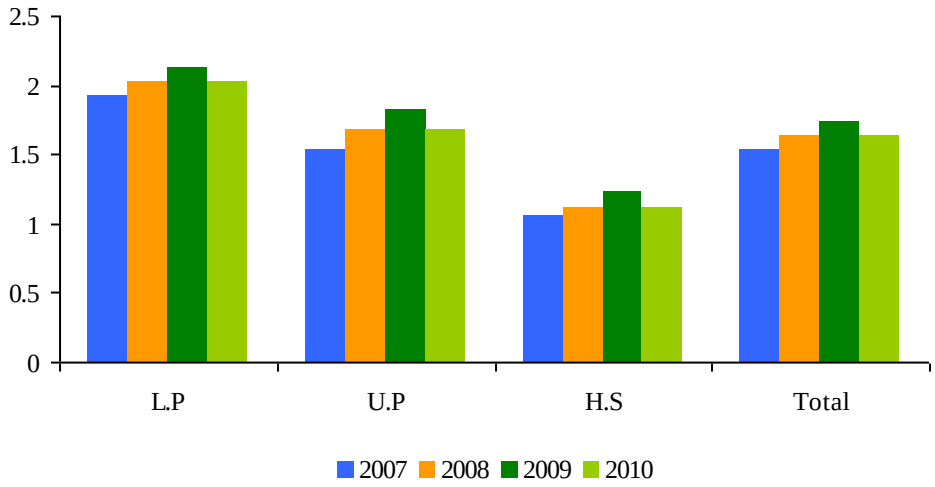
22.2.1.1 Historically, *adivasis* (or STs), comprise a small fraction of Kerala's population. According to the 2001 Census, STs with a population of 3.6 lakh accounted for 1.14 per cent of the population of the state consists of *adivasis*. As per the Tribal Survey of 2008, the population of STs was 4.26 lakh which constituted 1.27% of the population. District-wise distribution of the STs population shows that 35.85% of the *adivasi* population resides in the district of Wayanad, comprising over 18 per cent of the population of the district. Idukki accounts for another 12.3% of the ST population which constitutes almost 5% of its population. Thus.almost 50% of the trobal population is concentrated in the hilly districts of the state. Kasargode, Kannur and Palakkad are other districts which have some concentration of ST population. The Paniyanis are the dominant tribe in Kerala, comprising about a fifth of the ST population. They reside mainly in Wayanad, Kozhikode and Malappuram. *Adivasis* are mainly rural based—with 96 per cent residing in rural areas, in places like forest land, forest fringes and wildlife sanctuaries. This implies that access to land and forest resources is very important to STs, economically and socially.

Education

22.2.1.2 The latest Tribal Survey the literacy rate among the STs in the state was 74.4% as against the 47.1% at the national level (in 2001). While this is higher than the national average ST literacy rate, it is much below the general literacy rate of Kerala (Chapter 3). The literacy rate varies from 94% in Kottayam to 57.6% in Palakkad. However there is a wide variation across the tribes. While Malayarayans have the literacy rate of 97%, Cholanaikans jave the lowest literacy rate of 34.5%. Analysis of education level attaned shows that 33.1%have attained primary education but the shate of gradiuates and above remains as low as 0.3%. Only 4.25% of

the population has technical and diploma certificates. Analysis of trends in share of STs in total enrolment in schools in Kerala based on the National Sample Survey data reveals that share of STs drops off at higher levels of education. Overall, the trend is increasing at all levels, though there is a drop in 2010 (Figure 22.1).

Figure 22.1: Share of STs among school students in Kerala—2007 to 2010 (%)



Note: L.P. lower primary; H.P: Primary and higher; H.S. Higher secondary;
Source: NSS Rounds

22.2.1.3 Gross enrolment ratio at higher levels of education among STs in 2009-10 is estimated by MHRD to be 13.9; this is lower than that in states like Chhattisgarh, Himachal Pradesh, Uttar Pradesh, Uttarakhand, West Bengal and North-eastern states. Gender parity in Kerala is however expectedly higher than unity (1.05). This is bettered only by Uttarakhand, among major states.

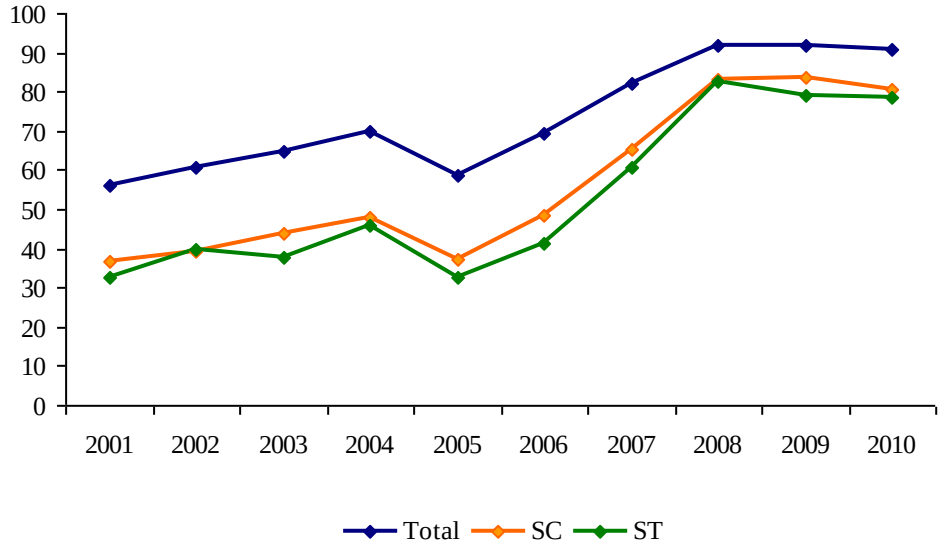
22.2.1.4 Since educational backwardness is the main hurdle for the socio-economic progress of the STs top priority is given for their educational development and about 50 percent of total budget provision (both plan and non-plan) is set apart for the education sector. The ST department distributes educational concessions, scholarships and other kinds of assistance to tribal students from pre-primary to PG level. Apart from exemption from all kinds of fee, they are also given lump sum grant meant for the purchase of books, stationery and dress materials and monthly stipend at varying rates. For imparting primary education to primitive tribe children living in remote tribal settlements, 24 centres are functioning under the scheme "Peripatetic Education Centres of PTG's". With a view to provide residential education to tribal students from remote areas the ST department is running 108 pre-matric hostels and three post-matric hostels in the state providing boarding, lodging and tuition facilities. There are 29 single teacher schools for providing pre-primary education to tribal students living in very remote and inaccessible areas. Of these 27 are in Idukki District. For providing pre-primary education to the

tribal students kindergartens and Balawadies are functioning under local self government and the ST department respectively.

22.2.1.5 Further, in order to provide quality education to ST students, 18 Model Residential Schools are functioning under the ST department—15 Ashram Schools in Tribal Sub-Plan areas, 2 Ekalavya Model Residential Schools and one Special Model Residential school (100% Assistance under Art. 275[1]). The Model Residential Schools have achieved impressive results in the last few SSLC examinations. These efforts have had a favourable impact.

22.2.1.6 Analysis of trends in performance of ST students in SSLC (Senior Secondary Level Completion) examination in the last decade reveals an increasing percentage of students passing the SSLC between 2005 and 2008 (Figure 22.2). However, there has been a marginal deterioration in percentage since 2008.

Figure 22.2: Percentage of students passing SSLC examination in Kerala by caste—2001 to 2010



Source: Ministry of Human Resource and Development

Health status

22.2.1.7 Analysis of NSS data for the 60th Round (2004-05) shows that proportion of ailing persons (PAP) is 16 per cent amongst STs, against 24 per cent for the overall state. This could be due to state assistance to SCs/STs under the health schemes of the government. Various measures are taken for providing timely medical attention to STs. The Health Services Department has established 63 PHCs in tribal areas. Besides, the ST Development Department has 4 Midwifery centres, 17 Ayurveda Dispensaries, 3 Allopathy Dispensary/O.P. Clinics, 1 Ayurveda Hospital, 2 Mobile Medical units and one Allopathy Hospital at Mananthavady.

During 2007 the Nalloornad and Attappady hospitals under the ST Development Department were transferred to the DHS (Directorate of Health Service). Homoeo Dispensaries are also functioning in tribal areas under TSP of the respective Department. The Health Department conducts medical camps in tribal areas to diagnose diseases.

22.2.1.8 However, the NSS data should be interpreted with caution. The reason is that health status is self-reported. It has been argued [2]that if a community is deprived then this may affect its perceptions and expectations from society, and increase the chances of reporting satisfactory health status. If we look at proportion hospitalized within the year preceding the survey, then we find that 11 per cent of STs had sought treatment as an inpatient, compared to a similar proportion for all social groups. The NFHS-3 (2005-06) report for Kerala also observes that 52 per cent of ST women suffer from anaemia, while 15 per cent of ST women were severely thin. The 2001 State Development Report made observations on the large number of deaths due to starvation, poor quality of living environment and lack of access to medical care. The State Development Report also observed that a high proportion of STs suffered from TB (tuberculosis), leprosy, scabies and several water-borne diseases. It cited a survey undertaken by AIMS (All India Medical Sciences) that found that nearly one out of every seven ST in Wayanad and Palakkad suffered from sickle anaemia.

Employment

22.2.1.9 Analysis of 2001 Census reveals that while 26 per cent of total population was main workers, the corresponding figures for ST population were 30 (Table 22.1).

Table 22.1: Changes in occupational patterns among ST and SC population in Kerala

Categories	**Kerala**		**ST**		**SC**	
	1991	**2001**	**1991**	**2001**	**1991**	**2001**
Main worker (as %age of population)	28.53	25.87	36.82	29.75	40.28	30.17
Male main worker (as %age of male population)	44.82	41.77	47.22	41.54	51.11	40.66
Female main worker (as %age of female population)	12.81	10.85	26.72	18.51	29.42	19.9
Percentage of Cultivators to main workers	12.24	7.12	3.1	1.61	12.24	7.12
Percentage of workers in household industries to main workers	25.54	12.4	53.79	29.48	25.54	12.4

[2] Husain, Z. & Ghosh, S. (2011) "Is health status of elderly worsening in India- A comparison of successive rounds of National Sample Survey data," *Journal of Biosocial Science*, **43**(2): 211-231.

Percentage of service sector workers to main workers	2.58	3.35	2.44	2.6	2.58	3.35
Work participation rate	15.17	77.13	10.7	66.31	15.17	77.13

Source: Planning Commission (2008) State Development Report.

22.2.1.20 It indicates that a moderately higher proportion of the STs are workers when compared with general population. The ratio of female workers belonging to STs is almost double than that of other population. It is significant to note that the decline of workers among total population was marginal during the decade 2001 compared to 1991, it was substantial for STs during the period. The decline in the proportion of main workers, both male and female, is not a welcome change as it is indicative of growing unemployment, underemployment and deprivation among the population. An analysis of Table 22.1 also indicates excessive dependence of STs on agriculture (55 per cent) for their livelihood as against only 20 per cent for the total population. The Tribal Survey 2008 shows that more than 75% of the tribal workers are engaged in agriculture and allied sectors. Majority is constituted by agricultural labour.

22.2.1.21 In Kerala, as per Rule 14(a) of the Kerala State and Subordinate Service Rules 1958, eight per cent reservation in public service is provided to SCs and two per cent to STs. Total representation of SC/ST employees in government services as on 1.1.09 was 11.89 per cent (for SCs it was 10.07 per cent and for STs, 1.78 per cent). It shows that SC/ST had already achieved more than ten per cent reservation. While the STs alone did not achieve the target of 2%, the gap was marginal.

22.2.1.22 The State Human Development Report observes that STs are mainly engaged in low-skilled, low-paid activities. It also comments on the dual wage system prevailing in tribal dominated regions—with STs being paid much lower wages than agricultural labourers from other social groups. Analysis of NSS 66th round data (2009-10), however, castes aspersion about such pessimism (Table 22.2).

Table 22.2: Differences in land ownership and cultivated and daily earnings between ST and non-STs – 2009-10

Social group	Non-ST	ST
Daily earnings of agricultural labourers- Rural (Rs.)	182.68	172.02
Daily earnings of wage & salary earners- Rural(Rs.)	361.06	455.33
Daily earnings of wage & salary earners- Urban (Rs.)	303.27	259.77

Source: Estimated from unit level NSS data 66th round (2009-10).

22.2.1.23 Indeed, *Adivasi* agricultural labourers earn lower wages than non-ST agricultural labourers. Yet, after controlling for education and age, the gap is only three per cent. An

interesting finding is that if educational level of STs is raised to that of non-STs, then wage rate of *adivasi* agricultural labourers would rise by four per cent. Decomposition of wage gap using the Oaxaca-Blinder method also shows that if educational attainments of ST and non-STs are identical, then *the latter would get lower daily wages*. In fact, STs would earn about 70 percent more than a similarly educated and experienced non-ST worker. This underlines the importance of improving educational attainments for the successful integration of STs in urban informal sector. What is worrisome is that this does not reflect in poverty ratios.

Deprivation and poverty

22.2.1.24 The incidence of poverty has risen among STs in Kerala. In 2004-05, the proportion of STs below the poverty line was 46 per cent; in 2009-10 this increased to 52 per cent. Corresponding all-India figures are 40 and 45 per cent.[3] This calls for review of land reform measures and the extent to which STs can access land resources and infrastructural services, secure employment and are covered under social security measures.

22.2.1.25 Another possible method of assessing economic status of STs is through an index capturing their access to basic necessities. The index of deprivation reported in Human Development Report 2005 is based on deprivation in housing quality, access to drinking water, good sanitation and electricity for lighting. The incidence of deprivation among STs is 57.9, while that for total population is only 29.5 (Table 22.3). In 10 districts, STs have a deprivation index above 50. These districts include those of Wayanad, Idukki and Palakkad, with the highest share of ST population.

Table 22.3: District-wise deprivation Index in Kerala - 2005

District	SC			ST			Kerala	
	Index	Population share	Rank	Index	Population share	Rank	Index	Rank
Thiruvananthapuram	54.4	11.87	13	60.1	5.74	10	39.5	11
Kollam	47.8	10.34	8	50.7	1.43	5	30.4	8
Pathanamthitta	50.3	5.19	10	54.6	1.8	7	31.1	9
Alappuzha	45.9	6.38	6	40.1	0.86	3	29.6	6
Kottayam	42.1	4.81	4	43.1	5.04	4	25.1	3
Idukki	40.8	5.1	2	65.3	14	13	42.7	13

[3] Note that the methodology for estimating poverty line changed in 2009-10 as a result of the recommendations of the Tendulkar Committee. On the other hand, the recall period was different in the 50th round. This implies that the poverty estimates are comparable for only 1999-00 and 2004-05.
All-India estimates of poverty were calculated using all-India poverty lines. In contrast, NSSO calculates number of people below poverty line for each state and aggregates them to get all-India figures. Hence, our figures will not match with those of NSSO.

District	SC			ST			Kerala	
	Index	Population share	Rank	Index	Population share	Rank	Index	Rank
Ernakulam	29.3	8.44	1	37.2	2.76	1	15.5	1
Thrissur	42.0	11.34	3	37.5	1.33	2	24.7	2
Palakkad	52.9	13.85	12	65.3	10.89	12	40.4	12
Malappuram	46.2	9.14	7	56.8	3.37	8	28.6	5
Kozhikkode	48.8	6.43	9	50.9	1.63	6	28.3	4
Wayanad	51.5	1.07	11	66	37.36	14	46.3	14
Kannur	43.8	3.17	5	57.7	5.48	9	29.7	7
Kasargod	62.7	2.89	14	61.3	8.33	11	37.6	10
Total	**45.5**	**9.81**		**57.9**	**1.14**		**29.5**	

Source: GoK (2005) Human Development Report: Kerala.

22.2.1.26 Tribal Survey 2008 reveals the condition did not improve substantially over time. More than 90% of the families that were surveyed had their own houses but of them, 54% were in a damaged condition; 48% houses (with students) were not electrified. Further, 47.75% of the households had no latrine facilities; 27% of the colonies were not electrified and over 15% had no drinking water facilities within 500 mts.

Land redistribution

22.2.1.27 If one examines socio-economic status of STs in the post Independence period in Kerala, two important points emerge. Historical inequalities existing between STs and other communities since Independence have been reduced considerably—mainly as a result of anti-poverty measures and trickle down effect from economic growth. However, such inequalities have not been totally eliminated, but remain to form social divisions. In particular, given the importance of land in the rural economy land remains an important issue that has to be addressed by planners.

22.2.1.28 Increasing alienation of STs from their traditional land and forest holdings has been commented upon by different committees (GoK, 1962; GoK, 1979). Such reports note that land holdings of STs have declined steadily since Independence due to alienation, lease and mortgage. Such alienation has been particularly high among communities like the Irulas and Mudugas. What is frustrating about this process is approach of the successive state governments. The State Development Report notes that only nine per cent of the disputed cases have been resolved and only six per cent of the disputed land restored. At different points of time, Commissions have recommended protection of tribal rights to land, or acts like the Kerala Scheduled Tribes Act (Restriction on Transfers of Land and Restoration of Alienated lands) of 1975 have been passed. However, recommendations or provisions have remained dormant, or implementation stopped

after facing opposition from the non-tribal groups. The amendments of 1996 and 1999, along with the Kerala Restriction on Transfers and Restoration of lands to Scheduled Tribes Act of 1999, may be cited in this context.

22.2.1.29 Land reforms and redistribution of surplus land is another contentious issue. In Kerala, only 1.35 lakh acres of land has been vested. Out of this, only 47 per cent has been redistributed as on March 1996, of which 5 per cent was to STs. The average land size redistributed to STs is only 71 cents.

22.2.1.30 Political movements within the tribal community led to a settlement with the government in 2001. According to this agreement, the government committed to:

- Distribution of five acres of land to every ST household with less than one acre;
- Master Plan would be prepared to provide support t beneficiaries for a period of five years;
- *Adivasi* land would be brought under Schedule V;
- Government would abide by the decisions of the Kerala High Court regarding repeal of the 1975 Act; and,
- Tribal Mission headed by an IAS (Indian Administrative Service) officer would be set up to carry out the above components of the agreement.

22.2.1.31 Although a Tribal Mission was set up, other components of the Plan was not implemented. Various hurdles were cited preventing return of forest and other land to the STs—like dispute between Forest and Revenue Department over land—and even the Mission was downgraded in 2002 by replacing its head by an officer of the Indian Forest Services.

22.2.2 Scheduled Castes

22.2.2.1 According to the 2001 Census, the SC population constitutes 9.8 per cent of the total population of the state. The growth of SC population has been 8.2 per cent; this is 1.2 percentage points lower than the growth of total population (9.4 percent) in 1991-2001. The proportion of SCs declined further to 7.2% according to the 2011 figures. The SCs are overwhelmingly rural, with 81.8 percent residing in rural areas. Among the districts, Palakkad district has the highest proportion of SCs (16.5 per cent) followed by Idukki (14.1 per cent), Pathanamthitta (13.1 per cent) and Kollam districts (12.5 per cent). Kannur district has the lowest percentage of SC population (4.1 per cent), preceded by Wayanad (4.3 per cent) and Kozhikode (7 per cent) districts.

22.2.2.2 Hinduism is the predominant religion of the SCs (99.9 per cent) in Kerala. A negligible number of SCs are followers of Sikhism and Buddhism. The state has a total of 68 SCs as enumerated at 2001 census. Pulayan is the most populous caste with a population forming 33.3

percent of the total SC population of the state. Cheruman is the second largest SC. These two castes, along with Kuravan, Paraiyan, Kannakan, Thandan and Vettuvan castes constitute 78% of the total SC population. District-wise distribution of the individual SC shows that Pulayan, numerically the largest caste, account for the highest proportion (76 per cent) of total SC population in Ernakulam district, followed by Alappuzha and Kottayam (56 per cent) whereas Cheruman and Kuravan have the highest proportion in Palakkad (38 per cent) and Pathanamthitta (36 per cent) districts respectively. Other four major groups Paraiyan, Kanakkan, Thandan & Vettuvan have their highest proportion in the districts of Idukki, Malappuram, Kollam and Thrissur respectively.

Educational status

22.2.2.3 The SCs have shown an encouraging trend in the level of literacy. More than three fourth of the population aged 7 years and above are literate. The overall literacy rate of SCs which was 80 per cent at 1991 census, increased to 83 per cent at 2001. This is significantly higher than the national average of 55 per cent overall for SCs. According to the latest SC survey, it has gone up to 90%. SCs are thus comparable with the general category in terms of the rate of literacy.

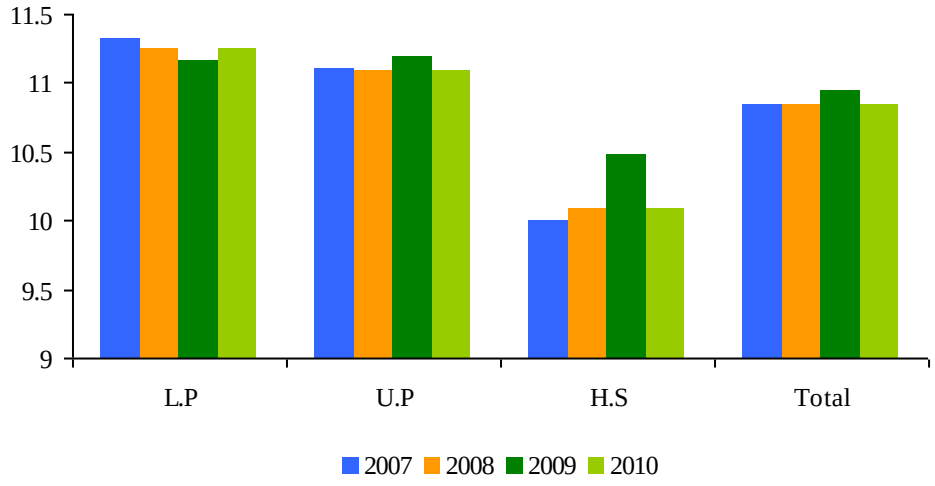
22.2.2.4 However, they lag behind in terms of tertiary education. The SC survey shows that the proportion of literates who have attained education up to primary is 34.54 per cent, while 31.09 per cent have secondary level of education. The graduates and post graduates represent 2.18 per cent and 0.40 per cent respectively. Altogether, 1,113 youths, including 700 boys and 413 girls have acquired B.Tech. The medical degree holders among Scheduled Castes are 302 (143 males and 159 females). The diploma and certificate holders in engineering and technical branches constitute 0.84 per cent of the population.

22.2.2.5 The drop out rate among the Scheduled Castes students is very high. Approximately 10.90 per cent of the students have left educational institutions during the interim period of their study. The dropout rate at higher secondary stage works out to 22.07 per cent while at the high school level it is 9.75 per cent. More than 10 per cent of students joining for graduation and post graduation are leaving the institutions with- out completing the courses. This is despite the fact that the Department is implementing various educational schemes such as scholarships for pre- and post-matric studies, running/construction of Model Residential Schools, assistance to students studying in self financing colleges etc., e-Grantz for the distribution of educational concessions to the students during the eleventh plan period. In addition, under the Ayyankali Memorial scheme, selected students from standards IV and VIII are provided with continuous special tuition and counseling.

22.2.2.6 Approximately half of the habitats don't have access to secondary and higher secondary schools around their vicinity. Moreover, 26.76% as well as 15.77% habitats are 2.5 km away from the upper and lower primary school respectively.

22.2.2.7 A positive trend, however, is the convergence in proportion of SC student qualifying in the SSLC examination (see Figure 22.2 earlier). This convergence has occurred post 2005.

