INRM Policy Brief No. 15

Prioritizing Agricultural Research and Extension

C. Ramasamy and K. N. Selvaraj

Asian Development Bank

India Resident Mission Policy Brief Series

Asian Development Bank
India Resident Mission (INRM)
4 San Martin Marg
Chanakyapuri
New Delhi 110021

Institute for Social and Economic Change, Bangalore, and National Centre for Agricultural Economics and Policy Research, New Delhi, are the Implementing Agencies for the thematic cluster 'Agriculture, Food Security, and Rural Development'.

INRM Policy Brief No. 15

Prioritizing Agricultural Research and Extension

C. Ramasamy and K. N. Selvaraj

2007

C. Ramasamy is Vice Chancellor at the Tamil Nadu Agricultural University, Coimbatore.
K. N. Selvaraj is Professor of Agricultural Economics at the Tamil Nadu Agricultural University, Coimbatore.

Foreword

The India Resident Mission (INRM) Policy Brief Series is sponsored by the Asian Development Bank (ADB) and is designed as a forum to disseminate findings from policy research work undertaken on the Indian economy. The series is primarily based on papers prepared under the Technical Assistance (TA) 'Policy Research Networking to Strengthen Policy Reforms in India'. The main purpose of the TA was to provide assistance for developing policy research networking capacity, in order to build support for, and consolidate the reform process. The INRM Policy Briefs provide a nontechnical account of important policy issues confronting India.

Tadashi Kondo
Country Director

Prioritizing Agricultural Research and Extension

C. Ramasamy and K. N. Selvaraj

India's agricultural research and extension system has grown tremendously to meet the country's rapid change in research and development (R&D) needs over the past half century. Major activities in this field since the 1960s involved the dissemination of technologies. Institutes belonging to the Indian Council of Agricultural Research (ICAR) conduct about 43% of the agricultural research done in India; state agricultural universities about 33%; the private sector (private companies and private nonprofit foundations) 16%; and international centers about 8%. This paper attempts to understand the current status of agricultural research and extension system, identify the gaps, and suggest improvements with specific focus on food security, poverty reduction, sustainable use of natural resources, and agricultural production in the context of globalization.

Under-investment

Agricultural research has contributed significantly to improvement in productivity, high benefit-cost ratio, and increase in social welfare. The primary effect is lower food prices and the consequent nutritional gains. Further, the profitability of modern farming systems has been maintained despite falling food prices (in real terms), owing to a steady decline in the cost of production. Unit production costs have consistently tended to decline over time and production costs to be lower than output prices.

Marginal internal rate of return on agricultural research and investment is highly rewarding. It is estimated that 10% increase in public sector expenditure on agricultural R&D would induce agricultural growth by 2.4% at constant prices. Crop-wise, the coefficients of influence of research expenditure on yield range between 0.01 and 0.77. Simulated results indicate that 10% annual growth in research expenditure would bring down production costs by 3.18% for rice, 1.91% for wheat, 0.17% for groundnut, 1.80% for sugarcane, and 7.63% for cotton in 2005-6 compared to the base year 2001-2. The impact of agricultural R&D on overall welfare of the economy, using the composite index (encompassing food security, nutritional security, employment guarantee, equity, efficiency, and sustainability), has an estimated elasticity of 0.38, implying that 10% increase in agricultural R&D improves overall welfare by 3.8%.

Growth in agricultural total factor productivity (TFP) results predominantly from investment in infrastructure (irrigation, electricity, roads), research and extension, and efficient use of water and plant nutrients. TFP for India grew at an average rate of 0.69% between 1970 and 1995. In the 1970s TFR grew at 1.37% per annum, at 1.99% in the 1980s, and at 0.59% in the 1990s. The observed decreases in TFP are in large part a consequence of a substantial lessening of investments, notably in the public sector, in agriculture.

Investment in agricultural research and extension is much more productive than other alternatives, in terms of accelerating the pace of development. Research by itself contributed to 48% of TFP growth. About 22,300 improved varieties of many crops were developed by research and extension and were widely adopted by farmers. During the 1970s about 30% of the area under rice was planted with rice covered by modern varieties and it increased to 70% during the 1990s. About 90% of the area planted with wheat and 50% of the area planted with coarse grains were covered by modern varieties during the 1990s. Apart from high-yielding varieties (HYV) of rice, hybrid rice also helps break the yield barrier. Research effort on hybrid rice over the last decade led to the release of 19 rice hybrids by the public sector. Seven or eight hybrids are marketed by the private seed sector. Average yield gain of hybrid over the popular inbred varieties is 16%. Similarly, technical change contributed to 34–51% increase in wheat productivity.

As a result of various programs, including investment in agricultural research and extension, the rural poverty ratio declined from 45.65% in 1983-84 to 27.09% in 1999-2000. One result of stagnation in investment was that poverty declined more slowly in the 1990s than in the previous two decades. R&D also helped in attaining high export growth. The import content in agriculture is insignificant, making it a net foreign exchange earner for the country.

The share of government expenditure to total expenditure on agriculture has declined marginally over the years. Agriculture currently shares only 5.2% of the public outlay. Investment in public research reached Rs 13,890 million by 2001-2 from Rs 409 million in 1971-72. Even so, it is only 0.32% of agricultural gross domestic product (AgGDP). Public expenditure on R&D at current prices grew at 19.21% during the 1970s, 14.61% during the 1980s, and 8.48% during the 1990s; at 1980-81 prices it grew at 9.51% during the 1970s, 7.56% during the 1980s, and 0.65% during