Figure 22.4: Share of SCs among school students in Kerala—2007 to 2010



Source: NSS Rounds

22.2.2.8 MHRD estimates show that gross enrolment ratio among 18-23 years is 14.9. However, the Gender Parity Index (value of 1.28) is better than all other major states, except Uttarakhand.

Employment status

22.2.2.9 The SC Survey of the government of Kerala shows that the Scheduled Castes population in the age group 15-59 os 1,636,211. Of them, 831,629 persons (50.82 per cent) are engaged in various occupations. The unemployment level among the educated Scheduled Castes is higher than the State average of unemployment among total Scheduled Castes. 59.53 per cent of the SSLC holders and 76.60 per cent of the Plus 2 certificate holders remain unemployed. The unemployment level among graduates is 63.56 per cent and it is 54.60 per cent among post graduates. Even Scheduled Caste youths with engineering and medical degrees are unemployed.

22.2.2.10 Table 22.1 above shows a sharp decline in the proportion of main workers among the SC community. This is much higher than the decline in the population as a whole. The decline is slightly larger among male SCs, compared to females. This could also be due to increasing enrollment in education. Analysis of the proportion of main workers engaged in different occupational categories indicates that there has been a sharp shift from the primary (where SCs

previously worked as agricultural workers) to the tertiary sector. This is welcome as a similar trend is observed in Kerala for the workforce as a whole.

Health

22.2.2.11 The state NFHS-3 report for Kerala provides some information about the health status of SCs. For instance, out of 268 currently married SC women, 77 per cent were reported to be using contraceptive methods, while 70 per cent used modern methods. Figures for antenatal and post natal checkups are very high. Out of 74 SC women surveyed in Kerala, 93 per cent had received three ANC (ante-natal check-up) check ups, 99 per cent had delivered in a health facility and 89 per cent had received post natal check up. It was also found that 47 percent of the children and 38 per cent of the women suffered from anaemia. Studies by the Health Department as well as AIIMS, New Delhi show that nearly 15 % of the tribal families in Wayanad and Palakkad Districts have traits of the genetic problem "Sickle Cell Anaemia". In order to tackle the problem, Kozhikode Medical College has set up a Sickle Cell Anaemia unit with Electrophoresis machine. Also programmes for rehabilitating Sickle Cell Anaemia patients are also undertaken in Wayanad District. Financial assistance is provided to Swami Vivekanada Medical Mission Kerala for extension of vocational cum production centres for rehabilitating Sickle Cell Anaemia patients belonging to ST communities of Wayanad. During 2007-08 a new scheme "Complete Health Care Programme for the Tribals" has been implemented by the Department. So far 27657 peoples have benefited under this scheme.

22.2.2.12 According to the SC Survey, physical disability and mental diseases are the two factors that mainly affect the health situation of Scheduled Castes. In all, 4.5 per cent of families and 1.71 per cent of persons in the Scheduled Castes suffer from mental and physical disorders and require the palliative care and compassion of the society; 3.1 per cent of the SC population is suffering from different types of chronic diseases. The terminal diseases like cancer, tuberculosis, heart diseases etc are the major ailments that spread among the Scheduled Castes.

22.2.2.13 The SC survey shows that the public health institutions are far away from most of the Scheduled Castes habitats. In the case of 6914 habitats (26.27 per cent), distance to the community health centers is above 25 km. The distance to primary health centres in respect of 8768 habitats (33.28 per cent) is above 5 km. The ayurveda and homoeo dispensaries/ hospitals are also not located within reasonable distances to the habitats. However, there are a few remote settlements in Idukki, Palakkad, Thrissur, Wayanad and Malappuram where such health care facilities are still lacking. Extending health facilities to such remote areas remains a major challenge before the government.

Infrastructure

22.2.2.14 The problem of drinking water is more acute in habitats. Among the Scheduled Castes families, only 26.53 per cent have the reach to protected water. For scattered families water connection is available only for 21.38 per cent of families. More than 62 per cent of Scheduled Castes families in habitats are experiencing scarcity of drinking water. Altogether, 86,318 families do not have sanitary latrines. It is estimated that the families without latrines among Scheduled Castes are 15.30 per cent. It has been estimated that 81840 houses (14.50 per cent) of Scheduled Castes have not been provided with electricity.

Poverty and deprivation

22.2.2.15 The incidence of poverty stood at 32.2% in 2009-10. This is substantially lower than the all-India poverty level for SCs. The incidence of deprivation among SCs is 45.5, while that for total population is only 29.5 (Table 22.3). Deprivation level of SCs is particularly high (above 50) in the districts of Kasargod, Thiruvananthapuram, Palakkad, Pathanamthitta and Wayanad. Specifically, Vedan, Nayadi, Kalladi and Chakkilian are the most economically, socially and educationally backward castes. The majorities of these sub-castes are landless and reside in huts built in 'Purambock' and suffer from malnutrition. Special emphasis is needed for the development of these communities, including provision of land and homes. The destitute families among Scheduled Castes are enumerated at 31.06 per cent. They comprise families of unwedded mothers, widows, divorcees, victims of atrocities, orphans etc. The unwedded mothers, widows and divorcees constitute 16.39 per cent of female population above 15 years. Among the unwedded mothers, widows and divorcees, widows represent the major share by contributing more than 95 per cent.

22.3 Tackling social inequalities-A proposed strategy

22.3.1 Social or ethnic inequalities are a universal feature of multi-ethnic Asian countries. As they are historically entrenched in institutions and practices, they are much more difficult to address than other forms of horizontal inequalities. The persistence of caste-based inequalities in India is due to socio-economic and historical factors, the way labour markets are structured, and differential access to governance institutions. Labour markets may be segmented on the basis of caste lines because of past public policies, unequal development, or efforts by specific castes to protect advantages. The so-called backward castes get trapped into a vicious circle of weak economic and social status both of which reinforce each other. Public policies and market segmentation may lead to physical segregation of groups, further reinforcing prejudice and antagonism against them. Since social institutions are rigid in nature, it may be difficult to directly impact on their social status. It is therefore required to give a major push to their economic status.

22.3.2 **Vision of the strategy** will be create a society in which every Keralite is entitled to live with human dignity.

22.3.3 Objective will be to achieve

1. Objectivity in the identification of the vulnerable population
2. Equity in service delivery
3. Efficiency in service delivery
4. Accessibility for all qualified

22.3.4 The proposed strategy is multi-pillared. It recommends

- Affirmative actions
- Development programmes
- Social upliftment through people centric approach

22.3.5 **Pillar 1: Strengthen the system of identification of beneficiaries of public assistance Programmes**

- Improve system of selection of beneficiaries (including persons not in households) Affirmative actions
- Increase awareness of the availability and eligibility criteria of social assistance programmes
- Strengthen the capacity of the main implementing agencies through proper training

Pillar 2: Strengthen the affirmative actions

22.3.6 In India affirmative action, in the form of quota-based reservation, is a major instrument for reducing horizontal inequalities. Critics argue that, by undermining merit-based competition, such policies create distortions within the economy and may produce inefficient outcomes. This imposes heavy costs on the economy, particularly during recession. There is also a possibility that communities become dependent on quotas, eroding their capability for independent vertical mobility. However, there is also evidence that affirmative action can be highly effective. The experience of Northern Ireland, Malaysia and South Africa shows that, if properly used, such

policies may reduce social conflict, freeing resources for growth. There are studies[4] for India also that have confirmed the positive effects

22.3.7 The argument that reservation shifts the historical burden of past discrimination on the current generation cannot be accepted. A South African court has ruled in *National Coalition of Gay and Lesbian Equality v. Minister of Justice* (1998):

> "Particularly in a country such as South Africa, persons belonging to certain categories have suffered considerable unfair discrimination in the past. It is insufficient for the Constitution merely to ensure that statutory provisions which have caused such unfair discrimination in the past are eliminated. Past unfair discrimination frequently has ongoing negative consequences, the continuation of which is not halted immediately when the initial causes thereof are eliminated, and unless remedied, may continue for a substantial time and even indefinitely."

22.3.8 A potential danger is that the benefits of affirmative action may be appropriated by the top (creamy) layer. This worsens intra-group and hence vertical inequality. In India, for instance, many reservations extended to SCs/STs are unclaimed because SC/ST students from poor households are unable to meet even the relaxed requirements because of deficient primary and secondary schooling.

- Target the neediest members of the population
- Integrate the affirmative actions within a comprehensive framework rather than implement them as a group of loosely connected ad hoc measures with independent objectives.
- Combine affirmative actions with assistance either in terms of knowledge (management assistance/additional training, etc.) or money (sponsorships/research assistantships, etc.).
- **Cash transfers:** Replace other forms of grants with conditional cash transfer programme to the neediest of the SC/ST

Pillar 3: Empower STs while protecting their habitat and culture

22.3.9 In Kerala, the government earmarks funds for Special Component Plan (SCP) and Tribal Sub-Plan (TSP) from State Plan outlay in proportion to the ratio of population of SCs and STs to total population of the state. This allows planners scope to introduce a wide range of schemes for the all round development of the targeted groups. The annual allocation of funds to SCP/TSP is

[4] Aggarwal, Aradhna, Johnes, Geraint, Freguglia, Ricardo S. and Spricigo, Gisele, Education and Labour Market Outcomes: Evidence from India (December 2010). Available at SSRN: http://ssrn.com/abstract=1744058 or http://dx.doi.org/10.2139/ssrn.1744058

has increased sharply from 398.3 cr and 90.8 cr in 2002-03 for SCs and STs respectively to 1178.3 cr and 284.2 cr in 2011-12[5]. The development programmes cover almost all aspects of vulnerabilities: Housing, health land, marriage, and education. These measures are targeted at

- provisioning of housing to SCs/STs in the state;
- providing SCs/STs with land for construction of house and assistance for house construction, purchase of land;
- monetary support for the provision of education, treatment, drinking water, electricity, road etc;
- Assistance for marriage of SC/ST girls,
- Self employment scheme,
- Critical Gap Filling through Corpus Fund for skill development,
- water supply and sanitation, communication facilities, foot bridges, improvement of education and health etc.

22.3.10 The affirmative actions have been less successful for STs than for the SCs because the basic assumption is that the model generating the incomes of the better off group is also applicable to these tribes. This approach does not take into account the prejudices historically engrained in the cultural and institutional structures. This acts as a drag to reduce the effectiveness of policies simply allocating funds to the ST communities. It is necessary to realize that schedule tribes may have models of income generation that are fundamentally different from historically favoured communities. Such models often contain inbuilt compensatory effects that partially reduce the negative effects of institutional and market based discrimination. Only by identifying the parameters of this model and appreciating on the traditional practices and institutions that act as a compensatory effect can caste-based inequality be redressed effectively and economically.

22.3.11 For instance, STs are geographically concentrated in a few districts like Idukki and Wayanad, and historically dependent upon forest resources. Their traditional way of life makes them less capable of adopting the income generating model of forward castes. Returns to investment in education and land will also depend upon the opportunities available in the local economy. Therefore, policies that address caste-based inequalities must take into account such cultural differences and geographic effects. This calls for territorial affirmative action, focusing on the spatial organisation of opportunity. Such geographical targeting should be appropriately tailored to, and narrowly focus on, the problems, needs, and situation of households from community households. The core idea is to develop policies delivering services and investing in areas specific to needs of the locality. The VSS for instance is a right step in this direction. This has had a substantial effect on empowering the forest dwellers.

[5] GoK (2011a) Economic Review.

Economic empowerment

22.3.12 Government needs to find means to address issues relating to ST lands, forests, estates and associated resources. STs will experience a transformational change in economic productivity when they have a more active role in the use of resources which are the backbone of their contribution to the economy. To achieve this, Government and STs need to find increase in the provision of support services, including educational-support services. Government will create new models of compulsory schooling that better meet their needs. It will ensure a greater collaboration with the science and innovation sector, targeted export strategies, financial support, and greater participation and engagement by STs in these systems. Our Action Plan is about creating the right settings and opportunities for them to achieve these changes and realise self generating well-being.

Promote education

22.3.13 Participation in early childhood education is vital for every child's development and for preparing them for future learning. Early childhood education can support future educational achievement. Currently, children participate in early childhood education at a lower rate than the general population.

- The Ministry of Education will need to target partnership developments with communities and identify successful models of schooling.
- Expand schooling based on models adapted to suit the their requirement
- Identify successful models.
- Target greater transition from school to tertiary level education.
- For improving the performance of the ST students, target them and offer them better public services; hold schools accountable for their performance.
- Engage counsellors and mentors to work with ST student

Employment

22.3.14 For transition from academic to vocation, vocational skills are as important as academic skills. Promote academic qualifications alongwith vocational qualifications

- opportunities to gain work experience while studying will help develop practical skills for future employment
- Foster partnership between schools, training providers and industries. The Department also runs 20 training centres for imparting job oriented technical training. However, it is important that these are linked with industries.

- Build a network of registered training providers who can work , conduct their courses in the tribal environment, or focus specifically on the needs of tribal learners. Demand-side signals should guide education and training providers around the types, levels and nature of skills and qualifications sought, which influences education delivery. Tribal cooperatives and other micro enterprises could also provide useful information about their particular needs that would be of interest to learners and education providers alike.

- Build entrepreneurial, management and governance capability.

- Promote connection between tribal enterprises and the business services available to them to build their management capability. Providing them with the right services such as Business Facilitation Service and incubators will enhance their ability to grow scale and lift productivity.

- Promote linkages between innovation system and tribal enterprises and cooperatives. They can be connected with the district hubs of specialized skills.

- Produce official statistics for their contribution to and participation in the economy on an ongoing basis

- Provide market intelligence and facilitate business networks to enable tribal enterprises to enter and grow in export markets. Particular barriers encountered by firms are: limited advice on overseas government regulation and tariffs; limited access to finance; language and cultural differences; limited experience; inadequate knowledge of target markets; and an inability to rapidly increase supply and limited access to distribution networks. Initiate projects to ensure the continuous flow of information to them.

- Ministry for Agriculture and Industries to work with tribal land owners and local authorities in identifying and targeting resources to land blocks with potential for development.

Increased financial literacy and domestic savings

22.3.15 Financial literacy allows them to make the most of their income and resources, and places them in the best position to build savings and financial assets – key aspects of economic self-determination. In addition, savings and asset creation initiatives can foster and support educational ambition as well as greater social mobility.

22.3.16 Government will need to explore the merit and feasibility of establishing savings scheme(s) targeted at tribals, increase flexibility within existing schemes to enable accumulation of savings for education, home ownership and other asset development. This can be combined with financial literacy and retirement income programme. These services should be well targeted, tailored and delivered to the members of the saving schemes.

Box 22.1: Savings Scheme for Tribes in New Zealand

Whai Rawa is a savings scheme established by Ngāi Tahu to support its members to achieve increased personal financial wealth in the medium to long term. The scheme supports a culture of saving and asset-building, and aims to assist Ngāi Tahu whānau to access higher levels of tertiary education, increased levels of home ownership, and increased emphasis on retirement savings. Currently an estimated 16,700 tribal members have joined the successful scheme, operating for five years with membership continuing to grow. The scheme offers savings benefits and contributions to members, including matching contributions for children and adult members and additional distributions to all members. Members of Whai Rawa can withdraw their accumulated savings for tertiary education, a first home purchase, or retirement. Whai Rawa also supports members to increase their level of understanding of financial and investment matters through education and training programmes.

Source: WhaiRawa Website
http://www.whairawa.com/

- Investigating new ways to build financial literacy, as well as considering alternative delivery mechanisms and budgeting services.

Box 22.2: ICAN: Indigenous Financial Counselling Mentorship Programme (Australia)

The Indigenous Consumer Awareness Network (ICAN) provides consumer education, advocacy, and financial counselling to clients across Australia. A partnership between ICAN and the Commonwealth Bank of Australia has resulted in the Tribal Financial Counselling Mentorship, described as a 'nation first'. The Programme provides support to Aboriginal and Torres Strait Islanders to undertake accredited training in the Diploma of Community Services (Financial Counselling). Graduates also gain a full understanding of the rights and obligations of their clients. Most of the graduates live in the communities they are going to serve. They are employed by ICAN to help lift the financial literacy levels of the whole community, further increasing their ability to

empower indigenous consumers.

Sources: Indigenous Consumer Awareness Network (ICAN). Indigenous Financial Counselling Mentorship Program 2012. Course brochure. Australia.Indigenous Consumer Awareness Network (ICAN) website:http://ican.org.au/about-us/ican-program/Commonwealth Bank of Australia (2012). 'More Indigenous financial counsellors graduate'

Pillar 4: Mainstream schedule castes

22.3.17 While the culture of STs needs to be protected, an all out effort should be made to mainstream SCs. There is an urgent need to reorient and focus the strategy in order to support the lesser privileged by providing qualitative education and infusing among them the individualistic and moralistic values of self-denial, temperance, forethought, thrift, sobriety and self-reliance essential to bring these downtrodden into the national mainstream.

22.3.18 The above analysis indicates that SCs educational attainments are comparable with the general category. However, the employment scenario needs an improvement. This means that the action plan should focus on the following:

- Improve their representation in tertiary education
- Promote entrepreneurship (see,the action plan for the STs)
- In addition to economic empowerment, it is important that they are socially empowered. This requires change in the social relationships and institutions and discourses that exclude poor people and keep them in poverty. Their involvement in local associations and inter-community cooperation mechanisms can contribute to social empowerment by improving their skills, knowledge and self-perception. Local associations also act as self-help mechanisms through which poor people organise their economic activities, such as farming cooperatives, or microfinance groups.
- Initiate public debates on social institutions and their relevance.
- School curriculum at an early level should include courses on social issues, norms, international laws and agreements regarding human rights to inculcate among students respect for each other and make them global citizens.

Pillar 5: Develop infrastructure: The targeted approach

22.3.19 Geographical targeting should also acknowledge the fact that location may keep deprived communities backward them—particularly if such communities reside in areas that are

remote, more difficult to integrate and costlier to reach with social services and physical infrastructure. In helping redress current inequalities it will be necessary to identify and remove the conditions that have caused their isolation and social exclusion.

22.3.20 Simultaneously, there is need for specific interventions within geographically targeted poor area development programs:

- For instance, it is necessary to strengthen the basic infrastructure in their habitats and connecting their habitats with the rest of the economy: housing, sanitary systems, roads, transport, water and energy. The target should be to achieve 100% access to these facilities.
- Given the importance of human capital formation in improving welfare of SCs/STs it is necessary to understand why investment in education of SCs/STs is not paying off. For instance, drop out rate is high at the secondary level among SCs, while a high proportion of STs are either illiterate or without formal education. Reasons for this phenomenon should be identified and integrated into the planning process.
- Creating permanent and sustainable livelihood sources for them is another imperative component of strategies to improve their welfare.
- Health is another issue that requires urgent attention. Inequalities in health are multi-factorial. They are influenced by issues such as environment, housing, educational achievement, material wealth, discrimination and lifestyle. Therefore, reducing health inequalities cannot take a 'one size fits all' approach and requires a multitude of efforts at different layers of society, engaging a wide variety of stakeholders. These stakeholders range from government level through local statutory level and local voluntary sector level, to grass-roots community level.
- Sources of leakages in financial assistance should be identified and suitably plugged.

Pillar 6: Empower the marginalized sections through ICT: People centric approach

22.3.21 There has been a shift in development thinking from top down approaches based on economic growth and transfer of technology to people centred development. There is more emphasis on the cultural and local dimensions of development. It is also more widely accepted that human development requires dialogue, interaction and sharing of ideas for social change and innovation to occur. The government needs to promote these interactions through a project which may involve participation by young students.

22.3.22 New information and communication technologies (ICTs) have created the so-called information and knowledge society. Experiments with ICTs are demonstrating that the benefits of the information revolution can have positive repercussions for economic and social development. But infrastructure, access and use are still limited for vulnerable groups in the rural

areas of developing countries. They are on the wrong side of the digital divide, and risk further marginalization. They thus have limited participation and voice in the public sphere and in decision-making processes affecting their lives. There is need to create an alternative framework for communication interventions, that is truly people and participation oriented. Connect them through radio, television and other media channels. These are most widely available and affordable mass medium for disadvantaged groups. There have been experiments in some developing countries in particular in Africa with community radio. Radio is the only media that is accessible even in remote rural communities where infrastructure is lacking . It is cheap, portable and needs little maintenance. These advantages are leveraged in African countries to reach out to people to disseminate information and education. In almost all African countries projects have been launched to empower the marginal segments through radio. In many cases these are community owned radios. In China, radio and TV universities have been set up for the underprivileged sections.

Box 22.3 Yasarekomo: A communication experience by indigenous people in Bolivia

In 1994, with assistance from FAO, the Asamblea del Pueblo Guaraní (APG), the main Guaranì organization inBolivia, established a rural communication unit the *Unidad de Comunicación Guaraní (UCG*), in the Chaco region of Bolivia. The goal of the unit was to improve the quality of life of isolated and marginalized native communities and support indigenous development initiatives. With training from FAO, the Guaranì villagers applied intercultural communication approaches to share knowledge and information using video training packages and community radio. The UCG received assistance from FAO for three years, and then continued independently for an additional six years, generating income by producing intercultural communication materials and implementing communication for development plans agreed with APG and co-funded by the Government, Municipalities and NGOs. The UCG then decided to carry out a self-evaluation in collaboration with the APG and other indigenous organizations of Bolivia. The results confirmed the validity of the participatory and intercultural communication approaches applied to advisory services.

Source: FAO, 2004. Yasarekomo, Una experiencia de comunicación indígena en Bolivia

22.3.23 Box 22.1 provides a case study of Bolivia. There are several such case studies. For them to be effective, governments should create regulatory frameworks and an enabling policy environment for communication with the poor. Legislation and equitable policies are essential if communication is to become a real tool for poverty alleviation. A shortage of people trained in new functions may be a constraint for designing and implementing participatory communication programs. This calls for organizing training programmes and developing course curricula. Finally, new instruments and indicators will have to be devised to effectively assess the impact of participatory communication processes with disadvantaged groups.

22.4 Conclusion

22.4.1 In conclusion, it needs to be emphasized that correcting caste-based inequalities requires sensitivity and experimentation. Innovative approaches need to be promoted. Community participation and sensitivity is important in promoting these approaches. Further, without political inclusivity, it is difficult to implement remedial policies. Finally, it is essential to develop cultural sensitivity. Unless the state embodies a culture that is inclusive in nature, placing equal value and visibility on practices of all groups, affirmative action is bound to fail.

Chapter 23

SOCIALLY VULNERABLE GROUPS

In terms of literacy, life expectancy, and mean age at marriage, women in Kerala score higher than any other state in the country. Still, incidence of crimes against women, rape, and sexual harassment is high in Kerala; female health issues have assumed alarming dimensions; autonomy of women in household matters; and their participation in economic activities is low. Kerala is in the midst of a unique and irreversible process of demographic transition that has resulted into enlarged elderly population. In case of disability, according to the figures based on the 2001 Census, 2.7 per cent of State's population is disabled. And, lastly Kerala has a long history of in-migration from other states which become minorities. So, there have been signs of dissatisfaction emerging in the state, due to the absence of institutionalized efforts. The strategies must involve not a mere alleviation of circumstances, but rather, a careful analysis of different vulnerabilities, how these can be prevented or diffused, and in general, the levels of social infrastructure that must be established for enhancing the quality of life for them. Mainstreaming of concerns of socially vulnerable groups are needed to alleviate their concerns. In urbanisation, infrastructure development, their concerns have been taken into account while designing urban spaces or infrastructure.

23.1 The socially vulnerable groups

23.1.1 The Perspective Plan 2030 vision around which the plan is being developed is to make "Kerala the place of choice to live, work, raise families and do business". To accomplish this, the State Planning Board has identified a number of thematic areas that should be addressed under the Plan. One of the theme areas is the protection to socially vulnerable groups. Social vulnerability refers to the inability of certain population groups to withstand adverse impacts from multiple stressors to which they are exposed. These impacts are due in part to characteristics inherent in social interactions, institutions, and systems of cultural values. This chapter comprehensively analyses the challenges being faced by the vulnerable groups and develop an appropriate plan to upgrade the management and provision of services to these groups to the developed countries' standards. The vision around which the strategy is developed is "A social system that contributes to maintaining human dignity". Four groups of population are identified as socially vulnerable groups:

- women,
- aged,
- linguistic minorities and
- differently-abled.

23.1.2 The strategies involve not a mere alleviation of circumstances, but rather, a careful analysis of different vulnerabilities, how these can be prevented or diffused, and in general,

the levels of social infrastructure that must be established for enhancing the quality of life for them.

23.2 Empowerment of Women

23.2.1 The empowerment of women has been a central feature of the international agenda since 1945 when the Charter of the United Nations was signed. It was the first international agreement to affirm the principle of equality between women and men. On December 10, 1948 the General Assembly of the United Nations adopted and proclaimed the "Universal Declaration of Human Rights" in which the United Nations reaffirmed their faith in fundamental human rights, in the dignity and worth of the human person and in the equal rights of men and women. The United Nations Conference on Environment and Development (UNCED) Agenda 21 (1992) mentions women's advancement and empowerment in decision-making, including women's participation in 'national and international ecosystem management and control of environment degradation' as a key area for sustainable development. The importance of women's empowerment in demography was underlined in the International Conference on Population and Development (ICPD) in Cairo, 1994. The Conference stressed that women should be empowered to make informed choices with respect to their health and reproductive outcomes. The 1995 Copenhagen Declaration of the World Summit on Social Development (WSSD) argued that empowering people, particularly women, to strengthen functional capacities is a major objective of development. The participatory nature of the process of empowerment was recognized in the Copenhagen Declaration and in the Report of the UN Fourth World Conference on Women called its Platform for Action an agenda for women's empowerment, meaning that .the principle of shared power and responsibility should be established between women and men at home, in the workplace and in the wider national and international communities (UN, 1995). The importance of women's empowerment in the developmental process has been highlighted in recent international discourses The 2012 World Development Report has argued that "Gender equality is smart economics". Empowering women can contribute to higher productivity, income growth and poverty reduction. In a dynamic context, empowering women has substantial positive inter-generational effects as it can improve opportunities and outcomes in subsequent generations. Finally, it is widely recognized[1] that empowerment can enhance

[1] Chattopadhyay, R. and E. Duflo (2004) 'Women as policy makers: Evidence from a randomized policy experiment in India.' Econometrica, 72(5), p.1409–1443.

development decision-making by increasing diversity within the political system. Incorporating women in decision-making process improves outcomes in natural resource management and local provisioning of local public goods.

23.2.2 Empowerment of women has been one of the important building blocks of the "Kerala Model" of development also. The spectacular success of the state owes its success in the areas of health and education; the contribution of women in these areas has been significant. The achievements in literacy and education have positively influenced the status of women in the state. Kerala's high levels of human development and gender development are the result of its achievements in the field of health and education for women.

23.2.3 Another feature of Kerala worth mentioning has been its demographic characteristics— in particular its sex ratio (defined as the number of females per 1000 males). Kerala had a favourable sex ratio of 1058 in 2001; this increased to 1084 in 2011. In comparison, the sex ratio for India was 933 (2001) and 940 (2011). Kerala is the only Indian state where the sex ratio has historically been above unity. Similarly in terms of literacy, life expectancy, and mean age at marriage, women in Kerala score higher than any other state in the country. In 1950 when India became a democratic republic, the female literacy rate at the national level was merely 7.9 per cent. Kerala's female literacy at the same time was four times higher (32 per cent)[2]. Similarly in 1950, while the female life expectancy at the national level was only 31.7 years, the same was 42.3 years in Kerala. Thus historically a favourable ground was set for Kerala women while most of the Indian states had a poor record in this regard. Perhaps this paved the way for the outstanding achievement of Kerala in terms of women's development, and as a result, the increase in the overall human development. The National Human Development Report (GOI, 2002) ranked Kerala as the leading state in terms of Human Development Index, Gender Equality Index and Gender Empowerment Measure.

23.2.4 However, recent analysis of data—coupled with media reports and studies by Non-Governmental Organisations (NGOs) — bring out another side of the story. The incidence of crimes against women, rape, and sexual harassment is high in Kerala; female health issues have assumed alarming dimensions; autonomy of women in household matters; and their participation in economic activities is low. This calls for a closer look at the social, educational and economic status of women in Kerala and develop a comprehensive strategy.

23.2.1 Female empowerment: The current status

23.2.1.1 The status of women is assessed in terms of, educational attainment, economic empowerment, health attainments, crimes against women and social empowerment.

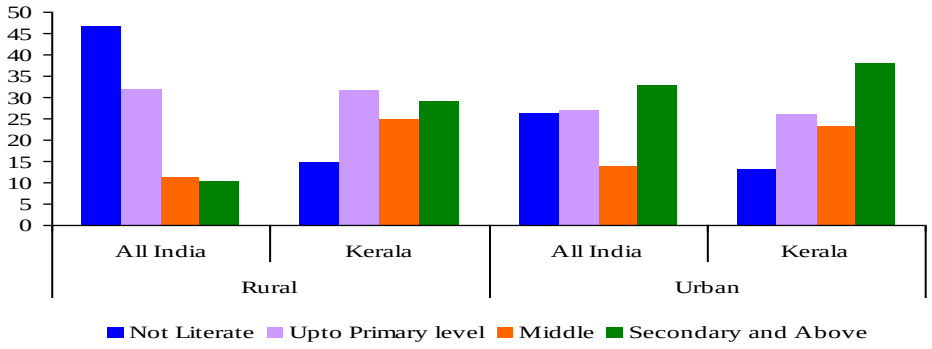
---

[2] State Planning Board (2009) Gender and Development, Economic Review 2009, Chapter 18, p.429

Educational empowerment

23.2.1.2 **Overall educational attainment:** NSS data from the 66th Round (2005-06) reveals the extent to which women in Kerala are ahead of women in other states with respect to educational attainments (Fig. 23.1). While 47 per cent of rural women are illiterate in India, in Kerala this figure is only 15 per cent. In urban areas, the percentage of illiterate women in India and Kerala are 26 and 13 per cent, respectively. The proportion of women with at least secondary level of education is three times more in Kerala than in India in rural areas; in urban areas, also, the figures are in favour of Kerala by five percentage points. This is also confirmed by the third round of the National Family Health Survey of 2005-06 (not shown here).

Figure 23.1: Education levels of female in India and Kerala—2009-10 (per 1000)



: *Source:* National Sample Survey Round 66 on Unemployment and Employment

23.2.1.3 **Representation in higher education:** Figures released by the Ministry of Human Resources Development (GOI, 2011)[3] indicate that in Kerala, out of every 100 students, about 54 are women; in India, on the other hand, only 40 out of every 100 students are women. The Gender Parity Index estimated by the MHRD (Ministry of Human Resources Development) also reveals that Kerala is ahead of other states. Kerala's Gender Parity Index[4] of 1.18 (against India's 0.74) is below only Goa, Daman & Diu, Chandigarh and Dadra, Nagar Haveli.

23.2.1.4 Estimates of the proportion of women in under graduate (UG), post graduate (PG) and M.Phil./Ph.D. courses in Kerala and India is given in Table 23.1. Overall, representation of women in Ph.D./M.Phil., particularly PG courses is higher than that of all-India levels.

[3] GoI (2011) *Statistics of Higher and Technical Education: 2009-10*. Ministry of Human Resource Development: Bureau of Planning, Monitoring & Statistics, New Delhi.

[4] Gender Parity Index means the number of female students enrolled to the number of male students.

However, representation of women in UG courses is lower than that of all-India level by about six percentage points.

Table 23.1: Representation of females in higher education – 2008-09

Course	Kerala			India		
	Girls	Total	Percentage	Girls	Total	Percentage
Ph.D./M.Phil.	942	1800	52.3	37436	92211	40.6
PG-Arts	6944	9518	73.0	366452	753068	48.7
PG-Science	6849	8519	80.4	199751	439725	45.4
PG-Engineering & Technical	877	2203	39.8	21904	76565	28.6
PG-Medicine	758	1351	56.1	14443	35596	40.6
PG-Education	157	195	80.5	14661	26892	54.5
PG	18529	26707	69.4	805713	1833507	43.9
UG-Arts	45214	72532	62.3	2896841	6304595	45.9
UG-Science	48978	68371	71.6	890617	2148956	41.4
UG-Engineering & Technical	33715	99071	34.0	554947	1928998	28.8
UG-Medicine	11682	17009	68.7	154236	318588	48.4
UG-Medicine	3002	3348	89.7	260019	518185	50.2
UG	107478	304469	35.3	5776915	13872870	41.6

Source: Statistics of Higher and Technical Education: 2009-10. Ministry of Human Resource Development

23.2.1.5 Analysis of representation of women in specific streams reveals that, in Kerala, women are better off in terms of representation in all courses. In particular, a much high proportion of women are enrolled in Science (UG and PG) and Medicine (UG) in Kerala, compared to all-India figures. While the representation of women in Engineering & Technology courses in Kerala is higher than in other states, there is scope to improve the figures.

23.2.1.6 Table 23.3 indicates the measure of Gender Parity Index (GPI)[5] in enrolment at primary, secondary and tertiary levels for both Kerala and All-India. It shows that Kerala not only succeeded in eliminating the female-male disparity at all levels of education but has shifted it in favour of females. At the All-India level, the ratio remains unfavourable and its gap with Kerala increases with increase in the level of education.

[5] Gender Parity Index (GPI) in enrolment at primary, secondary and tertiary levels is the ratio of the number of female students enrolled at primary, secondary and tertiary levels in public and private schools to the number of male students.

Table 23.2: Gender Parity Index at primary, secondary and higher education levels for selected years: Kerala vs All India average (2004-5 to 2007-08)

		2004-05	2005-06	2006-07	2007-08
Primary education	Kerala	1	1	1.01	1.01
	India	0.95	0.94	0.94	0.98
Secondary education	Kerala	1.04	1.03	1.07	1.08
	India	0.79	0.8	0.82	0.85
Higher education	Kerala	1.22	1.12	1.14	1.1
	India	0.71	0.69	0.69	0.7

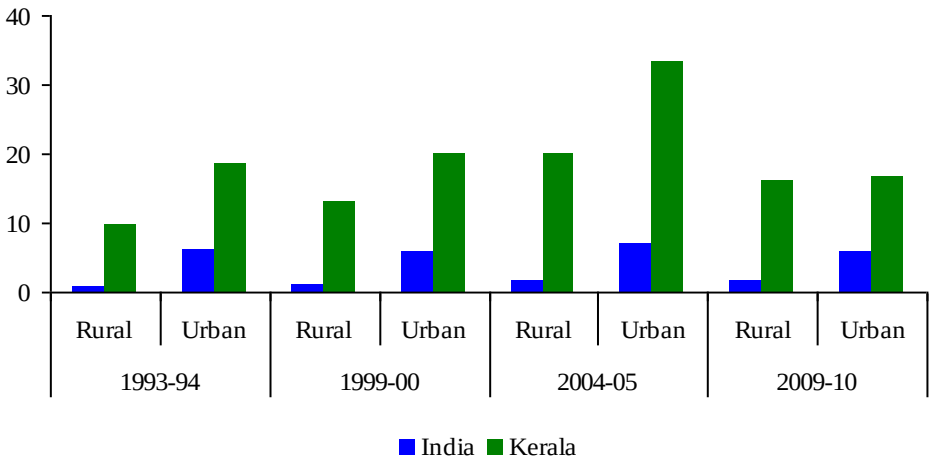
Source: Millennium development goals : India country report 2011

23.2.1.7 Prima facie, therefore, it appears that Kerala is ahead of other states in terms of representation of women in education, in particular higher education.

Economic empowerment: Participation in economic activities

23.2.1.8 As already discussed on Chapter 1, in both rural and urban areas female unemployment rates in Kerala are higher than all-India levels. In fact in the 66th round, the difference in unemployment levels is about 15 and 11 percentage points in rural and urban areas.

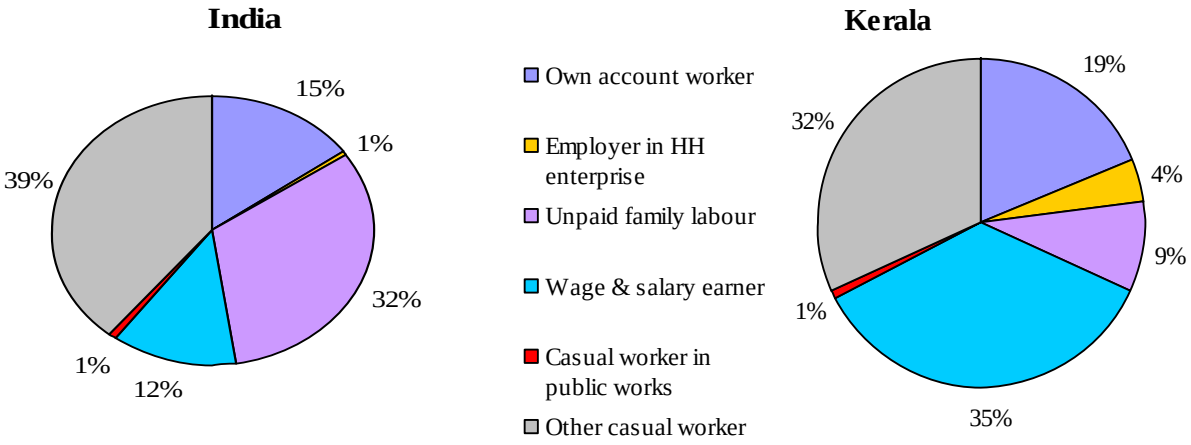
Figure 23.2: Female unemployment rates in Kerala and India—across NSS rounds (per 1000)



Source: National Sample Survey Round 66 on Unemployment and Employment

23.2.1.9 **Nature of Female employment activity:** Analysis of principal activity status of women workers (Fig. 23.4) indicates that the proportion of regular wage and salary earners is three times higher in Kerala than in India. Moreover, the proportion of female workers engaged in the household sector (As own account workers, employers and unpaid family workers) is substantially lower in Kerala, compared to all-India figures. The difference is as high as 16 percentage points. These are positive developments. Similar changes are observed in the rural and urban sector.

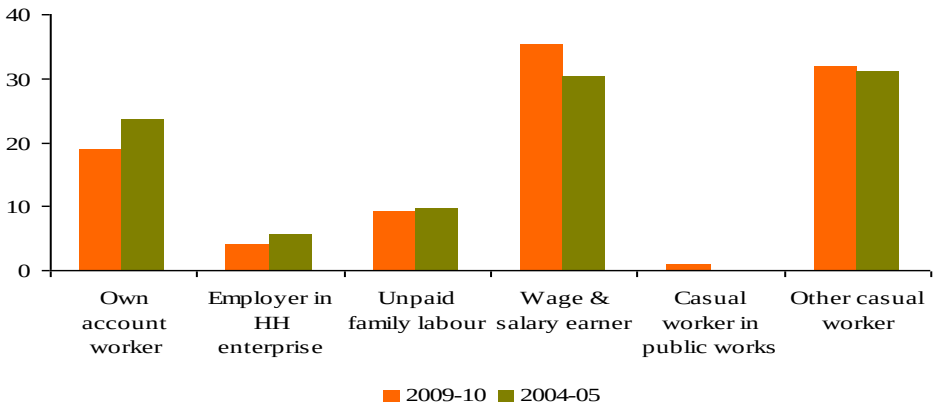
Figure 23.4: Distribution of female workers by principal activity status—2009-10



Source: National Sample Survey Round 66 on Unemployment and Employment

23.2.1.10 Figure 23.5 shows that the share of regular wage and salary earners have increased between 2004-05 and 2009-10, while the share of own account workers have gone down. Other changes in activity status are marginal. This rules out the possible worsening of their employment status in Kerala.

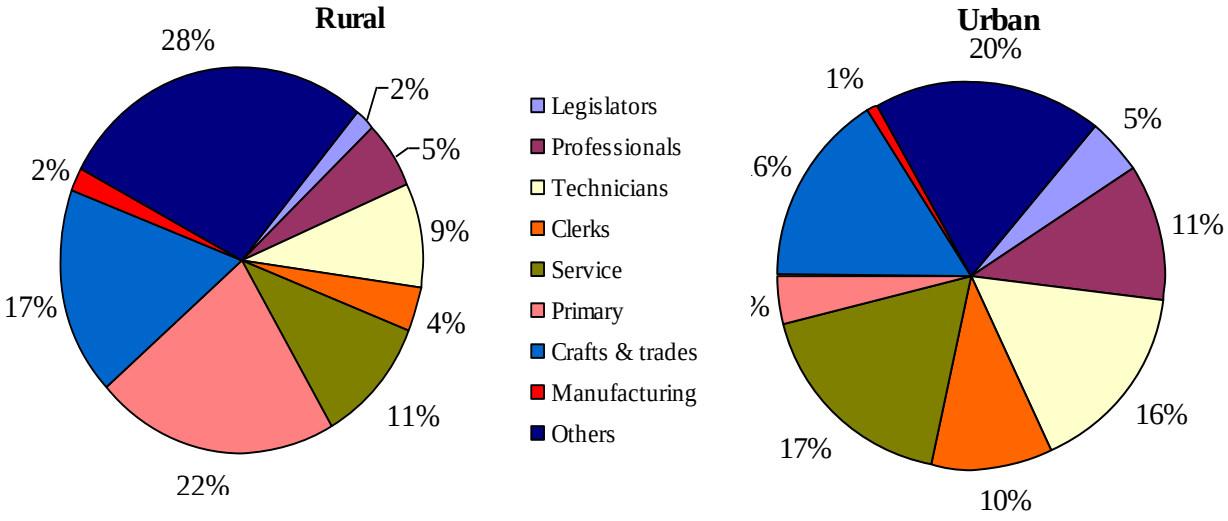
Figure 23.5: Distribution of female workers by principal activity status in Kerala—2004-05 and 2009-10



Source: NSS Rounds

23.2.1.11 **Nature of jobs taken up by females:** Classification of female workers by occupational categories (Fig. 23.6) reveals that in rural workers, most of the female workers are engaged in the residual 'Others' category (28 per cent),[6] followed by primary sector (22 per cent) and service sector (11 per cent). In urban areas, women workers are concentrated in the "Others" category (19 per cent), service sector (17 per cent), or are technicians (16 per cent) and trades and craftswomen (16 per cent). Women engagement is thus found to be skewed in low productivity categories.

Figure 23.6: Classification of female workers in Kerala by occupation—2009-10



Source: NSS round

23.2.1.12 Education and participation in economic activities are often identified to be necessary conditions for empowerment. While Kerala has made sufficient progress in women's education, analysis of NSS data reveals that the situation with respect to participation in economic activities is an important challenge before policy makers.

23.2.1.13 **Wage patterns: Male vs. female:** Using statistical techniques[7] geometric mean of daily earnings has been estimated and presented in Table 23.2. Estimations are based on NSS unit level data from the 61st and 66th rounds. It may be seen that male wages are always higher than that of wages. This holds across NSS Rounds, place of residence and for both wage and salaried workers and casual labourers.

[6] Unskilled workers in primary sector, mining, construction, manufacturing, etc.

[7] Mincerian wage function (Mincer, 1958)

Table 23.3: Analysis of discrimination in daily earnings of wage and salary earners and casual labourers in Kerala & India – 2005-05 and 2009-10

Round	Occupation	Place	State	Daily male wages (Rs.)	Daily female wages (Rs.)	Difference* (%)	Discrimination** (%)
66th round (2009-10)	Wages & Salary earners	Rural	Kerala	240.45	167.71	43.37	106.65
			India	231.93	132.64	74.85	86.07
		Urban	Kerala	295.39	187.04	57.93	94.14
			India	261.68	177.29	47.6	81.71
	Casual Labourers	Rural	Kerala	205.03	104.75	95.73	99.22
			India	100.37	68.37	46.8	93.77
		Urban	Kerala	205.24	91.11	25.26	100.55
			India	113.03	67.31	67.92	95.95
61st round (2004-05)	Wages & Salary earners	Rural	Kerala	131.39	88.58	48.32	94.38
			India	129.12	68.66	88.05	79.38
		Urban	Kerala	141.73	98.58	43.78	97.46
			India	140.31	81.75	71.64	77.01
	Casual Labourers	Rural	Kerala	123.76	60.97	1.03	102.45
			India	54.02	32.81	64.62	92.09
		Urban	Kerala	116.15	52.84	119.79	103.51
			India	64.11	38.14	68.08	94.70

Note:
* Difference shows simple % difference in wages between males and females; ** Discrimination means that part of wage difference which cannot be explained by difference in education and experience. Its calculation is based on the decomposition methodology provided by Oaxaca (1973) and Blinder (1973)
Source: Estimated using NSS unit level data for 61 and 66 rounds.

23.2.1.14 A part of this could be due to gap in average age and educational attainments between male and female workers. But in part, it could also be due to gender discrimination. Using the decomposition methodology given by Oaxaca (1973) and Blinder (1973) (see Appendix 23A for details), wage difference between males and females is decomposed to estimate the latter. Estimates of the extent of discrimination (Table 23.3) reveal the presence of significant gender discrimination in both the formal sector and among casual labourers. However, such discrimination is higher in Kerala than in India. This is not surprising as the gender difference in educational attainments is marginal in Kerala. However, one positive aspect of recent growth in Kerala has been a decline in the extent of discrimination since 2004-05. With the exception of rural formal sector, discrimination has decreased slightly in Kerala—against an across the board increase in discrimination in India.

Health challenges

23.2.1.15 Women health in Kerala has become a prime concern over the time. We have discussed the female health challenges in Chapter 4. To summarise them here, some of the serious female health concerns that the policy makers are faced with include: a high rate of abortion; mental illness; and life style diseases including diabetes, hypertension, thyroid-related problems, obesity, and terminal illnesses like breast cancer.

Social empowerment:

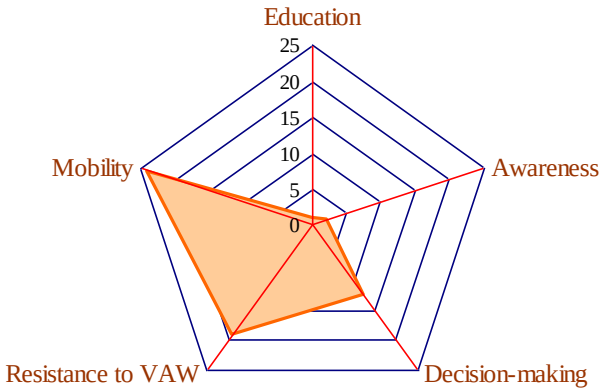
23.2.1.16 NFHS-3 elicits information on several parameters reflecting empowerment of women. These are organized into four empowerment indicators—

- Awareness: The awareness indicator comprises of information on educational attainments, control over money, holding of savings account and knowledge about loan programmes.
- decision-making within household,
- mobility and attitude towards females
- domestic violence against women (VAW).[8]

23.2.1.17 Kerala ranks second to Goa in terms of women awareness. In terms of other indicators however, it does not compare so favourably. In decision-making Kerala ranks 12th; the rank is even lower for attitude towards VAW (19th) and mobility (24th). The overall indicator—a simple average of the other four indicators—shows Kerala's rank to be 8th out of 29 states. States where women are more empowered than in Kerala are Goa, Delhi, Himachal Pradesh, Maharashtra, Mizoram, Sikkim and Tamil Nadu. While NFHS measures of empowerment has been widely criticized by feminists and researchers in gender studies for being unreliable, this analysis does raise questions about the extent of inclusiveness of Kerala's human development model.

Figure 23.7: Kerala rank in different empowerment indicators—2004-05

[8] The variables going into each of these factors are stated in Appendix A.

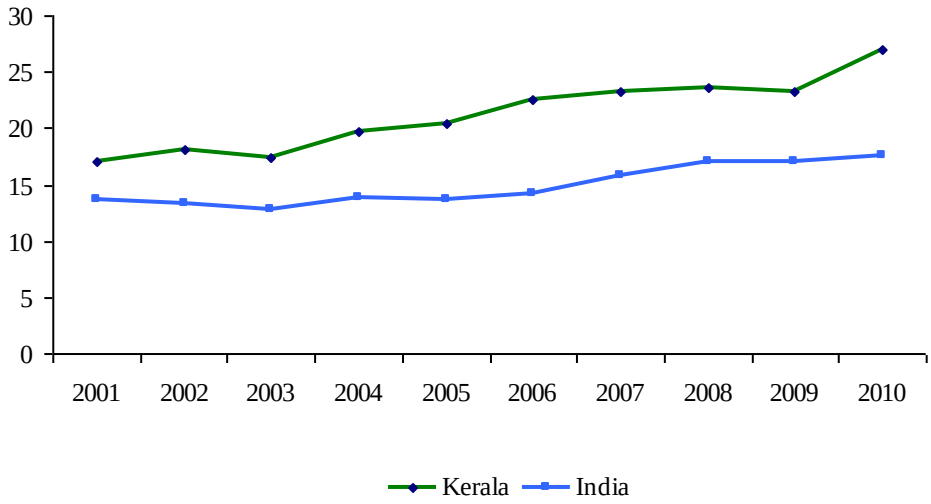


Source: Based on the national Family Health Survey, 2004-05

Crimes against females

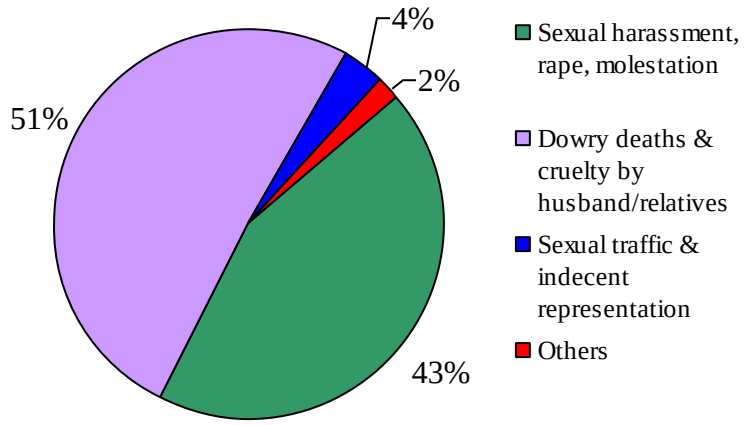
23.2.1.18 A concerning trend in Kerala has been the gradual increase in crimes against women in the last decade (Fig. 23.8). In Kerala, reported crimes as a proportion of population has increased by 58 per cent from 17.1 (2001) to 27.1 (2010). This is 54 per cent higher than the all-India level. This could in part be due to a high rate of reporting in Kerala. But that does not mean that this issue is over played. The incidence of crime against women is significant in the state which calls for serious policy interventions.

Figure 23.8: Trends in crime rates in Kerala and India—2001 to 2010



23.2.1.19 Analysis of type of crimes against women (Fig. 23.9) reveals that cruelty by husband and relatives constitute the main form of crime against women. Such crimes comprise 51 per cent of all crimes in 2010 in Kerala. The combined total of sexual harassment, rape and molestation is also very large (43 per cent of all crimes against women).

Figure 23.9: Classification of crimes against women—2010



Source: National Crime Bureau Reord

23.2.1.20 A study on safety of women undertaken in Trivandrum and Kozhikode (SAKHI et al., 2011) brings out the magnitude and nature of sexual harassment in Kerala. About 98 per cent of the 1400 women surveyed reported facing sexual harassment, generally taking the form of verbal and visual abuse. Six out of every ten women reported having been physically harassed.

23.2.1.21 Another major form of crime against women is rape. This comprised seven per cent of crimes against women in 2010. Although the rates of rape reported is not markedly higher than that of all-India levels (1.8 in India and Kerala), alarming signs are that it has increased by 12 per cent over the last decade, and shows a steadily increasing trend since 2003—in fact, the incidence of rape has increased by 60 per cent between 2003 and 2010.

23.2.1.22 It is widely acknowledged that education is a key to women empowerment. In Kerala, gender disparity in educational attainments is eliminated. Yet, serious challenges remain. The worrying aspect of women empowerment is education's inability to address the men-women equality. This calls for direct intervention by the state.

23.2.1.23 The main obstacles to women's emancipation are structural and cultural, and mostly rooted in the reproduction of unequal gender relations in the household and community. This inequality manifests itself in women's widespread inability to access and control productive resources, most notably land and agricultural services. Women find it difficult to graduate from to more prominent positions in market-based agriculture

23.2.2 Fostering gender equality in Kerala: Strategic Framework

23.2.2.1 It is proposed that the Kerala government should adopt gender mainstreaming (GM) as an overarching strategy. Mainstreaming gender perspective is achieved

through a process of assessing the implications for women and men of any planned action, including policies or programmes, in any area and at all levels. This process makes women's as well as men's concerns and experiences an integral dimension in the design, implementation, monitoring and evaluation of policies and programmes in all political, economic and social spheres so that women and men benefit equally and equitably; and inequalities and inequities are not perpetuated. GM thus concerns equality of opportunity, while acknowledging that neither men nor women are a homogeneous category. Individuals' situation and needs vary in terms of many factors, such as age, socioeconomic status, ethnicity, disabilities, sexual preferences and religion. Therefore GM means that every activity must consider, and shape itself in relation to, the conditions under which women and men can satisfy their needs. Accordingly, proposals and decisions must be analysed in terms of possible implications for both sexes. The strategy will be multi-pillared.

Pillar 1: Gender sensitization

23.2.2.2 Gender sensitization should pervade all spheres and all levels from top down to household level.

23.2.2.3 *Gender sensitization in schools*

- Start a gender sensitization programme among students of classes I to XII as part of its regular curriculum. Students of each gender since an early stage of their lives should be taught how to respect the opposite gender .
- It should also be integrated with classroom learning through various activities.
- Appoint gender coordinator and gender trainers to conduct gender-training workshops for teachers and students

23.2.2.4 *Gender sensitization in employment :*

23.2.2.5 It needs to be made compulsory for all employers in the public, private and cooperative sectors to have a "Gender Policy" with the following components:

1. Employment policy:

- The minimum percentage of women employees at various organizational levels should be determined
- Ensure that equally qualified and experienced women are not passed over for promotions by giving preference to men.
- Interview panels/ recruitment committees should be aware of the gender policy have at least 40% female representation.
- HR and Managers hiring new staff should also be responsible to provide necessary orientation to new employees.
- Salary review committee should be constituted to eliminate gender based disparities in salary structures where applicable
- The Gender Focal Person should be included in staff appraisal committees to ensure the incorporation of gender perspective in appraisals
- Maternity/paternity leave

2. Sexual Harassment Policy:

- Develop a culturally - sensitive sexual harassment policy,
- a definition of sexual harassment including both quid pro quo and hostile work environment giving examples;
- an explanation of penalties (including termination) the employer will impose for substantiated sexual harassment conduct;
- a detailed outline of the grievance procedure employees should use;
- a clear statement that anyone found guilty of harassment after investigation will be subject to immediate and appropriate disciplinary action;
- a clear understanding and strict rules regarding harassment of or by third parties like clients, customers etc,
- additional resource or contact persons available for support and consultation;
- an express commitment to keep all sexual harassment complaints and procedures confidential and time bound;
- provisions for training of employees at all levels, an anti retaliation policy providing protection against retaliation to complainants, witnesses, Complaints Committee members and other employees involved in prevention and complaints resolution,

- Promote discussions on the subject in all training sessions on gender equality,
- Establish a sexual harassment committee, to look into cases of sexual harassment as well as other problems arising out of possible gender conflicts between local culture and job requirements, as and when required,
- Provide means of dealing with independent investigations of allegations, should that be necessary.

3. Capacity building/Gender Sensitization

- Provide training in gender sensitization for all existing employees and new ones.
- Continue consultations, along with briefings and training at regular intervals. This can be done either in-house or by using outside expertise.
- Develop in-house capacity of staff to ensure that gender perspective is included in all project activities.
- Regular quarterly staff meetings to discuss gender issues among the staff or projects.
- a system of feedback on practicality and impact of Gender Action Plan, once it is in place. Maybe through the Gender Focal Person.

4. Publications /communications
    - language used must be gender sensitive
    - all publications and publicity material as well as material on e-mail and internet must be ensured to be gender sensitive

23.2.2.6 Employers in the unorganized sector should also be subjected to strict regulation on sexual harassment.

23.2.2.7 *Gender sensitization in public services and utilities*

- Adequate public utilities for women
- Genders sensitization in the provision of public unities and services

Pillar 2: Economic empowerment

23.2.2.8 Gender inequalities in economic opportunities, such as gender wage gaps, the concentration of females and female-led enterprises in less remunerative jobs and sectors, is a feature of the Kerala economy. Such inequalities persist despite the existence of policies aiming to provide an enabling environment in which women are able to balance their multiple roles and flourish as economic actors. One of the reasons why such policies are ineffective in attaining their objectives is the presence of constraints that impinge on women's ability to flourish as economic actors. Such constraints may be found in households, markets and informal and formal institutions. Thus, policy makers must act to improve gender equality in economic opportunity. Notably, policy makers should focus on three primary areas: (i) reducing the time constraints associated with women's household roles; (ii) increasing women's access to resources; and (iii) establishing a level playing field through reforming institutions.

Reducing the Trade-offs between Women's Household and Market Roles

23.2.2.9 Women's household roles, such as care-giving, affect their decisions as economic actors. A key policy priority is to reduce the impact of household roles on their economic lives. Policies can work around existing norms to reduce the impact that these norms have on women's economic activities. For instance,

- In rural areas where infrastructural constraints limit women's access to markets and energy and water sources, policies targeted at improving existing infrastructure are likely to have the greatest impact on women's time balance.
- In urban areas, on the other hand, policies to increase access to affordable childcare should be considered, particularly where informal mechanisms for childcare are more limited. The introduction of Day Care Centres for Children of Working Mothers would actively help in reducing the work-home balance. In the formal sector, addressing parental leave policies will help to level the playing field for men and women and may serve to ameliorate gender divisions of labour within households.

Increasing access to land and other productive resources

23.2.2.10 Access to land affects women's economic opportunities since land is an important productive asset and form of collateral. According to study conducted, the incidence of violence among women is 49% if they don't own house or land; it reduces to 18% for women who own land and 9% for women with land and house[9]. And as with education, access to land assets and income generated from land contributes to women's voice and influence. To that extent, policies promoting equal access to land also affect agency. Kudumbashree, the women-oriented community-based poverty alleviation programme started in 1999, has proved be a highly successful in this direction. This

[9] This study by Bina Aggarwal is reported in the Twelfth Plan Working Report on Gender Development.

experiment revolves around three critical components – micro-credit, entrepreneurship and empowerment and aims to reach out to families through women and communities through families. This vast network needs to be strengthened and leveraged to reach out to the women who have been susceptible to domestic violence of any form, divorce or sexual harassment.

23.2.2.11 Along with enhancing access to land, improving access to agricultural extension and rural livelihoods promotion services for female farmers will also improve their income. This is important given the feminization of agricultural sector due to migration of male workers. Acquiring knowledge and skills in agriculture and other rural livelihoods can however be extremely challenging particularly when extension services are orientated around traditionally male concentrated activities or when training occurs outside of rural villages, limiting female participation. Policies must be framed to ease this constraint over the period of the Perspective Plan.

23.2.2.12 Simultaneously, policies should be directed towards improving access to finance among female entrepreneurs by shifting their financial portfolios away from informal sources of credit towards more formal credit institutions. Since women generally have limited assets that may serve as collateral and also often have more limited credit histories than men, they are more likely to be restricted in their sources of borrowing. Beyond financial constraints, training programs that improve business skills may be implemented to address gender differences in entrepreneurial capital.

Enabling gender equality in the labour market

23.2.2.13 Given asymmetries existing between male and female workers in the labour market in Kerala it is necessary to address such inequities through protective legislation. This is important given the level of sexual harassment reported in the state. However, such protective legislation should be designed carefully and be constantly revised so that they do not serve to reduce the employability of female workers. It is also necessary to promote female participation in all sectors and in all jobs (management and below). This is likely to increase information on the competencies of women as leaders, and may also be a way to establish environments that are more attuned to the issues faced by women. Skills training programs can be used as a means to reduce occupational segregation by encouraging women to move into non-traditional professions. This will reduce gender stereotyping, particularly when paired with apprenticeship opportunities.

23.2.2.14 Enlisting the support of the private sector is important in this context. Encouraging companies to promote greater transparency in recruitment and promotion procedures can level the playing field for women and can help to achieve greater female representation, particularly at a managerial level. A programme targeting managers and union representatives in the private sector to train them in discrimination and equal opportunity issues related to the recruitment process may be introduced. Supportive organisational

policies can also help women to acquire relevant competencies and move to managerial levels.

23.2.2.15 The State Government can establish a Committee to analyze the nature of affirmative action and identify provisions in the Employment Equity Act that is of potential relevance to Kerala.

Pillar 3 : Social empowerment

23.2.2.16 This means a set of policies and programs to strengthen the voice and participation of women in households, in communities and in society.

Reduce gender-based violence through a multi-pronged approach

23.2.2.17 Reducing discrimination against women and gender-based violence requires action on a number of fronts: efforts to increase women's voice within the household; enactment and enforcement of appropriate legislation and strengthening of women's access to justice; provision of adequate support services for victims of violence; and use of the media to provide information in women's rights, to increase social awareness, and to shift social norms with respect to violence.

23.2.2.18 Two pronged policy is proposed here:

- Creating an effective preventive network: This entails not only addressing the issue from the school level to inculcate appropriate norms amongst male students, but also to plan use of public spaces and transport to enable easy and safe access to women.
- Offer protection and support to those exposed to violence or harassment: Special shelters for such victims with facilities for physical treatment, psychiatric counseling and group therapy may be set up in appropriate numbers. These can be availed either as a day patient or as an in-patient.

23.2.2.19 In this context, the introduction of *Nirbhaya* (fearless) by the Kerala government in July 2012 assumes significance. This policy is based on the report of a five member committee chaired by Sugathakumari to suggest a multi-pronged strategy for providing safety to women and children. *Nirbhaya* is a comprehensive action plan with multiple stake holder convergence setting out a five point agenda—prevention, prosecution, protection, rehabilitation and reintegration. It envisages steps like sensitizing society to the problem, empower vulnerable groups, target contributory factors (like alcoholism, gender discrimination and consumerism), crime mapping, establishing community vigilant groups in high risk areas, set up toll free lines and help booths, introduce strong laws and special fast track courts for speedy disposal of justice aimed to act as a deterrence, and establish rehabilitation centres to educate victims, helping them to heal, become empowered and

integrate with society. The action plan is supposed to be executed with the aid of *Jagratha Samithis* and *Kudumbasree* at the grass root level. While it is too early to predict to what extent *Nirbhaya* will be successful. But, if the plan is implemented effectively, it can serve as a useful launching short term launching pad for a more comprehensive plan to narrow agency gap across gender. The government may consider a time bound audit of the scheme to identify its success and defects.

(b) Strengthen women's endowments and economic opportunities in support of agency

23.2.2.20 Positive gains in gender equality in economic opportunities and endowments can lead to gains in agency across multiple domains of agency. These include: skills, knowledge, access to resources, finances and other productive assets.

23.2.2.21 It is proposed that a ten-year programme to enhance women's entrepreneurial skills should be introduced. The objective of the scheme should be to increase the number of units set up by women entrepreneurs and ensure sustained growth in existing units run by women entrepreneurs. The programme may be developed around the following components:

- Motivating women through the public media and camps in vocational and technical institutes to set up entrepreneurial units
- Facilitating flow of information and advise to ensure establishment of business unit and its development
- Assistance in establishing and operating specialised projects
- Development of financing opportunities
- Development of attitudes and role models
- Intensification and updating research on women entrepreneurship to facilitate their entry into business employment

23.2.2.22 Another scheme with potential to improve women in economic activities is a Skill Development Programme for Unemployed Women. Unemployed women aged 18-25 years may be provided subsidized short term training in technical skills, like Desktop Printing, Data Entry, Multimedia, and similar areas. The Government may enter into an agreement with specific skill providers for this purpose.

Transform social norms and practices through role models

23.2.2.23 Providing a forum for successful women to act as an inspiration to other women and girls can help the evolution of gender perceptions. Women in leadership roles can serve as effective role models for other women and girls. Female teachers are among the first professional women that show girls that being active outside the home is socially acceptable. These women serve as agents of change in the communities they work in by educating and socializing children beyond gender stereotypes. Experience shows that exposure to positive

female role models from an early age can help break the cycle of gender inequalities across generations. Policy makers can also support and encourage mass-media outlets—e.g., television, radio and virtual outlets—to promote positive messaging that will help to change gender norms.

Gendering urban development through sociotope mapping

23.2.2.24 Sociotope mapping is a method used in community planning to obtain information about social conditions. It is a method used to facilitate planning of a community's social dimension that has been successfully used in cities such as Gothenburg and Stockholm. A gendered sociotope mapping project has been introduced in Gotland, Sweden. This project seeks to collect information on:

- How women and men use and perceive a certain place?
- How accessible is the place and what qualities does it have?'

23.2.2.25 Sociotope mapping captures people's experiences via questionnaires, interviews, workshops and field studies, and the resulting information is then complemented with city officials' own observations. Questionnaires provide a comprehensive view of how different places are being used. Interviews and workshops offer more in-depth insight. Field studies can yield general impressions and spontaneous reflections of how citizens use an area and move around there. All the results are finally outlined on a map, giving a good overview of the information. It enables incorporation of the user perspective that is generally missing in community planning and Urban development schemes, helping planners to allocate resources to the right locations, enabling them to prioritise areas that citizens actually perceive as unsafe instead of the ones planners believe are unsafe based on statistics that after all do not reflect people's feelings of not being safe.

Pillar 4: Female health

23.2.2.26 Specific action plan to address female health issues is discussed in detail in Chapter 4. Further, social and economic empowerment can be instrumental in addressing female health issues. Also, there needs to be greater awareness of being health conscious among women. It is proposed to encourage the formation of all-women social clubs or meeting places where they get together, socialise and spend some quality time. These interactions may be stress buster and can help them boost their self-esteem and improve their health.

Pillar 5: Legal empowerment

Strengthen the legal and institutional environment

23.2.2.27 A key element of this includes the institution and enforcement of legislation to create an enabling environment for equal voice and influence regardless of one's gender. Programs that increase women's knowledge of the law with respect to violence and human rights and increase the capacity of justice service providers to address women's issues also contribute to greater safety and security among women in society.

Improve women's access to justice through mobile courts

23.2.2.28 Programs that increase women's knowledge of the law, help them to access the formal justice system, and encourage them to exercise agency through formal mechanisms may be initiated. Technology can help women access the justice system. Introduce mobile courts. Such courts can make access to legal redress easier and less costly for litigants, particularly from poor households in rural areas. The experience of mobile courts in rural areas of China and Indonesia shows that they can provide a solution to the problem of accessibility and security for women who wish to exercise their rights in the legal system but are unable to access the court. In countries like Indonesia, the waving of court fees for poor and marginalized groups has increased the ability of women to bring their cases to court. The justice system can also adapt to better address the specific needs of women in the justice system. Countries can institute gender sensitive training for officials in the system, as well as increase the representation of women within all institutions charged with formulating, implementing and enforcing the laws. Similarly, women's' courts and fast track courts may be set up to deal with sexual harassment and rape cases.

Complaints channel for reporting harassment and violence

23.2.2.29 Set up women's cells or committees which would be setting up "Complaints Channels" for any woman in distress calling a hotline, complaining through email, etc. Many complaints can be resolved effectively and positively through informal methods. Kudumbasree women group may be trained to operate these cells.

Pillar 6: Political empowerment

Take active measures to enable women's participation in the policy domain

23.2.2.30 Implementation of political reservation systems has contributed to increasing women's participation in electoral politics in a number of countries. The quota-based political reservation system in Kerala opens the doors to women in politics and provides a relatively fast track for women to enter politics. Evidence from India shows that public opinion about female political leaders improved with increased exposure. However, as with affirmative action in the labour market, there are concerns about the pipeline of qualified

candidates, along with possible doubts about the qualifications of women elected through a reservation system (independent of their actual qualifications).

Creating space for women's collective action

23.2.2.31 Formation of women professional groups can provide a space for women to interact, learn and advocate for gender equality. These groups can equip their members with access to a global network of women's business associations, information and advocacy on their behalf. More specifically, these organisations can offer access to contacts for sources of credit, access to training in international trade issues, access to mentoring, as well as access to the more basic skills of operations management and marketing. Kudumbasrees in rural areas have already been playing an important role in this regard. Other versions of this programme may be initiated to held wider sections of female population.

Pillar 7: Gender budgeting

23.2.2.32 The concept of gender budgeting was introduced in 80 countries in the mid 1980s. Essentially it is aimed at national level with a few exception. Gender budgeting was formally institutionalised in India in 2005-06. The Gender budget announced with the general budget takes into account the total magnitude of resources designated to women in a particular year. It contains two parts: Part A considers the schemes in which 100 percent funds are directed to women while Part B takes into account the programmes where at least 30% of the funds are meant for women. Kerala government may adopt such practice. There should be periodic review of the budget to evaluate the outcome.

Pillar 8: Women with disabilities

23.2.2.33 Women with disabilities are one of the most marginalized groups in society. Women and girls with disabilities encounter further discrimination as they are exposed to greater risk of physical and sexual abuse, denial of their reproductive rights, and reduced opportunity to enter married and family life. Government should implement measures to uphold the rights of women with disabilities and to protect them from discrimination. In particular, measures should be implemented to ensure equal access to health services, education, training and employment, and protection from sexual and other forms of abuse and violence.

Pillar 9 : Outcome Evaluation

23.2.2.34 To ensure that the suggested measures are not introduced without proper implementation, Kerala should consider adoption of a Gender Equality Outcome Evaluation Exercise. This Evaluation should identify the measures taken to achieve gender equality,

measures the progress achieved, estimate the costs and benefits of such measures, incorporate public feedback into the exercise to identify the failures and suggest appropriate measures to be undertaken in the next decade. It should also set out the parameters by which the performance in gender mainstreaming in the next decade is to be evaluated. These indicators can be used to evaluate the outcomes of gender - specific and mainstream interventions and policies and help reveal barriers to achieving success. They can provide vital information for adjusting programmes and activities so that they improve the achievement of gender equality goals and do not create unintended adverse impacts on women or men.

23.2.2.35 Appendix 23A provides the indicators of gender empowerment used by various organizations. However, it is important to ensure that what is measured is relevant to specific regions, countries and local situations. Therefore, a broad set of such measures will need to be developed by the government to evaluate the impact of its gender-specific programmes.

23.3 Aged Population

23.3.1 Ageing: A demographic perspective

23.3.1.1 Kerala is in the midst of a unique and irreversible process of demographic transition that has resulted into enlarged elderly population (Chapters 1 and 4). This calls for a policy response as members of this age group are particularly dependent upon others for daily needs, economic support and health care. A comparison with other states shows that, from the 1980s, Kerala had outpaced other states in ageing (Table 23.3).

Table 23.3: Share of aged in population (%)—1961 to 2026

Year	India	Kerala	Andhra Pradesh	Himachal Pradesh	Punjab
1961	5.6	5.8	6.2	7.4	6.6
1971	6.0	6.2	6.4	7.2	7.5
1981	6.3	7.6	6.4	7.5	7.7
1991	**6.6**	**8.8**	**6.5**	**7.8**	**7.6**
2001	6.9	10.6	7.2	8.8	8.7
2011	8.3	12.3	9.1	10.3	9.7
2021	10.7	16	12.2	12.9	12.6
2026	12.4	18.3	14.2	14.7	14.6

Source: Subaiya and Bansod, 2011

23.3.1.2 An important indicator of the extent to which the population has aged is the Index of Ageing. This is defined as:

Index of Ageing = (Population aged 60 years and above) *100/ (Population aged 0-14 years).

23.3.1.3 Trends in the Index of Ageing in Kerala and other rapidly ageing states are given in Table 23.4. Starting from a comparatively lower index value, Kerala has aged rapidly. By 1981 the state is ahead of others in terms of the Index of Ageing. In 1961 Kerala's index was 43 per cent below that of Himachal Pradesh; but in 2026 projections reveal that Kerala's ageing index will be 23 per cent above that of Punjab.

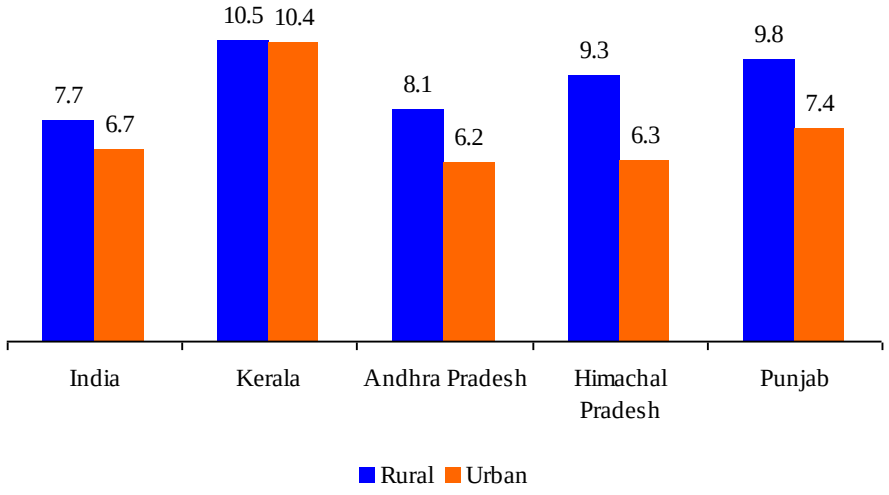
Table 23.4: Index of Ageing in Kerala and selected states—1961 to 2026

Year	India	Kerala	Andhra Pradesh	Himachal Pradesh	Punjab
1961	13.7	13.5	15.8	19.3	14.8
1971	14.0	14.8	15.6	17.4	17.8
1981	15.0	20.8	16.3	19.0	20.7
1991	17.6	28.9	18.1	21.0	21.2
2001	19.4	40.5	22.3	28.2	27.7
2011	28.4	54.2	36.3	41.4	38.9
2021	42.5	79.7	56.5	61.0	58.7
2026	53.0	97.4	70.4	74.4	74.7

Source: Subaiya, Lekha and Bansod, Dhananjay. W., December 2011, "Demographics of Population Ageing in India", BKPAI Working Paper No. 1, United Nations Population Fund (UNFPA), New Delhi.).

23.3.1.4 An analysis of the distribution of aged by place of residence reveals that in India, as well as in other rapidly ageing states, the proportion of aged is higher in rural areas. In Kerala, in contrast, the share of elderly in population is about the same in both rural and urban areas (Fig. 23.10).

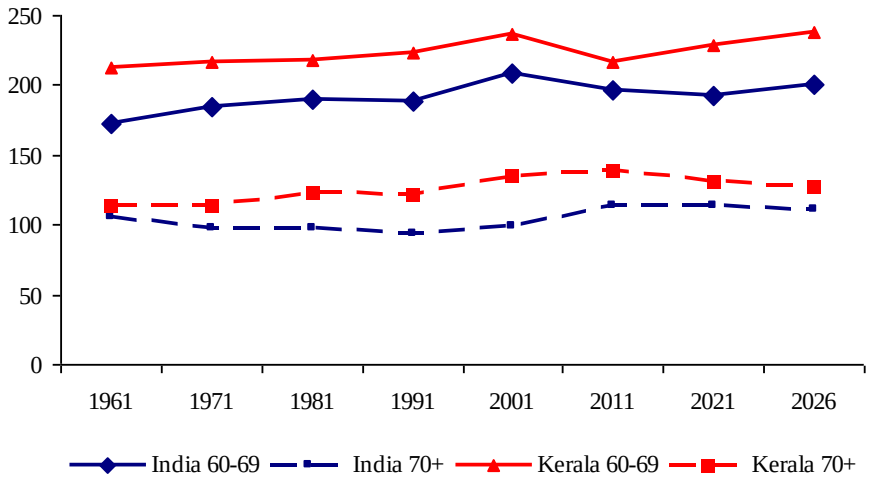
Figure 23.10: Distribution of aged by place of residence in Kerala—2001



Source: Census of India, 2001

23.3.1.5 Kerala has a sex ratio (number of females per 1000 males) above 1000. Trends in sex ratio for the elderly also reveal that number of females will be higher than number of males in both the 60-69 and 70+ age groups (Fig. 23.11). Moreover, as that female longevity is higher, we find that the sex ratio increases for the 70+ age group. Targeting elderly females is thus a major challenge facing policy makers.

Figure 23.11: Sex ratio among elderly in Kerala and India—1961 to 2026



Source: NCAER based on Development Report, 2005

23.3.2 Ageing—a social challenge

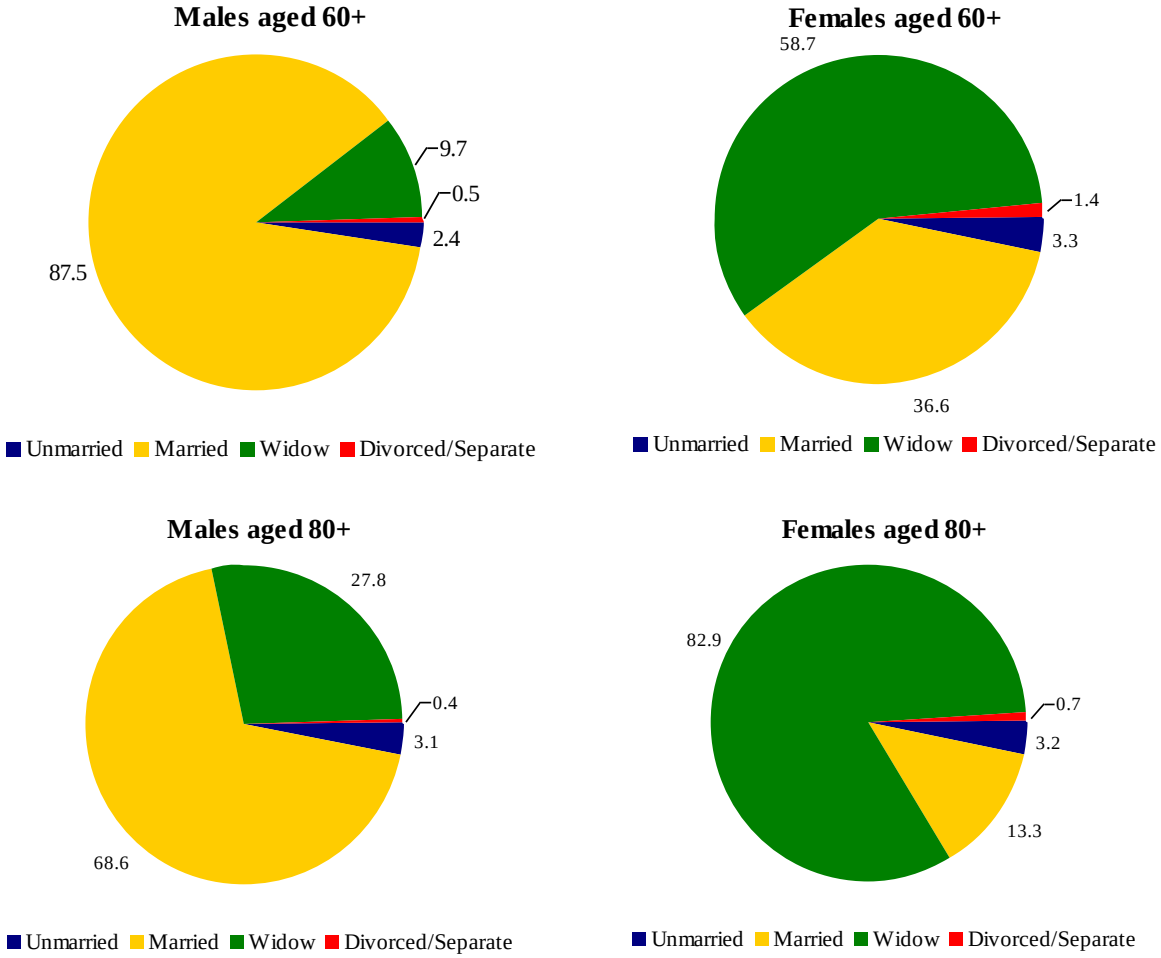
23.3.2.1 From Fig. 23.12 we had seen that sex ratio is high among the elderly, particularly among the 70+ population. This, coupled with the nature of Kerala's social structure, implies that ageing represents more than a demographic issue — it represents a social challenge before policy makers. This may be seen if we consider two aspects:

- Marital status of elderly, and
- Living arrangement of elderly.

23.3.2.2 In Fig. 23.13 we have presented the distribution of elderly by their marital status. We find that about 88 per cent of elderly males are married, compared to 37 per cent for females (a gap of 51 percentage points). The gap increases to 56 percentage points if we consider the 70+ group. This is expected given the differences in longevity across gender. What should be noted here is that a female elderly is more likely to loose her spouse than a male elderly. The loss of a spouse is disastrous for either sex in terms of psychological effect. However, the effect is greater among widows rather than widowers because of two reasons:

a) Women generally do not own economic assets; and,
b) Status of females (low to start with) deteriorates even more if they are widows.

Figure 23.13: Distribution of elderly by marital status—2001

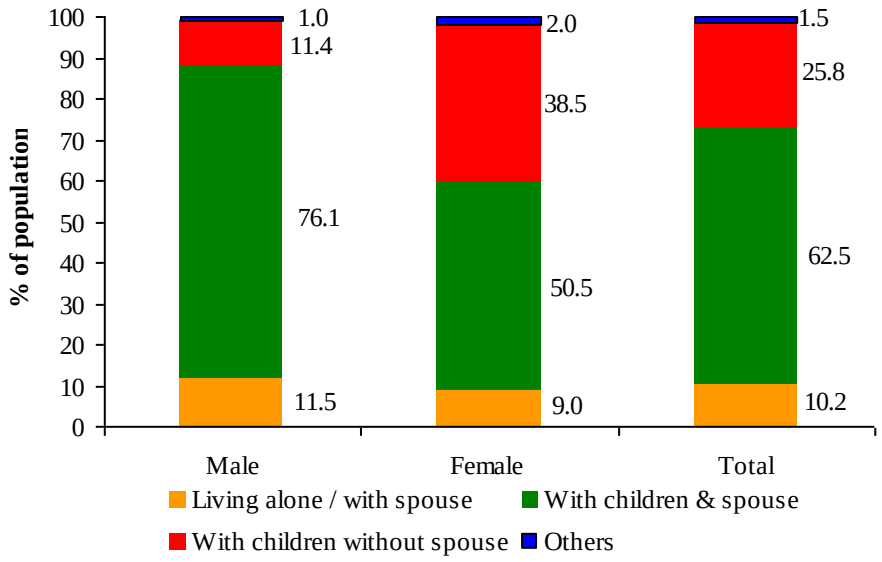


Source: Census of India, 2001

23.3.2.3 With the breaking up of the joint family system, an increasing proportion of the aged are found to be residing in nuclear families, with their spouses, rather than in inter-generational households. Further, studies have shown that work pressure and physical strain on the children, coupled with rising costs of living intensifying competition for scarce family resources, adversely affects relations between the elderly and their family members (Agewell Foundation, 2010[10]). Such trends are marked in urban areas where social isolation and lack of social networks is more common. In Kerala, there is the added factor that emigration rates are very high and have increased over the years. Fig. 23.14 shows that a high proportion of elderly females — relative to elderly males — live without spouse.

Figure 23.14: Living arrangements among elderly in Kerala—2004

[10] AGEWELL Foundation AGEWELL STUDY ON CHANGING TRENDS OF OLD AGE (September 2010), Agewell Research and Advocacy Centre



Source: Agewell Foundation, 2010

23.3.2.4 Starting from an initially disadvantaged position in a patriarchal society, the status of women deteriorates sharply as they lose their functional importance within the family[11].

23.3.3. Ageing -A health issue

23.3.3.1 Analysis of NSSO 52nd and 60th Round data highlights one aspect of the plight of the elderly in Kerala. Analysis of NSS data reveals that reported health status of the elderly has worsened between 1994-95 and 2004-05. While 48 per cent of the elderly in Kerala report a poor health status in 2004-05, in 1995-96 this figure increased to 52 per cent. However, there is no significant gender difference in reported health status. This is also confirmed by econometric analysis. Results also reveal that health status is better off among the relatively younger sections of the elderly, or those residing in urban areas, with higher education levels and from affluent households. Interestingly, while males report better health status if they are economically independent or reside with spouse, health status of women does not vary with either living arrangements or extent of economic dependency.

23.3.4 *Active ageing* : Strategic policy suggestions

23.3.4.1 The Madrid Conference proposed a new vision of ageing emphasizing on "… achieving *healthy, active, productive, successful and positive ageing* to the very end through

[11] Bagchi, K. (ed.) (1997) *Elderly Females in India; Their Status and Suffering*. Society for Gerontological Research and Help Age, New Delhi.

lifestyle modifications and interventions that work" (Andrews, 2002)[12]. Healthy and active ageing calls for active involvement of the elderly in social and community life (through steps like appropriate design of disabled-friendly transport system and public spaces), promoting healthy life style and attacking underlying socio-environmental factors responsible for poor health among elderly (through provisioning of housing facilities, etc.).

23.3.4.2 The vision of the strategic planning will be "Every older Keralite is able to live with dignity and independence, in a place of their choice with appropriate and affordable support and care services as and when they need them".

23.3.4.3 The state is proactively involved in creating enabling conditions for the elderly population to enjoy this phase of life[13]. However, Much focus has been on health services and infrastructure creation. This problem which will aggravate needs a broader approach.

23.3.4.3.1 **Pillar 1: Promote physical activity (see, Chapter 4)**

- ✓ Implementing a broad‐based healthy and active ageing community education campaign targeting lifestyle changes, and other prevention strategies, that can be adopted throughout a person's life to improve quality of life.
- ✓ Develop and implement targeted community programmes for physical activity among older people;
- ✓ Provide advice about physical activity in all health and social care settings for older people;
- ✓ Support local governments in creating motivating environments and infrastructure for physical activity (in particular active transport) for all age; and
- ✓ Promote the civil engagement of older people and strengthen the role of volunteering;
- ✓ Promote old persons' hobby clubs across the state
- ✓ Ensure that the public utilities and infrastructure including roads and transport are aged friendly for them to use it conveniently.

[12] Andrews, G. (2002) Second United Nations World Assembly on Ageing, Madrid, Spain, 2002. Available from: http://bit.ly/WCq58e (accessed on 20/6/06)

[13] State has formulated the Old Age Policy 2006 (See Appendix 23B)

23.3.4.3.2 ***Pillar 2: Public support to informal care giving with a focus on home care, including self-care.***

- ✓ Design strategies for training older adults in self-care and for training informal caregivers, and adapt self-care training programmes; and
- ✓ Design volunteer-based programmes to take care of aged people
- ✓ Young generation may be invited to initiate old age care programmes either voluntarily or on entrepreneurial basis under an institutionalized scheme (along a similar lines as R&D based programme)

✓ Create regional networks of providers of older persons services to consolidate and maximise local provision of ageing services.

✓ Conduct a research programme to identify service models and services which most effectively assist individuals experiencing different sorts of difficulties, maximise their independence and ability to remain living at home as lo;ng as possible

23.3.4.3.3 **Pillar 3: ICT enabled independent living for the aged**

23.3.4.3.4 With the availability of a new wave of ICT applications reesrach is needed to determine how learning can best be supported and provided in an ageing society. ICT Solutions address daily and independent living such as:

- Social communication: easy access to phone and video conversation, notably if enabled by broadband to stay in touch with family and friends, overcoming social isolation (in several countries over half of the 65+ are living alone)
- Daily shopping, travel, social life, public services: easy access over the internet to order goods online e.g. when reduced mobility makes physical shopping more difficult
- Safety (making sure entrance doors and windows are locked/closed when leaving then house or sleeping; checking for water or gas leaks; and turning all but one light off when going to bed, etc.)
- Reminders (memory problems tend to be associated to ageing and thus support may be needed in taking medication and fulfilling household tasks)

- User-friendly interfaces (for all sorts of equipment in the home and outside, taking into account that many elderly people have impairments in vision, hearing, mobility or dexterity)
- Telecare and telemedicine opens up new opportunities for providing medical care to the home and there are many new developments in ICT-based home care, including ways of monitoring wellbeing and providing a secure home environment Personal health systems include wearable and portable systems for monitoring and diagnosis, therapy, repairing/substitution of functionality and supporting treatment plans for individuals with a chronic disease – (e.g. heart disease and diabetes), complemented by tele-monitoring and telecare, thus avoiding hospitalisation
- Support for people with cognitive problems and their carers to stay at home for longer and remain active for as long as possible, e.g. through cognitive training, reminders, GPS tracking etc.
- Support for more efficient workflows in care, by integrating health and social care through sharing information, monitoring and follow-up to interventions across different organisational and physical boundaries.

23.3.4.3.5 Future developments in many of these areas are underpinned by some key emerging echnologies

23.3.4.3.6 **Pillar 4 : Adapt health systems to the needs of the aged**

23.3.4.3.7 As people grow older, they become more prone to fall ill, while the costs of treatment increases. Empirical studies reveal a high incidence of ailments and disabilities like visual impairment or loss, cataract, orthopedic and locomotor-related ailments, depression, Alzheimer's disease, Parkinson's disease, etc. Further, the incidence of chronic diseases will also increase with age. Consequently, the elderly population will require better co-ordinated and more patient-centred care. Key areas where policy needs to focus include:

- *More regular follow-up of chronically ill patients and better co-ordination of care.* A growing share of the elderly have chronic conditions – and aged often suffer from multi-morbidity– while medical care systems have become more specialised and fragmented over time.

- *Enhanced preventive health services*: Primary and secondary prevention are of particular importance. Policies in this area include vaccinations, reducing substance abuse and screening for diseases such as glaucoma, cancer, diabetes and hypertension related ailments. Policies can also include efforts to reduce accidents, for example

through the promotion of safe homes of the elderly and their environment or programmes against violence and suicide.

Greater attention to mental health: Mental illness – which can take on a range of forms from depression to dementia and to psychiatric disorders – is common among the elderly and requires institutional care. Policies to address wider determinants of mental health as well (social isolation, poverty and discrimination and housing) may also be required.

- *Encourage better self-care*: Increased health literacy and access to technology such as the Internet may provide at least well-off individuals with the potential for a greater understanding of their condition and how to adapt their lives to deal with it best.

23.3.4.3.8 There is a wide range of responses that can make existing health and health-care systems better adapted to the needs of the elderly. At the level of health care, much care of a chronic nature can be provided in an ambulatory environment. Increased attention to improved co-ordination of care and, where feasible, improved models of primary care to enhance follow-up may be desirable.

23.3.4.3.9 **Pillar 5 : providing institutional care to the aged**

23.3.4.3.10 The Kerala government has established Old Age Homes and Day Care Centres for the care, protection and rehabilitation of the aged by providing food, clothing, medical services, shelter, and other services. The 2011 Economic Review reports that there are 14 Old Age Homes with 697 inmates against a sanctioned strength of 1250. There is also one Day Care Centre & Old Age Home with sanctioned capacity of 75 persons (with 23 inmates). The 2011 Economic Review comments that

> "The present institutions lack facilities for counseling and geriatric care. The physical, emotional and psychological problems faced by the elderly people due to ageing demand that these institutions be revamped. Participation and involvement of NGOs and other welfare organisations can be thought of to ease or share the financial burden of revamping and providing the above facilities in these institutions" (GoK, 2011a: 426).

23.3.4.3.11 Two pronged policy may be adopted.

- **Increase old age homes:** If we assume a constant capacity (in terms of bed)/population ratio, then sanctioned capacity will have to be increased to 1998 in 2026. If we assume that demand for such facilities increases by three percent every five years (based upon rates of decline of co-residential arrangements), then sanctioned capacity will have to be increased to 2058.

- **Improve facilities:** Moreover, it is important to improve the facilities in such Old Age Homes. A triple-layered system may be useful in this context. Less well-off aged population may be catered to by the public sector offering basic facilities like medical care, counseling, exercising facilities, group recreation, etc. Demand from the middle income households may be met by establishing facilities through Public-Private Initiatives (PPI). Well-off aged, who can afford to pay more, can be lodged in Old Age Homes established by the private sector. Such Homes should also have facilities for rehabilitating aged patients with locomotor-related ailments or accident-related facilities.

23.3.4.3.12 The existing number of Day Care Homes should also be increased. Such centres may be a useful alternative to the Home Visit System prevalent in developed countries. This will allow working couples to admit their parents in such centres during working hours, reducing chances of falls and accidents. It will also help in the creation of social networks among the elderly that will minimize their sense of isolation and depression.

23.3.4.3.13 **Pillar 6: Ensuring economic security to the aged**

23.3.4.3.14 To meet the social and demographic challenge of ageing in Kerala comprehensive social security measures are needed to ensure basic entitlements in the form of income security, health and housing for them. Successive governments in Kerala have introduced various social security measures for the aged. Currently there are about 35 such schemes in the state—of which 16 are fully funded by the state. In addition, there are 26 Welfare Fund Boards providing welfare assistance and income security and employment to workers in the unorganised sector. Details available for 26 Welfare Fund Boards show that there are 59.18 lakh members enrolled in these Boards. Out of them, 16.27 lakh are in the agriculture sector and 11.58 lakh are in the construction sector. Female workers out number males in industries like cashew, tailoring, coir, bamboo, beedi industries and anganwadi workers. In the Anganwadi Workers Welfare Fund Board, all the enrolled workers are female. Similarly in tailoring, 85 per cent workers are female. On the other hand, in Boards like Toddy Workers, and Abkari Workers, above 99 per cent of the workers are male. The coverage of these welfare schemes is very high—70 percent of the workers in the sector, and 28 percent of the population aged 15-59 years are covered by them. Reducing cost of delivery of these schemes will be an important challenger in coming years.

23.3.4.3.15 While Kerala has made considerable progress in extending social security coverage to the aged through the mechanism of tripartite welfare fund boards, many of the existing schemes require a clear perspective and restructuring to improve their delivery mechanisms to ensure cost effective delivery. A “Frame Legislation” can be enacted to bring in a degree of perspective and order to all social security initiatives. This will enable consolidation of the current set of enactments, executive orders, provide guidelines for

working out future schemes and obviate the need for individual legislations, apart from providing a standard set of basic operating policies and procedures.

23.3.4.3.16 It is proposed in that context that the 26 sectoral boards may be merged and standardized (Chapter 17 for details). The scheme may be extended to groups which are excluded from the programme. The delivery system should be computerized to facilitate efficient disbursement; and chip-based social security cards should be introduced to facilitate universal access and to prevent leakage and malpractices. There is thus a need for better quality delivery of services emerging as a major requisite. It is essential to upgrade institutions as also to make provision for hitherto relatively neglected areas of concern—of which the ageing population is an important group.

23.4 Disability

23.4.1 Disability

23.4.1.1 According to the figures based on the 2001 Census, 2.7 per cent of State's population is disabled. The All India average is 2.1%. Kerala in fact is the third largest state in terms of the prevalence of disability; J&K (3.0) and Orissa (2.8) are the top two states. The disabilities include chronic fits, strange behaviour, and difficulty in moving around, seeing, hearing, learning and feeling. There are more women among the disabled in the State. Tamil Nadu is not far behind with 2.6% of the population being disabled. Andhra Pradesh and Karnataka, the other two South Indian States however have been below the national average.

23.4.1.2 Out of a total of 8,66,598 disabled, 4,45,511 are females and 4,21,088 males. The number of disabled people (98,793) is the highest in Malappuram. Thiruvanthapuram district (88,044) is in the second place and Ernakulam (84,333) is third. There are 1,21,324 people in the State with vision problems. Here again, Malappuram has the largest number of people with the problem - 13,831. Thiruvanathapuram has 12,326 and Ernakulam 11,807 people in this category.

23.4.1.3 A total of 1.17 per cent of the population in the State has difficulty in moving around. Notably, 43 per cent of the disabled population in the State belongs to this category. As many as 89,260 persons have chronic fits. This is 10.3 per cent of the disabled population and 0.28 per cent of the total population in the State.

23.4.1.4 It is significant that the NSS Round on disability in 2002, which shows the disability rate to be 2.2% in Kerala, also placed it at the third position among Indian States and Union Territories in terms of the proportion of population with disability.

Indian government has adopted has built a strong institutional set up with detailed policies and guidelines. The legislative framework for the protection of the rights of disabled people is covered by four acts in India:

- **Mental Health Act 1987:** This Act consolidated and amended the law relating to the treatment and care of mentally ill persons and to make better provision with respect to their properly and affairs.
- **The Rehabilitation Council of India Act 1992:** This Act sets out to regulate the training of professionals in rehabilitation. The amendment in the Act in 2000 gave the additional responsibility of promoting research to the Council. The major functions of the council include the recognition of qualifications granted by Universities in India for Rehabilitation Professionals and also the recognition of qualification by Institutions outside India.
- **The Persons with Disabilities (Equal Opportunities, protection Of Rights And Full Participation) Act 1995:** This act provides 3% reservations for disabled people in poverty alleviation programmes, government posts, and in state educational facilities, as well as other rights and entitlement. The specific objectives of the Act are: Prevention and Early Detection of Disabilities, Education, Employment, Affirmative Action, Non-Discrimination, Research And Manpower Development, and Social Security
- **The National Trust for Welfare of Persons with Autism, Cerebral Palsy, Mental Retardation and Multiple Disabilities Act 1999**: This Act provides for the constitution of a national body for the Welfare of Persons with Autism, Cerebral Palsy, Mental Retardation and Multiple Disabilities. It provides guidelines to enable and empower persons with disability to live as independently and as fully as possible within and as close to the community to which they belong;
- **National Policy for Persons with Disabilities Act 2005:** The National Policy, released in February 2006 recognizes that Persons with Disabilities are valuable human resource for the country and seeks to create an environment that provides them equal opportunities, protection of their rights and full participation in society. Its aim is to ensure better coordination between various wings of the State and Central Governments

23.4.1.5 In addition to the legal framework, extensive infrastructure has been developed in India for disabled persons under this Act and includes the establishment of the following institutions:

- Institute for the Physically Handicapped, New Delhi.

- National Institute of Visually Handicapped, Dehradun
- National Institute for Orthopaedically Handicapped, Kolkata
- National Institute for Mentally Handicapped, Secunderabad.
- National Institute for Hearing Handicapped, Mumbai
- National Institute of Rehabilitation Training & Research, Cuttack.
- National Institute for Empowerment of Persons with Multiple Disabilities, Chennai

23.4.1.6 India also draws support from international bodies to compliment the legal framework. It is a signatory to the United Nations – Convention on the Rights of Persons with Disabilities and Biwako Millennium Framework for Action.

- **United Nations – Convention on the Rights of Persons with Disabilities:** Member countries which signed and ratified the Convention must promote, protect and ensure full and equal enjoyment of all human rights by all persons with disabilities. It applies to everyone with a disability and covers all areas of life including education, employment, health, culture, liberty, and accessibility.
- **United Nations Economic and Social Commission for Asia and the Pacific - Biwako Millennium Framework for Action*:*** In May 2002, the United Nations Economic and Social Commission for Asia and the Pacific (UNESCAP) adopted the Biwako Millennium Framework for Action. The framework outlined issues, action plans and strategies towards an inclusive, barrier-free and rights-based society for people with disabilities in the Asian and Pacific region over the Decade of 2003 to 2012 . It identified seven priority areas for action:

    1. persons with disabilities, family organizations
    2. women with disabilities
    3. early detection, early intervention and education
    4. poverty alleviation through capacity-building, social security and sustainable livelihood programs
    5. training and employment including self-employment
    6. access to built environments and public transport, and
    7. access to information and communications, including information, communications and assistive technologies.

    In all, 21 targets and 17 strategies supporting the achievement of all the targets have been identified. At the High-level Intergovernmental Meeting held in Bangkok in September 2007, it was agreed to adopt the Biwako Plus Five. The Biwako Plus Five

provides additional actions in the seven priority areas as well as an increase of 25 additional strategies. This framework provides guidance in adopting the framework for the strategy.

23.4.1.7 In addition, most international agencies have integrated the programs and policies on disability. For instance, WHO promotes a medical rehabilitation approach to disability issues; UNESCO promotes inclusive education policies; the International Labor Organization (ILO) has a policy of including disabled people in their employment; UNICEF focuses on prevention of impairment in children through health and immunization programmes.

23.4.1.8 The future strategies will need to be built around the guidelines provided by national and international agencies. Set out a high level policy framework to give coherence and guidance to various departments' activities in disability specific areas covering

- The definition of disability
- Early detection and prevention: Vaccination, specialized care during pregnancy, early detection and training
- Encourage and educate for a non-disabling society
    - Develop national and locally-based anti-discrimination programmes.
    - Include the perspectives of disabled people in ethical and bioethical debates.
    - Encourage ongoing debate on disability issues.
    - Increase awareness among people with disabilities of their rights and opportunities through a range of communication activities.
- Ensure rights for disabled people
    - Provide education to ensure that disabled people understand their rights, recognise discrimination and are able to be self-advocates.
    - Educate agencies responsible for supporting children and families about the rights and abilities of disabled parents.
- Education for disabled
    - Ensure that no child is denied access to their local, regular school because of their impairment.
    - Support the development of effective communication by providing access to education in Sign Language, communication technologies and human aids.
    - Ensure that teachers and other educators understand the learning needs of disabled people.
    - Ensure that disabled students, families, teachers and other educators have equitable access to the resources available to meet their needs.

- Improve schools' responsiveness to and accountability for the needs of disabled students.
- Improve post-compulsory education options for disabled people, including: promoting best practice, providing career guidance, increasing lifelong opportunities for learning and better aligning financial support with educational opportunities.

Provide opportunities in employment

- Provide education and training opportunities to increase the individual capacity of disabled people to move into employment.
- Provide information about career options, ways to generate income, and assistance available for disabled people.
- Investigate longer-term incentives to increase training, employment and development opportunities for disabled people.
- Encourage the development of a range of employment options recognising the diverse needs of disabled people.
- Ensure disabled people have the same employment conditions, rights and entitlements as everyone else has, including minimum wage provisions for work of comparable productivity.
- Enforce the legal requirement of 3% employment to disabled in the public sector.

Foster leadership by disabled people

- Encourage disabled people to take part in decision-making as service users, as staff in the delivery of services, and in the governance, management, planning and evaluation within all services that disabled people access.
- Assist self-help initiatives, service provision and advocacy organisations run by disabled people for disabled people.
- Support the establishment of a leadership development and mentoring programme for disabled people.

Foster an aware and responsive public service

- Develop mechanisms to ensure that all government policy and legislation is consistent with the objectives of the Disability Strategy.
- Adapt public sector training to ensure that service development and service delivery are consistent with the Disability Strategy.

- Ensure the locations and buildings of all government agencies and public services are accessible.
- Require all new scheduled public transport to be accessible
- Encourage the development of accessible routes to connect buildings, public spaces and transport systems.
- Develop nationally consistent access to passenger services where there is no accessible public transport.
- Improved performance of service delivery leading to improved outcomes for persons with a disability,

Support e-enabled quality living for disabled people

- Draw on the strategy for the aged

Develop a well developed care system

- Develop a highly skilled workforce to support disabled people.
- Draw on the strategy for the aged
- Health service network

Collect relevant information about disabled people and disability issues

- Ensure that guidelines for research funding take into account the need for research on disability issues, include disabled people in the development and monitoring of the disability research agenda, and enable disabled people to put forward their own experiences in the context of the research.
- Collect relevant and useful information about disability through all relevant surveys to inform the research programme.

For **implementation**, it is proposed that

- Each relevant department mainstreams the policy for disability
- The overall policy framework is developed by a " separate body for disability" which will also be responsible to oversee its implementation by various departments.
- A part of fund is set aside (specified in the policy framework) by each department for implementing strategy for the disabled.
- The administrative body for disabled may set the targets based on the guidelines provided by the Biwako Millennium Framework for Action and monitors its implementation.

23.5 Linguistics Minorities

23.5.1 International standards

23.5.1.1 General UN human rights treaties provide important standards for the protection of the rights of persons belonging to minority groups. There are eight human rights treaties that have established committees to follow the implementation of their work (listed in parentheses):

ICCPR - International Covenant on Civil and Political Rights (Human Rights Committee)
ICESCR - International Covenant on Economic, Social and Cultural Rights (Committee on Economic, Social and Cultural Rights)
ICERD - International Convention on the Elimination of All Forms of Racial Discrimination (Committee on the Elimination of Racial Discrimination)
CRC - Convention on the Rights of the Child (Committee on the Rights of the Child)
CAT - Convention Against Torture and other Cruel, Inhuman or Degrading Treatment or Punishment (Committee against Torture)
CEDAW - Convention on the Elimination of All Forms of Discrimination Against Women (Committee on the Elimination of Discrimination Against Women)
ICRMW - International Convention on the Protection of the Rights of All Migrant Workers and their Families (Committee on Migrant Workers)
CRPD - Convention on the Protection and Promotion of the Rights and Dignity of Person with Disabilities (Committee on the Rights of Persons with Disabilities)

23.5.1.2 Two of these treaties contain minority-specific provisions:

23.5.1.3 Article 27 of ICCPR is the most widely accepted legally binding provision on minorities and provides basis for the UN Declaration on Minorities. Article 27 reads:

23.5.1.4 In those States in which ethnic, religious or linguistic minorities exist, persons belonging to such minorities shall not be denied the right in community with the other members of their group, to enjoy their own culture, to profess and practise their own religion, or to use their own language.

23.5.1.5 The article grants persons belonging to minorities the right to a national, ethnic, religious or linguistic identity, or a combination thereof, and to preserve the characteristics they wish to maintain and develop. Although the article refers to the rights of minorities in those States in which they exist, its applicability is not subject to official recognition of a minority by a State. States that have ratified the ICCPR are obliged to ensure that all individuals under their jurisdiction enjoy their rights; this may require specific action to correct inequalities to which minorities are subjected.

23.5.1.6 Article 30 of CRC provides a similar standard for minority children: In those States in which ethnic, religious or linguistic minorities or persons of indigenous origin exist, a child belonging to such a minority or who is indigenous shall not be denied the right, in community with other members of his or her group, to enjoy his or her own culture, to profess and practise his or her own religion, or to use his or her own language. Given the wide ratification of the ICCPR and the CRC, almost every State in the world has a legally-binding obligation to protect minority rights based on its voluntary commitments under international law.

23.5.2 Other standards relevant to minorities

23.5.2.1 There are several additional international human rights standards that have particular relevance to the situation of minorities.

23.5.2.2 Practices such as forced population transfers intended to move persons belonging to minorities away from the territory on which they live, or with that effect, as well as forced sterilizations, would constitute serious breaches of the Rome Statute.

23.5.2.3 The 1960 UNESCO Convention Against Discrimination in Education governs equality in access to education and to training for teachers as well as providing safeguards for religious or linguistic education and education by national minorities. The importance of providing education that will "promote understanding, tolerance and friendship among all nations, racial or religious groups" is stressed (article 5.1 (a)).

23.5.2.4 The 2003 UNESCO Convention for the Safeguarding of Intangible Heritage safeguards and promotes the practices, representations, expressions, knowledge, skills – as well as the associated instruments, objects, artefacts and cultural spaces – that communities, groups and, in some cases, individuals recognize as part of their cultural heritage. For this purpose, the Convention establishes a fund and a listing system of representative and endangered heritage.

23.5.2.5 The 2005 UNESCO Convention on the Protection and Promotion of the Diversity of Cultural Expressions encourages States to incorporate culture in national and international development policies and to adopt measures aimed at protecting and promoting the diversity of cultural expressions within their territory.

23.5.2.6 The UNESCO Convention emphasises the recognition of equal dignity and respect for all cultures, including that of persons belonging to minorities. It provides for the freedom to create, produce, disseminate, distribute and have access to traditional cultural expressions, and encourages States to create environments conducive to this.

23.5.2.7 The Commission on Human Rights, in Resolution 2005/79, established the mandate of the Independent Expert on minority issues:

(a) To promote the implementation of the Declaration on the Rights of Persons Belonging to National or Ethnic, Religious and Linguistic Minorities, including through consultations with Governments, taking into account existing international standards and national legislation concerning minorities;

(b) To identify best practices and possibilities for technical cooperation by the Office of the United Nations High Commissioner for Human Rights at the request of Governments;

23.5.3 Multilinguistic minorities in India

23.5.3.1 Politically, India has linguistically organised states. In every state, in addition to the majority regional language speaking population, there are linguistic minorities as well. Indian constitution provides protection to them vide Articles 29 and 30 under Part III of the Constitution.

23.5.3.2 Article 29 "Protection of interests of minorities. (1) Any section of the citizens residing in the territory of India or any part thereof having a distinct language, script or culture of its own shall have the right to conserve the same. (2) No citizen shall be denied admission into any educational institution maintained by the State or receiving aid out of state funds on grounds only by religion, race, caste, language or any of them."

23.5.3.3 Article 30 "Right of minorities to establish and administer educational institutions: (1) All minorities whether based on religion or language, shall have the right to establish and administer educational institutions of their choice. (2) The state shall not, in granting aid to educational institutions, discriminate against any educational institution on the ground that it is under the management of a minority, whether based on religion or language."

23.5.3.4 The States Reorganization Commission that was set up in the early 1950's recommended certain measures to promote the cause of linguistic minorities. Consequently Article 350A and 350B were added to the Constitution.

23.5.3.5 Article 350A Facilities for instruction in mother-tongue at primary stage
It shall be the endeavour of every State and of every local authority within the State to provide adequate facilities for instruction in the mother-tongue at the primary stage of education to children belonging to linguistic minority groups and the President may issue such directions to any State as he considers necessary or proper for securing the provision of such facilities.

23.5.3.6 Article 350B Special Officer for linguistic minorities

(1) There shall be a Special Officer for linguistic minorities to be appointed by the President.
(2) It shall be the duty of the Special Officer to investigate all matters relating to the safeguards provided for linguistic minorities under this Constitution and report to the

President upon those matters at such intervals as the President may direct, and the President shall cause all such reports to be laid before each House of Parliament, and sent to the Government of the States concerned.

23.5.4 Multi-linguistic minority in Kerala and strategic initiatives

23.5.4.1 Kerala has a long history of in-migration in particular from the neighbouring state of Tamil Nadu. Other major minorities in Kerala include Kannada speaking, Tulu speaking, Konkani speaking, Marathi speaking, Urdu speaking, and Mahl speaking, speaking people also in particular in Kasaragod District. In addition, there are small Gujrati, Sikh, Bengali, Bihari and Oriya minorities. The setting up of global education and health cities in Kerala will further attract students and professionals not only from different parts of the country but from other countries. This will require a well-designed policy to create the right environment for a multilingual and multicultural society. Kerala has allowed measures relating to the safeguards of its linguistic minorities in Kerala. In 2009, Kerala bagged the running shield for its commendable performance in implementation of the scheme for safeguarding of linguistic minorities. However, in the absence of institutionalized efforts, there have been signs of dissatisfaction emerging in the state.

23.5.4.2 It is proposed that the state must develop a long term strategy for the providing enabling conditions to linguistic minorities with the following underlying principles:

- All individuals in Kerala will be entitled to mutual respect and understanding regardless of their diverse backgrounds;
- All individuals and institutions in Kerala should promote and preserve diversity;
- All individuals in Kerala (regardless of background) will work together to build a positive and progressive future and this co-operation is to be encouraged so as to enhance Kerala as a great place in which to live;
- All individuals in Kerala are equally entitled to access opportunities and participate in and contribute to the social, cultural, economic and political life of the State;
- All individuals in Kerala have a responsibility to abide by the State's laws and respect the democratic processes under which those laws are made;
- All individuals and institutions should recognise Kerala's diversity as an asset and a valuable resource benefiting the state.

23.5.4.3 **Strategic initiatives:**

- Gather accessible information about culturally diverse groups within the community.

- Undertake projects to build awareness of cultural collections in the community and develop the capacity for communities to care for them in the most appropriate way.
- Increase awareness, usage and care of records, and the implementation of a community archives strategy to enhance our support for regional groups and organisations.
- Ensure that workforce practices, systems and processes support and reflect cultural diversity within the community.
- Assess the effectiveness of services provided for culturally diverse groups within the community.
- Linguistic policies in all public service provisions by all public departments

- Undertake initiatives for the socio-economic development of ethnic minorities, specifically within the Socio-Economic Development Programme for Ethnic and Mountainous Areas

- Establish regulatory frameworks and an enabling policy environment to respect the identities, languages, cultural diversity and traditions of minorities. Eliminate all discriminatory policies and practices which affect their interests adversely.

23.6 Conclusion

23.6.1 The socially vulnerable sections need to be empowered socially and economically also. It is essential to promote the participation of the community to develop common understandings, share experiences, identify common guidelines and principles, and identify challenges and means to overcome them. It is also crucial to identify what has been learned, and what still needs to be learned. Without a great deal of active support from the community, the State can fulfil only a small part of its responsibility of protecting the socially vulnerable groups.

Appendix 23A

The Gender-related Development Index (GDI) adjusts the Human Development Index (HDI) It covers three dimensions and adjusts it for female : life expectancy, education, and income. It is important to note that the GDI is not specifically a measure of gender inequality.
The Gender Empowerment Measure (GEM) seeks to measure relative female representation in economic and political power. It considers gender gaps in political representation and in professional and management positions, as well as gender gaps in incomes
GenderGap Index oftheWorld Economic Forum GGI indicatorsinclude the following dimensions: • Economic participation: male and female unemployment levels, levels of economic activity, and remuneration for equal work. • Economic opportunity: duration of maternity leave, number of women in managerial positions, availability of government- provided childcare, wage inequalities betweenmen and women. • Political empowerment: number of female ministers, share of seats in parliament, women holding seniorlegislative andmanagerial positions, number of years a female has been head ofstate. • Educational attainment: literacy rates, enrolment ratesfor primary,secondary and tertiary education, average years ofschooling. • Health and wellbeing: effectiveness of governments' efforts to reduce poverty and inequality, adolescent fertility rate, percentage of births attended by skilled health staff, and maternal and infant mortality rates.
Social Watch's Gender Equity Index (GEI) • Education: measured by the literacy gap between men and women and by male and female

enrolmentratesin primary,secondary and tertiary education.
• Participation in the economy: measured by the percentage of women and men in paid jobs,
excluding agriculture, and by the income ratio ofmen to women.
• Empowerment: measured by the percentage of women in professional, technical, managerial
and administrative jobs, and by the number ofseats women have in parliament and the number
of decision- makingministerial posts held by women.

TheGender StatusIndex (GSI) oftheAGDI
The GSI is based on three components: social power, economic power and political power. Each of the three
main components hasthe same weight in the calculation of the GSI. Within each block, each component also
carriesthe same weight.
1. The social power component(capabilities) consists oftwo sub- components:
- Education:measured by levels ofschool enrolment and dropout, and literacy levels of girls and women.
- Health:measured by levels of child health, new HIV infection and time spent out of work through illness.
2. The economic power component(opportunities) consists ofthree
sub- components:
- Income:measured by women’sincome fromagriculture, fromwork in the formal and informalsectors and
fromcash transfers.
- Time use or employment:measured by time spentin economic activities, and in employment.
- Accessto resources:measured by accessto themeans of production and tomanagement positions.
3. The political power component(agency) consists oftwo sub- components:
- Representation in key decision- making positionsin the public sector.
- Representation in key decision- making positionsin civilsociety.
Source:(Based on ECA 2004:13)

The Cambodian Millennium DevelopmentGoals(CMDGs)
CMDG3: Promote gender equality andwomen's empowerment
Target: Reduce significantly gender disparitiesin uppersecondary education and tertiary education

- Improve the ratio of girlsto boysin uppersecondary education from48% in 2001 to 100% in 2015.
- Improve the ratio of girlsto boysin tertiary education from38% in 2001 to 85% in 2015.
- Improve the ratio ofliterate femalestomales 15- 24 years old from87% in 1998 to 100% in 2010.
- Improve the ratio ofliterate femalestomales 25- 44 years old from78% in 1998 to 100% in 2010.

Target: Reduce significantly allforms of violence againstwomen and children

- Increase the proportion of cases of domestic violence counselled by qualified personalto 100% by 2015.
- Increase the percentage ofthe population who are aware that violence against women is wrongful

behaviour and a criminal actto 100% by 2015.

- Develop and implementlaws against allforms of violence against women and children according to

internationalrequirements and standards by 2005.

- Collect annualstatisticstomonitor violence against women by 2005.
- Develop and Implement a Prevention Plan by 2005.

Source: **GENDER EQUALITY INDICATORS: WHAT, WHY AND HOW?, Prepared for the DAC Network on Gender Equality by Justina Demetriades in 2009, based on BRIDGE's Gender and Indicators Cutting Edge Pack (2007), http://www.bridge.ids.ac.uk/reports_gend_CEP.html#Indicators**
http://www.oecd.org/social/gender-development/44952761.pdf

CHAPTER 24

GOVERNANCE FOR SUSTAINABLE PROSPERITY IN KERALA

Good Governance is one of the enablers in the KPP 2030. The strategy is based on seven pillars and instituting strict monitoring and evaluation processes. For sustainable prosperity in Kerala, the theme has to be not "Get the government off your back" but "Get the government to do its duty". Further, it will require institutional, organisational and cultural change in governance to improve its quality and deliver on the vastly increased duties of the government envisaged in the report.

24.1 Imperatives of Better Governance for Sustainable Prosperity

24.1.1 HOW CAN SUSTAINABLE DEVELOPMENT BE OPERATIONALIZED? Often the answer is sought in "governance". Sustainable development is a complex phenomenon, which requires a pluralistic approach that can deal with multiple actors and multiple levels to resolve trade-offs. Governance is seen as a means to steer the process of sustainable development. The term 'governance' refers to the act of governing, or the authority to rule and control. According to the UNDP, governance is[1] – "The exercise of economic, political and administrative authority to manage a country's affair at all levels. It comprises mechanisms, processes and institutions, through which citizens and groups articulate their interests, exercise their legal rights, meet their obligations and mediate their differences". There is a growing recognition worldwide that achieving excellence in governance is crucial for any economy to prosper. Quality governance provides a framework in which an economy can function efficiently and deliver outcomes effectively. Sustainable development, in particular, cannot be achieved without quality governance because of its nature: to foster common goals by collective action. It will require a change in traditional thinking, tools and methods of governance. Achieving efficient, effective and ethical governance is therefore a crucial challenge in achieving the objective of knowledge-driven sustainable development proposed in the perspective plan.

24.1.2 The preceding chapters have presented an outline of what it will take in economic, fiscal, social and ecological terms for Kerala to move towards sustainable prosperity within a generation. Economic prosperity would require Kerala to promote a knowledge-based economy. For sustainability in social terms, government would have to undertake robust measures to ensure inclusion of the underprivileged sections of society. For sustainability in ecological terms, Kerala would have to move towards a cleaner economy with lower intensity of energy. All these measures would require a pluralist approach,

[1] http://web.worldbank.org/WBSITE/EXTERNAL/COUNTRIES/MENAEXT/EXTMNAREGTOPGOVERNANCE/0,,contentMDK:20513159~pagePK:34004173~piPK:34003707~theSitePK:497024,00.html

collective action and a vastly increased role of the public sector, though not out of line with Kerala's own tradition of economic management. For sustainable prosperity in Kerala, the theme has to be not "Get the government off your back" but "Get the government to do its duty". Further, it will require institutional, organizational and cultural change in governance to improve its quality and deliver on the vastly increased duties of the government envisaged in the report.

24.2 Dismal Initial Conditions of Governance

24.2.1 There are several internationally recognized ratings based on the quality of governance along different dimensions. Appendix 24A provides a list of these indicators. The governance indicators contribute to a better understanding of governance, which has been used by policy makers for reforms in governance and monitoring. Four Nordic countries namely, Denmark, Sweden, Finland and Norway are invariably amongst the top 10 countries. On the other hand, India's performance has been rather dismal. In Transparency International (TI), India in 2012 was ranked 94 out of 176 countries and territories, behind Zambia, Malawi, China, Sri Lanka and Tunisia. The poor quality of governance in India is evident in other institutionalized ratings as well. A study by the Transparency International India,[2] which covered 11 areas of public service: Police (Crime/Traffic), Judiciary, Land Administration, Municipal Services, Government Hospitals, Electricity (Consumers) PDS (Ration Card/Supplies), Income Tax (Individual Assesses), Water Supply, Schools (up to 12th) and Rural Financial Institutions (Farmers) shows that police ranks at the top in the corruption index. Judiciary (lower Courts) and Land Administration are rated next only to Police. The corruption in Government Hospitals is mostly to do with non-availability of medicines, getting admission, consultations with doctors and availing of diagnostic services. Despite reforms, electricity service figures high on the corruption index. PDS figures lower in the corruption index score because the problem of common man dealing with services is more to do with leakages in the system, rather than direct monetary corruption.

24.2.2 There have also been attempts to assess state-wise performance of governance in India[3]. The findings are ambiguous. In some studies, Kerala comes out somewhat better

[2] India Corruption Study 2005 to Improve Governance, Center for Media Studies/ Transparency International India, New Delhi, June 30, 2005.

[3] Debroy B., Bhandari L. & Aiyar S. S. A. (2011), Economic Freedom of the States of India 2011, *Academic Foundation*, New Delhi.; Mundle. S , Chakraborty P., Chowdhury, S. & Sidkar, S.(2012), The Quality of Governance How Have Indian States Performed? , *Economic and Political Weekly*, vol xlvii no 49; Basu,S.R (2002), ' Does governance matter ? Some evidence from Indian States' , Draft Paper presented VII th Spring Meeting of Young Economists, Paris, April 18-20, 2002; Pradhan, R.P and Sanyal, G.S, (2011), 'Good governance and human development: Evidence form Indian States ', Journal of Social and Development Science Vol. 1, No. 1, pp. 1-8, Feb 2011;

than average. In a study by Debroy, Bhandari & Aiyar (2011) Kerala ranks 10th among the Indian states in their study and has performed moderately (see, Appendix Table 24B.1 for a tabular summary of these studies). In others, Kerala is among the top performing states in terms of quality of governance[4]. Interestingly, there are also studies that have put Kerala in the poor governance category[5].

24.2.3 Given the dismal conditions of governance in India, even being above average is no consolation for Kerala. If the state is to achieve sustainable prosperity and use the Nordic countries as the benchmark for its performance, as proposed in this report, it has a lot to do for improving governance.

24.3 Building blocks of governance for sustainable development

24.3.1 Sustainable development means transforming the state into a competitive and dynamic knowledge-based economy, with a plan to link social and environmental objectives into all areas of the state's policy. Governance for sustainable development will also require:

- change in traditional thinking, tools and methods;
- pluralist approach with horizontal coordination among various departments and diverse parties, and vertical coordination among multilayered governments;
- structural changes in the dominant institutions;
- delivery of goods and services;
- conformity with the law, regulations, published standards and community expectations of accountability and openness.

24.3.2 Central to good governance are the concepts of commitment, leadership, authority, accountability, transparency and stewardship.

Commitment

24.3.3 It is often said that without commitment throughout the society, sustainable development will not happen easily. Governance for sustainable development will invoke this commitment across all its organs and the society at large.

[4] Mundle, Chakraborty, Chowdhry & Sidhkar (2012), Vrimani, Sahu & Talwar (2006) and Pradhan & Sanyal (2011)

[5] Basu,S.R (2002), ' Does governance matter ? Some evidence from Indian States' , Draft Paper presented VII th Spring Meeting of Young Economists, Paris, April 18-20, 2002.

Strong leadership, culture and communication

24.3.4 Strong leadership is a critical element, which underpins how a country/region steers its future forward. There are several instances of a powerful leader changing the economic course of his/her country. Helmut Kohl of Germany, Brazil's Luiz Inácio Lula da Silva, and Kim Dae-jung of South Korea are some of the leaders who became instrumental in the transformation of their countries.

Strategic directions through perspective planning

24.3.5 The Government must set the strategic policy targets and directions that will ensure the best outcomes for communities. Perspective planning is a process by which the state government envisions the future of the state; sets the mission, targets and priorities; and develops a strategic policy framework to achieve the targets. This decision making process requires a deep understanding of competing priorities across social, economic, environmental and fiscal dimensions. It also requires collaborative effort and coordination across different layers of the government in developing policies and strategies, and evaluating performance.

Ensure Consensus building

24.3.6 In a pluralistic society, there are multiple of interest groups. It assures a variety of inputs to the government, a variety that is a flexible and a stabilizing element. They can also pull the bureaucrats in different directions through lobbying. Good governance requires mediation of different interests in society, to reach a broad consensus in society on what is in the best interest of the whole community. A society's well-being depends on ensuring that all these groups feel that they have a stake in the government decision and do not feel excluded from the mainstream of the society. This requires that all groups, particularly the most vulnerable, have opportunities to improve or maintain their well-being.

Accountability

24.3.7 Accountability and review structures provide assurance to the executives and the community that strong financial management practices exist and are adequately reviewed and monitored. Institutions and mechanisms need to be in place for procedural review, and monitoring and evaluation of performance.

Transparency

24.3.8 Accountability for whole-of-government performance ensures that the government actions are transparent to the community.

Rule of law

24.3.9 Adherence to the rule of law is the fundamental prerequisite to good governance. Rule of Law means fair legal frameworks that are enforced by an impartial regulatory body for the full protection of stakeholders. Impartial enforcement of laws requires an independent judiciary and also an impartial and incorruptible police force.

Ethics and Integrity

24.3.10 The government sector standards and codes of practice ensure integrity in the performance of official duties, due process for the use and release of information and stewardship of the processes. This ensures that people are being treated equitably and fairly and have access to information and decision-making. This requires freedom of information, an employees' code of conduct and community complaint resolution

24.4 What needs to be done?

24.4.1 The strategy is based on 7 pillars which include building institutional capacity, upgrading e-governance, ensuring fiscal sustainability, introducing administrative reforms, creating human capacity, strengthening local self-government, and instituting strict monitoring and evaluation processes. In what follows, we provide the action plan for each of these pillars:

Pillar 1: Build institutional capacity

24.4.2 Institutions refer to structures and practices that frame activity within each of the other dimensions. They shape outcomes across the economy, society and the environment. Sound legislative and administrative frameworks are fundamental to the efficient and effective implementation of the knowledge-based sustainable development strategy. This strategy is particularly challenging from an institutional perspective. This is because it requires that different departments work collectively and collaboratively; different government layers plan and implement the programmes collaboratively; and the knowledge base is created and strengthened. Thus, institutional arrangements have to be flexible and adaptable. Legal institutions also need to be enforced impartially. It also requires full protection of human rights, particularly those of minorities.

24.4.3 Internationally, it has been recognized that the failure to promote sustainable development is due to institutional rigidities as well as the inadequacy of good governance tools. Sustainable development is not the responsibility of a single department. It requires cross-sectoral, cross- disciplinary and cross-organizational collective actions. It requires a collective effort from bottom-up grass root community, right through to top-down legislative changes. Institutional arrangements and governance mechanisms need to respond to these sustainable development challenges. It requires changes in the way the government handles changes in social, economic and cultural institutions. This in turn requires upgrading human capital, organizational capacity and most importantly institutional capacities. This means that the organizations and individuals will have to develop different sets of knowledge and skills to operate differently, and more specifically collaboratively. This will be facilitated by different sets of institutions, which will be more flexible. Thus the policies and acts pertaining to education, health, construction, infrastructure development, energy, and water will have to be modified to establish a new work and organizational culture.

24.4.4 The action plan will involve changing the traditional ways of governance, as follows:

- Integrate the economic, social and environmental dimensions of decision-making across society.

- Evolve complex systems of horizontal and vertical governance, where decision-makers remain responsible to citizens, communities and stakeholders. This requires flexibility in practices.

- Develop appropriate political frameworks for iterative rounds of 'future-visioning', goal identification, policy design and implementation.

- Adopt a long-term focus and maintain political support for long-term adjustment, despite the fluctuating short-term preoccupations of politicians and electorates.

- Develop a better understanding of ecological processes and of economic/ social/ecological interactions, as well as of the possibilities of (but also the limits to) their conscious adjustment.

- Structure engagement as a learning process, so that governments and other social actors can acquire experience, experiment with options and draw lessons from failure.

- Strengthening the capacity of social institutions to adapt successfully in response to pressures and unexpected shocks (for example, by encouraging diversity and experimentation in the socio-technological sphere, or by extending deliberative and collaborative interactions among societal organizations).

24.4.5 New Zealand is experimenting with appropriate institutions for sustainable development by setting up sustainable cities first. Kerala can draw on this experiment and use its global cities as the testing laboratory of these changes.

Pillar 2: Utilize the Game-changing Potential of ICT: E-governance

24.4.6 ICT is a game-changer for governance: for delivery of public services, for taxation and regulation and for monitoring of government activities. Kerala has been a forerunner in e-governance and it needs to use its resources to exploit fully this new tool for improving governance. There are at least three dimensions in which ICT can help improve the efficiency of the government:

- First, G2G. Different government departments often operate in silos, not knowing what other departments are doing and not acting in a concerted manner. This needs to completely change. Sustainable development is about vertical and horizontal coordination of governance. This coordination may be maintained through intra-net services and communication.

- Second, G2B. Government expenditures and revenues form a big share of GDP and in the pre-ICT regimes, there is often a great deal of scope for corruption and inefficiencies due to inadequate information. With ICT, government procurement programmes can achieve a new level of transparency and thereby improve efficiency and integrity of the system. Through better G2B, the government can also improve its capacity for checking tax evasion and improving resource mobilization.Third, G2P (Government to public) – Regardless of a country's stage of economic development, their governments make payments to, and collect payments from individuals and businesses. Financial resources are also transferred between government agencies. These flows cover a wide range of economic sectors and activities, and in most cases, the overall amount of such flows is significant – normally ranging

between 15per cent to about 45per cent of the GDP. By going electronic, governments can save up to 75per cent on costs and improve safety, transparency and efficiency of these payments[6].

24.4.7 It is with regard to good governance that e-governance has become an integral part of any economy, which strives to achieve transparency, reliability, and affordability in its services.

24.4.8 As per World Bank definition (AEOMA Report) – "*E-Government refers to the use by government agencies of information technologies (such as Wide Area Networks, the Internet, and mobile computing) that have the ability to transform relations with citizens, businesses, and other arms of government. These technologies can serve a variety of different ends: better delivery of government services to citizens, improved interactions with business and industry, citizen empowerment through access to information, or more efficient government management. The resulting benefits can be less corruption, increased transparency, greater convenience, revenue growth, and/or cost reductions"*

24.4.9 Taking the same vision forward, The National E-Governance Programme (NeGP), a flagship programme of the government of India was launched in 2006. It consists of 27 Mission Mode Projects (MMPs), at Centre and State level. These MMPs were initiated in areas of Pensions, Income Tax, MCA21, Passport and Visa, immigration, banking, central excise, UID, MNIIC, e-office and insurance at Centre level. Integrated MMPs included CSC, e-courts, EDI, India Portal, NSDG, e-biz and e-procurement. On the other hand, at state level the following MMPs were initiated: land records (NLRMP), road transport, agriculture, police, treasuries, municipality, e-district, commercial taxes, gram panchayats and employment exchange.

24.4.10 Since its inception, NeGP has implemented many programmes successfully. Few of the projects which have attained outstanding success across the country are Gyandoot (Madhya Pradesh), Akshaya (Kerala), Bhoomi (Karnataka), eSeva (Andhra Pradesh) and HP-Kuppam (Andhra Pradesh), RASI-Rural Access to Services through Internet (Tamil Nadu), WARANA (Maharashtra), CARD (Andhra Pradesh), and Sukhmani (Punjab). However, despite India's reputation as an IT leader, its score in international e-government development index prepared by the UN is quite low. It was only 0.3829 in 2012 as against 0.9283 of the leader, Republic of Korea and 0.5359 of China and 0.4949 of Indonesia. It was however higher than the rank of Pakistan (0.282) Nigeria (0.2676) and Bangladesh (0. 2991) as presented in Table 24.1.

[6] www.worldbank.org/paymentsystems

Table 24.1: E-government development index and rank for selected countries

Country	Rank	Score
Republic of Korea	1	0.9283
Netherlands	2	0.9125
United Kingdom	3	0.8960
Denmark	4	0.8889
United States	5	0.8687
France	6	0.8635
Sweden	7	0.8599
Norway	8	0.8593
Finland	9	0.8505
India	**22**	**0.382**
Pakistan	27	0.282
Nigeria	28	0.2676
Bangladesh	29	0.2991
Asia Regional Average		0.4992
World Average		0.4882

Source: E-Government for the People, Department of Economic and Social Affairs, UN 2012

24.4.11 In compliance with the technological wave at the All-India level, Kerala also moved towards implementing many e-governance programmes at the state level. Some of the major e-governance programmes that have been implemented till date in the state are summarized in Table 24(C) in the Appendix. In all, currently 81 e-governance programmes are functional in Kerala.[7] It is to be noted that some of the e-governance programmes have attracted a lot of attention, programmes like FRIENDS, AKSHAYA, Em-Power Kerala, E-Krishi, KISSAN Kerala, hsCAPNIC, Sulekha Plan monitoring system, Sevena etc have won many reputed National as well State level awards. Even though the state is flooded with a number of e-governance programmes, very few studies have actually tried to make an assessment of these programmes. Some of the studies which have assessed the performance of certain major e-governance programmes are[8]: The success of programs like FRIENDS and AKSHAYA have been evaluated by Madon

[7] http://egovreach.in

[8] Madon R.(2004) ; ‘ Evaluating the Developmental Impact of E-Governance Initiatives: An Exploratory Framework” , The Electronic Journal on Information Systems in Developing Countries (EJISDC) 2004, 20,5, 1-13.

(2004) and Nair (2008)[9] .Other programme evaluations of SPARK, CAPNIC and DC*Suite–Suite of Applications for e-Collectorate have been evaluated by Raghunathan (2008)[10].

24.4.12 Though Kerala has achieved many milestones in its programmes, many more benchmarks are required to be set. Kerala has a long way to go in order to reach the international standards in the area of e-governance. As analyzed by a study undertaken by Centre for Development Studies, Kerala (2009)[11], some interesting features of Kerala's e governance are noteworthy. In a survey-based study, 110 districts were randomly selected for extensive field survey. Public response was also covered under this analysis. It shows that about 97per cent of the panchayats in Kerala have citizen charters for providing improved service. However, only 47per cent have heard about these charters and only 26 per cent know about the time-limits for completion of different items of work, which is provided in the charter. Lack of public awareness was the main issue here; people are not well informed even though the state has the necessary resources in place. Similar ignorance about social security was witnessed across the poor population of the state. Various studies have identified the lack of awareness among the beneficiaries of social security and poverty eradication programmes, despite the focus given to them in Kerala, as being a major bottleneck for these programmes.

24.4.13 Further, about 93 per cent of the sample panchayats had installed at least one kind of software, which were at some level of operation. Sulekha, a software for monitoring of financial expenditure against plan allocation, had been installed by 76 per cent of local government offices. Around 72.4 per cent of computers had been networked, 54.5 per cent had obtained Internet connections. However, only 41 percent of these departments considered that they had sufficient number of computers. In fact, about 25 per cent of the employees indicated that they did not have a computer on their desk. The main aim of e- governance was to improve the service delivery on time. Analyzing the system for registration of birth in Kerala, it was found that 42 per cent panchayats issued birth certificates within a day, 37 per cent took 2-3 days, while the remaining 20per cent required more than 3 days. Even though the number of days required to issue birth

[9] Nair K.B (2008), 'Fast Reliable Instant Efficient Network for Disbursement of Services (FRIENDS Janasevana Kendram)' Chapter 16 , "Compendium of e-Governance Initiatives in India" , Gupta P. & Bagga R.K , University Press.

[10] Raghunathan V.S (2008a), 'Centralized Allotment Process for the Professional Course Admissions— CAPNIC', Chapter 17 , "Compendium of e-Governance Initiatives in India" , Gupta P. & Bagga R.K , University Press. Raghunathan V.S (2008b), 'DC*Suite–Suite of Applications for e-Collectorate' , Chapter 26, "Compendium of e-Governance Initiatives in India" , Gupta P. & Bagga R.K , University Press. Raghunathan V.S (2008c), 'Service and Payroll Administrative Repository for Kerala—SPARK' Chapter 36, ""Compendium of e-Governance Initiatives in India" , Gupta P. & Bagga R.K , University Press.

[11] "E-Governance in Local Government Governments of Kerala- *Analyzing Institutional Issues*" – Research Unit on Local self-Governance, CD, Kerala 2009.

certificates has reduced significantly, there is still tremendous scope for improvement in the system. Furthermore, as per local governments in Kerala, a significant demand for computerization among citizens and elected representatives has been felt in the state. On the supply side, inadequate training of employees emerged as a crucial constraint. Some of the major reasons cited for low level of employee training are: a) non-inclusion of employees in training b) retirement of trained employees c) recruiting new employees without proper training. As per the findings of this report, one third of the local governments have cited lack of adequate training and lack of technical assistance as major concerns in speedy computerization. Hence, it can be argued that even though Kerala has a plethora of e-governance programmes, various demand-side factors (as mentioned above) and supply side institutional issues are constraining the progress of e-governance in the State. Employee training programmes, awareness of the citizen charters of every department, and access to technology for every single house are few of the ways to tackle these bottlenecks.

24.4.14 The quality of e-governance is measured along three dimensions (United Nation's E-government index):

- Infrastructure
- Human capacity
- Online services

24.4.15 The action plan for carrying forward the e-governance programme is thus, threefold:

Create adequate infrastructure

24.4.16 Readiness depends on an enabling environment that includes:

- mature technical infrastructure in various government departments;
- civil service willing to reengineer, share information, and treat citizens as customers where their satisfaction is primary;
- deep Internet penetration or presence of many public access points;
- legal framework that fosters public confidence and supports a government mandate to conduct transactions online;
- political commitment from departmental champions and managers.

Capacity building

24.4.17 E-government projects need to spend about 10 percent of their budget on training and capacity building. Awareness about project benefits has to be raised among senior civil servants and political leaders. Training is required for project managers, who need to define project deliverables, negotiate with consultants and vendors, and manage outsourced development efforts. Clerical staff needs to be trained on specific applications. Supervisors and managers need to be trained on using information. And citizens need to be made aware of online services available to them and their usage.

Readiness for automation

24.4.18 An important aspect of initiating e-government is documenting existing procedures and simplifying them into tasks that can be completed in a few steps, without compromising their basic purposes. The process of simplifying documents and workflows, points of approval, and audits is termed as *reengineering*. Most e-government projects that have reduced processing time and costs have done so through substantial process reengineering. Such reengineering must precede any efforts at automation.

On-line services: Move up the ladder

There are four stages of implementation of e-governance:

24.4.19 A. Presence on the web: The first and the most basic stage on any e government project is marked by its presence on the web, which acts as a common place for distributing information to the public.

B. Interaction between citizen and governments: This second stage is marked by the presence of an interactive web interface, where some kind of communication occurs between the government and its citizens through the web. For instance, the simple task of downloading forms for emailing to the concerned authority.

C. Complete Transaction over Web: This stage involves transactions between citizen and government being performed and completed over the internet. Payment of bills & taxes belong to this stage.

D. Integration of services: This is the highest level of e government, where technology is utilized to its full potential. In this stage, various government departments share information among each other and also offer services to the citizens online. It can be characterized by an integration of G2G, G2C and C2G (reverse) interactions.

24.4.20 As part of their efforts to advance citizen services, developed countries are paying greater attention to the concepts of an integrated government portal and the re-engineering of back-office processes while designing their e-government capabilities. The UN report identifies South Korea as the leader in e-government. The leading e-government practices, including that of Korea, are reproduced in Box 24.1 below:

Box 24.1: Leading practices

The United States of America

The United State's integrated portal has an easy- to-navigate design; and collects and consolidates all information and services for its citizens in one place, including agency services at the state and local level, which vastly increases the effectiveness of user search and uptake.

Brazil

An increasingly popular model is being used in Bahia, Brazil, where citizen assistance service centers integrate federal, state, and municipal agencies in a single location. The centers are in convenient locations (such as shopping malls and major public transportation hubs), offer tremendous time-savings, and deliver services with courtesy and professionalism. The centers also reduce overhead costs for government because most agencies saved on rent on property used earlier to interact with the public.

Korea

The main website of the Korean government has been made so user friendly that almost all the services are available on it, locally as well as nationally. The main government portal is a gateway to services through multiple channels, by theme as well as by subject. Customers can also have customised channels by providing information like age, gender and services of interest. Powerful back office connectivity offers advanced categorizing functions, which can list results by website services and news, including at the local level.

One of the key reasons that makes Korea a world leader in e-governance, is the massive revolution in downloadable mobile applications, which is available from its national portal. Applications like e cross sector, which are compatible with both iphones and android devices, allow students to take lessons on their mobile phones, in subjects such as Social studies, Math and English. *Jobcast* is another user-friendly application that

enables individuals to know about job availability in the Republic of Korea, along with relevant legislations governing labour.

Singapore

Singapore is one among the leaders in the use of private cloud computing for leveraging ICT infrastructure and services. In September 2009, it became the first government in Asia to equip all its teachers with Web 2.0 communication and collaboration tools, under an open standard cloud platform. Singapore's citizens' portal provides an extensive range of online payment services that lists by agency as well as bill type. Payments range from taxes, fees, fines and licenses that can be made through multi-channels such as credit card, direct debit as well as internet banking and even by phone.

Australia

Australia's national portal provides numerous features, enabling citizens to engage with the government in the policy-making process. The government provides a 'Have Your Say' section that is located on the homepage of the portal. This section links to a 'public consultations' section, where citizens can send their comments and suggestions on draft regulations to the respective ministries, mainly by email. The government also provides the outcomes of previous consultations online. Also, located in this section is a 'blogs' page that provides links to various government blogs. The section also has a Twitter page that shows a table of all government Twitter pages, which can be accessed by the users to post their comments and suggestions.

Malta

As part of the e-government strategy to enhance citizen communication with the government, Malta provides timely notifications and alerts to citizens about government services of interest, through multiple delivery channels. 'Malta myAlerts' provides citizens with a one-stop-shop for all notifications sent by email and SMS, allowing citizens to be notified about various government services instantly. These services are updated continuously to provide the latest information on governmental notifications. 'myAlerts' also provides citizens with news regarding ongoing and new e-government initiatives.

Source: E-Government for the People, Department of Economic and Social Affairs, UN 2012

Pillar 3: Ensure fiscal sustainability

24.4.21 Fiscal sustainability refers to whether the Government is able to maintain current policies without major adjustments in the future. It is recommended that the government of Kerala develops its own "Fiscal Sustainability Act, with the aim of maintaining a "prudent" level of public debt. Governments are free to define what is prudent. They are also required to set a long-term - at least 10-year - objective for debt, and must show how that objective will be reached. This requirement aims to protect the financial position of the governments of future generations. This will require vastly increased level of resource mobilization by the public sector through increased taxation, increased savings through social security system, increased cost recovery from public utilities and increased surpluses from public enterprises, on the one hand; and efficiency and focused spending on the other. It should also aim at phasing out some of the expenditures.

24.4.22 The role model that emerges from our proposed measures is the model of economic and social management practiced in the Nordic countries. As noted in Table 24.2, in the Nordic countries, government revenue accounts for nearly 50per cent of the GDP and the government, jointly with the private sector and labor unions, plays a key role in the economy.

Table 24.2: Share of General Government, (% of GDP)

Countries	Revenue	Outlays
Finland (2008)	53.4	49.0
Germany (2009)	44.5	47.6
Netherlands (2009)	46.0	51.4
Denmark (2009)	55.9	58.8
Norway (2009)	56.0	46.2
Sweden (2009)	54.0	55.2
United States (2009)	30.8	42.0

Source: Government Finance Yearbook, 2010, IMF

24.4.23 These countries tax heavily but also spend efficiently. They provide superb public health, quality childcare, proficient public education, quality infrastructure, and remarkable social equality. The results are low unemployment rates, small budget deficits, low poverty and small trade deficits. These countries also enjoy high social mobility, life expectancy and life satisfaction. Nor have they suffered slower growth in per capita incomes. From 1980 to 2009, US per capita income grew by an average of 1.7 per cent. Northern Europe averaged about the same.

Pillar 4: Reform of the administrative system

24.4.24 E-governance of course only provides an instrument for improving governance. The extent to which governance will actually improve will depend on the quality of the administrative service that Kerala can develop. The Tenth Report of the 'Second Administrative Reforms Commission of the Government of India- Refurbishing of Personnel Administration' provides a comprehensive list of reforms needed. The Commission has proposed a wide-ranging agenda of reforms, that includes reforms relating to recruitment, training, tenure, domain competency, creation of a leadership cadre incorporating some elements of a position-based Senior Executive Service, performance management, exit mechanisms, creation of executive agencies, accountability for results, a code of ethics and enactment of a civil service legislation. While these reforms focus on the Indian Administrative Services and are not under the purview of the state governments, Kerala should take these initiatives for the state and local officials. The key recommendations are as follows:

- Every government servant should undergo a mandatory training at the induction stage and also periodically during his/her career. Successful completion of these trainings should be a minimum necessary condition for confirmation in service and subsequent promotions.
- There is need to introduce competition for senior positions in government. Also, applications to fill up high level posts should be invited from interested and eligible persons from the open market and also, from serving eligible officers.

- The existing performance appraisal system should be strengthened on the following lines: (i) Appraisal to be more consultative and transparent; (ii) Performance appraisal formats to be made job specific; (iii) Performance appraisal to be year round; (iv) Guidelines to be formulated for assigning numerical rating.

- For motivating state officials, there is a need to recognize their outstanding work, including through state awards. Awards for recognizing good performance should also be instituted at the State and district levels. It must be ensured that selection for such awards is made through a prompt, objective and transparent mechanism because either subjectivity or lack of transparency should not compromise the value of such awards.

- Accountability: A system of two intensive reviews – one on completion of 14 years of service, and another on completion of 20 years of service - should be

established for all state government servants. The first review at 14 years would primarily serve the purpose of intimating to the public servant, his/her strengths and shortcomings for his/her future advancement. The second review at 20 years would mainly serve to assess the fitness of the officer for his/her further continuation in government service. The services of public servants, who are found to be unfit after the second review at 20 years, should be discontinued.

- Disciplinary Proceedings: The minimum statutory disciplinary and dismissal procedures required to satisfy the criteria of natural justice should be spelt out.

- There is a need for safeguarding the political neutrality and impartiality of state officials. The onus for this lies equally on the political executive. This aspect should be included in the Code of Ethics for Ministers, as well as the Code of Conduct for Public Servants.

Pillar 5: Strengthen local self-governments

24.4.25 In the proposed long-term vision, establishment of knowledge hubs at district level will be a key element for achieving and sustaining long-term prosperity in Kerala. District planning agencies will play a crucial role is designing these hubs with participation of the public and operating them in an efficient and democratic manner. For social sustainability of prosperity, there will be a need for ensuring full employment, providing income security for those who lose jobs, and ensuring social security for the disadvantaged. These functions will be carried out most efficiently at the local government levels. Similarly, for ecological sustainability involving protection of the delicate ecological balance in coastal areas and water bodies as well as forestry, the strategies will be locality-specific and local governments would have to play a crucial role.

24.4.26 For decentralized planning and local government, as in other matters of macro-strategy for combining growth with equity, stability and sustainability, Kerala may have a lot to learn from Nordic countries. In Nordic countries, local government expenditures and revenues account for as much as 20per cent of the GDP as against about 10per cent in other OECD countries. These countries have found local authorities to be the most efficient agencies of the state for delivery of social and economic services at local levels. There are of course, many difficult issues in the division of revenues between local and state levels; equalization of the access to different localities for essential services; and the extent of authority to be given to local authorities in designing their taxation system and their borrowing programs. The experience of the Nordic countries in these matters

provides a rich mine of experience, which Kerala can study profitably and use to design its own long-term programme of decentralized local government.

24.4.27 Kerala is fortunate to have a long-standing historical tradition of robust local government, just as Nordic countries have. Following the 73rd and 74th Constitutional Amendment calling for decentralized governance, this process was taken further. In the Ninth, Tenth, and Eleventh Plans in Kerala, a framework for decentralized planning was developed and increased role of the local government was promoted. Over time, the Kerala case has been recognized the world over, as a sort of model for local participation in decentralized planning. There has been extensive participation of various strata of society in local level planning. About 25per cent of the Annual Plan allocation of the State Plan has been allocated to local bodies in the form of untied Plan grant for implementing projects for local development according to the wishes of the people. For yet another, it enabled the transfer of powers, functions and personnel to Local Authorities. At the same time, in order to minimize the risk of capture by local elites, the state has typically earmarked a certain percentage of grants to local authorities for underprivileged groups.

24.4.28 Going forward, this process of reliance on local government has to be accelerated substantially. Enhanced role of the state in provision of health, education, sanitation, urban infrastructure, housing and waste disposal will increasingly devolve to local authorities. This would require a considerable strengthening of the resource mobilization capacities of local governments in Kerala. Own resources, which form only about 11% of resources in 2000-01, would have to increase to about 50per cent by 2040, if the Nordic pattern is to be replicated. Among the sources would be: property tax; car-related taxes; full cost recovery of utilities including electricity, water and sanitation; other local taxes such as entertainment taxes; and above all, utilization of dividend locked in underutilized land under local authorities or obtainable through conversion of land from low productivity rural use to high productivity urban use.

24.4.29 The competencies of local administration will have to be increased, along with the increase in their responsibilities. In addition, the officials from line departments will have to be made responsible to popularly elected officials.

24.4.30 By 2040, nearly 80per cent of Kerala's population will live in urban areas and issues of local government will revolve around a limited number of urban local bodies, rather than a multitude of village panchayats. This would give rise to large economies of scale in local government and make it easier to develop competencies of local government bodies. The Nordic experience has shown the need for a consolidation of municipalities into larger units for exploiting the economies of scale. In view of the

dispersed nature of urbanization in Kerala, this issue of consolidation of municipal authorities will be a priority in the State.

24.4.31 The recent review of decentralized planning and local government presented in Economic Review 2012 identifies, among other things, lack of vision in district planning as one of the weaknesses of the current system. It appears that a large part of the local government's activities focuses on meeting immediate needs, most often in social sectors, and do not give adequate attention to long-term economic, social and ecological needs. They also focus on small projects, and not on large integrated projects.

24.4.32 The Kerala Perspective Plan 2030 could be a useful instrument for developing long-term plans for district development.If the vision of a prosperous Kerala presented in this report is to be realized, then districts will have to become the arena of action. It is recommended that each district should prepare a plan for a knowledge-hub, suited to its conditions, which will promote development of health, education, tourism, industries and agriculture, with the long-term objective of achieving affluence within one generation. These perspective plans should have a clear timeline for implementation of the long-term vision and should be reflected in the Annual and Five-Year Plans prepared by District Governments.

Pillar 6: Improve the human resource capacity

24.4.33 Increasing community expectations and the changing technological, professional and skill requirements in the post- Perspective Plan period will mount the pressure on government officials for delivering services to the community. It will be crucial that the workforce remains highly skilled and motivated. There needs to be greater emphasis on workforce planning and skills development of government officials. Personal skills of government officials will need to be upgraded, including ways to communicate, cooperate and work collaboratively. Regular training programmes and well-structured programmes in governance may be initiated to build human capacity.

Pillar 7: Institutionalize monitoring and evaluation

24.4.34 For the implementation of the principles of good governance, different strata of society too will have to participate in monitoring the performance of the state. It is therefore argued here that in order to achieve the outcome, all strata of society must become a part of the development process. They must monitor the performance of the government on a regular basis and contribute to its achievements. To some extent, this work is being done by NGOs such as Samuel Paul's Public Affairs Center in Bangalore and Pratham, which prepare regular report cards on the performance of some sections of

society. But given its importance, monitoring of public-service delivery needs to be undertaken on a larger scale. An institutional mechanism focused on monitoring, can be created for this purpose.

24.4.35 Thus, it is proposed to set up an agency for independent evaluation and monitoring of performance of government programmes, in particular its performance under the Perspective Plan. The need for this has been noted in the Twelfth Five Year Plan (p.292) also. It will prepare regular report cards on how well different segments of the government are performing their duties, as specified in their own oaths or job descriptions. Such report cards may act as a catalyst for self-improvement, as well as an alert for actions by supervisory authorities.

24.4.36 For effective functioning of such an agency, Kerala government has to improve the quality of its data and streamline the organization and functioning of its different departments, so as to minimize over-lapping responsibilities and to establish clear performance indicators.

24.5 Indicators of governance

24.5.1 New global standards of governance are emerging. Citizens of developing countries are demanding better performance on the part of their governments, and they are increasingly aware of the costs of poor management and corruption. Many countries are seeking help from international agencies in diagnosing governance failures and in finding solutions. These developments have led to new interest in measuring the performance of governments, using indicators of governance and institutional quality. Table 24.3 provides access to many of the existing indicators by indicator source[12](see also, Appendix 24A for more indicators). While some performance indicators are based on objective data, others are based on subjective evaluations of a small number of experts, while yet others are based on surveys of investors, experts, or the general public. The Government should select the indicators that are most appropriate and set up channels for their periodic update.

Table 24.3: Selected Governance indicators (Partial list only)

Sources	Indicators
WDR97 (Private sector survey)	Policy unpredictability, quality of government services, corruption and red tape, and judicial

[12] See also, http://siteresources.worldbank.org/INTLAWJUSTINST/Resources/IndicatorsGovernanceandInstitutionalQuality.pdf

	unpredictability
CPIA (World Bank)	Property rights and rule-based governance, quality of budgetary & financial management, efficiency of revenue mobilization, efficiency of public expenditures, transparency, accountability, and corruption
KKZ (Kaufmann, Kraay and Zoido-Lobaton)	Graft, rule of law, voice and accountability, political instability and violence, Government effectiveness, regulatory burden
TI (Transparency International)	Corruption Perceptions Index
Freedom House	Political freedoms, civil liberties
BERI (Business Environmental Risk Intelligence)	Bureaucratic delays, contract enforceability, nationalization risk, and policy stability
Heritage	Property rights, Black Market regulation
GCR (Global Competitiveness Report	Civil service independence from politics, competence of public sector personnel, tax evasion, and effectiveness of police force
WCY (World Competitiveness Yearbook)	Bribing and corruption, tax evasion, public service exposure to political interference, personal security and private property
CIM (Contract intensive Money)	Contract enforcement and property rights
Telephone delays	Quality of government service delivery

Source: The World Bank

24.5 Conclusion

24.5.1 As at the national level, improvement of governance in Kerala is a high priority for sustained economic progress. The need has been recognized for some time, but progress in improvement has been slow. As Kerala sets it priorities for development in the Plans to come, it must make more serious efforts at solving the problem of governance. Experience of states like Gujarat, Bihar and Odisha in recent years, has shown that political leadership can make a huge difference. Even with the existing institutional set-up, a determined leader with integrity can transform the whole structure of governance within a short period. Thus we would like to end this chapter with two words: 'Leadership matters'.

Appendix 24A

International ratings of governance

1. Aggregate Governance Indicators by Country & Year (World Bank)

Aggregate governance research indicators for 212 countries for 1996–2007, for six dimensions of governance:

- Voice and accountability:
- Political stability and absence of violence;
- Government effectiveness;
- Regulatory quality;
- Rule of law;
- Control of corruption.

2. AGI Data Portal (World Bank)

A Data Portal that consolidates information on actionable governance indicators from a variety of sources including:

- Afro Barometer;
- Business Environment & Enterprise Performance Surveys;
- Country Policy and Institutional Assessments;
- Doing Business;
- Enterprise Surveys;
- Global Integrity Index;
- Human Resource Management;
- Open Budget Index;
- Press Freedom Index by Reporters without Borders;
- Public Expenditure and Financial Accountability.

3. Assessing Governance Dataset (ODI)

The dataset includes 30 indicators for 16 developing countries for the years 1996 and 2000. The data includes 5 indicators within 6 arenas of governance:

- Civil Society;
- Political Society;
- Government;
- Bureaucracy;
- Economic Society;
- Judiciary.

4. **Corporate Corruption/Ethics Index (World Bank)**
   - Corporate ethics index;
   - Public sector ethics index;
   - Judicial/Legal effectiveness;
   - Corporate governance index.

5. **Corruption Perceptions Index (Transparency International)**

Since 1995 the Corruption Perceptions Index (CPI) ranks 180 countries by perceived levels of corruption, based on expert assessments and opinion surveys.

6. **The World Justice Project, Rule of Law Index 2012-2013 (www.worldjusticeproject.org)**

The WJP Rule of Law Index® is an innovative quantitative assessment tool designed by The World Justice Project to offer a detailed and comprehensive picture of the extent to which countries adhere to the rule of law in practice. It includes:

1. . Limited Government Powers;
2. . Absence of Corruption;
3. Order and Security;
4. Fundamental Rights;
5. . Open Government;
6. . Regulatory Enforcement;
7. . Civil Justice;
8. . Criminal Justice;
9. . Informal Justice.

The dataset presents the factor and sub-factor scores for 96 countries in 2012 -2013. The WJP Rule of Law Index 2012-2013, does not include scores for "Factor 9: Informal Justice".

7. **Country Policy and Institutional Assessment- CPIA (World Bank)**

The CPIA index rates developing countries on a set of 16 criteria, grouped in four sectors: economic management, structural policies, policies for social inclusion and equity, and public sector management and institutions.

8. **Database of Political Institutions (Beck, Clarke, Groff, Keefer, and Walsh)**

Contains data on political institutions for 1975-2009, for the following categories:

- Legislature;

- Electoral rules;
- Stability and checks & balances;
- Federalism.

9. DataGob Database (IDB)

Provides access to 400 governance indicators by country and year, in four major areas: democracy, markets, public sector management, and rule of law. The indicators available through DataGob come from 30 different sources and the information on the methodology used to construct indicators is made available.

10. Economic Freedom of the World Index (The Fraser Institute)

Data for every 5 years from 1970-2000, annual data thereafter:

- Size of Government: Expenditures, Taxes, and Enterprises;
- Legal Structure and Security of Property Rights;
- Access to Sound Money;
- Freedom to Trade Internationally;
- Regulation of Credit, Labour, and Business.

11. The Global Integrity Index (Global Integrity)

Assesses the existence and effectiveness of anti-corruption mechanisms that promote public integrity. More than 290 discrete integrity indicators constitute the index, which are organized into six key categories:

- Civil Society, Public Information and Media;
- Elections;
- Government Accountability;
- Administration and Civil Service;
- Oversight and Regulation;
- Anti-Corruption and Rule of Law.

12. Governance Surveys Database (World Bank)

This database contains over 4,000 governance related questions drawn from more than 25 surveys. Every question is categorized by sector, governance/decentralization, and type of question (e.g., objective/participation/perception).

13. Open Budget Index by Country (CBPP)

The Open Budget Index is computed using the average of the responses to 91 of the questions on the Open Budget Questionnaire in 2006. These questions cover the public availability of budget information in seven key budget documents. (Access the data by clicking "Downloadable Database and Reference Material").

14. Polity IV Dataset (CIDCM)

Contains coded annual information on regime and authority characteristics for all independent states and covers the years 1800-2004. Indicators include:

- Indicators of democracy and autocracy;
- Authority characteristics;
- Polity regime transitions.

15. Public Expenditure and Financial Accountability (PEFA) indicators (PEFA Secretariat)

Uses a comprehensive set of 31 indicators to assess overall performance of public financial management systems in six areas (currently available for roughly 50 countries, more assessments are underway):

- Budget credibility;
- Budget comprehensiveness and transparency;
- Policy-based budgeting;
- Predictability and control in budget execution;
- External scrutiny and audit;
- Donor practices.

16. Word Bank Country Diagnostic Surveys (World Bank)

Governance and Corruption Country Surveys contain information and data on governance and corruption vulnerabilities, based on surveys of citizens, business people, and public sector workers.

APPENDIX 24B

Table 24B.1. Some studies on state-wise analysis of quality of governance in India

Author & Period of Study	Dimensions for measuring quality of governance	Method Used to calculate quality of governance index	Results
1.Debroy, Bandar & Ayer (2011)	Size of government, legal structure, property rights, and regulation of labour and business	Range equalization	Kerala ranks 10th in their study and has performed moderately.
2.Mundle, Chakraborty, Chowdhry and Sidhkar (EPW 2012)	Delivery of infrastructure services, delivery of social services, fiscal performance, maintenance of law and order, delivery of legal services under the judicial pillar, and the quality of the legislature under the legislative pillar.	Three methods have been used: i)Principal component analysis (ii) Average of the sum of ranks (modified Borda scores) (iii) Average of the average of ranks	Kerala is among the top five states in terms of quality of governance, as per all the three methods used.
3. Basu (2002), Draft Paper.	Crime rates, riots, industrial disputes and strikes, Gini index, and debt-income ratio.	Latent Variable Model (Principal component analysis)	Kerala is in the "Poor governance category", according to this study.
4.Vrimani, Sahu & Talwar (2006)	Public good, quasi public good, Government monopolized goods	Principal Component analysis	Kerala is among top performing states, in quality of governance.
5.Pradhan and Sanyal (2011)	Peace and stability, people's sensibility, social equality, management of government	Principal Component analysis	Kerala is among top performing states in the economy.

APPENDIX 24C

Table 24C: List of E-Governance Projects in Kerala

E – Governance Projects in Kerala
Kerala State Wide Area Network (KSWAN), State Data Centre, State Service Delivery Gateway (SSDG), Common Service Centre (CSC), e-Procurement, Aasthi - Asset Management System.
E-Governance initiatives in Agriculture Sector
Karshaka Information Systems Services And Networking – KISSAN, E-krishi, DACNET, FISHNET Project, HORTNET Project, AGRISNET.
E-Governance initiatives in IT Infrastructure
Broadband Connectivity for Rural Government Offices, International Center for Free and Open Source Software (IC-FOSS), Free and Open Source Software (FOSS), FRIENDS, Centre for Advanced Training in Free and Open Source Software (CATFOSS), Citizen's Call Centre (155300), Cloud Computing, Content Management Framework, Department WAN , Digitization of Government Records, Rural IT Parks / Techno-lodges, Sameeksha-Village Documentation and Community Computing Center, Secretariat Management System, Knowledge Archive Project (K-BASE), Mobile Governance, Dr. SMS, Secretariat Wide Area Network (SecWAN), Special Postgraduate Education Expansion Drive in IT (SPEED - IT), State Spatial Data Infrastructure (New Scheme), Video Conferencing - VC, Webinar.
E-Governance Initiatives in the Finance, Commercial Taxes and Revenue Departments
BOUGETTE – Budget Preparation Software, EMLI (Effective Management of LC Issuance), KVATIS, Bhoomi Keralam, e-Stamping, Any-Time Any-Where E-Filing of VAT Returns.
E-Governance initiatives in Tourism Department
E-Submission of C-forms, Online Hotel Finder, Online Room Reservation, Online Tour Operator accreditation, E-Submission of Tourist Arrivals, Online Brochure Downloads, Royalty-free Video Clips on DVD, Online Video Sharing.
E-Governance initiatives in Law Department
Law Information Management System .
Other e-Governance initiatives
Chief Minister's Sutharya Keralam, Akshaya - e-pay, e-Payment, Email to all Employees, Ente - gramam - My Village, INSIGHT, Integrated Govt. Service Gateway (IGSG), Intelligent Enforcement System, IntraGOV, Payroll and Personnel Management System-SPARK, Public Key Infrastructure (PKI) – Digital Signature, AADHAAR & Unique Identification Authority of India (UIDAI), CERT-Kerala, e-District, e-Grantz, E-Gazette, Fair Value of Land , e-Governance Initiatives in PWD of Kerala, Establishment of Geomatics Lab, Higher Secondary centralized Allotment Process (hsCap), Forest Management Information System (FMIS), Boat Registration Module, Export and Import Module , Integrated Treasury Management Programme, Core Financial Management System (CFMS), FFP (A) & FFP (B) , IT initiatives at the University of Kerala, Hospital Management System , TETRAPDS, Niyamasabha Knowledgebase (Archives), Research Project Automation System.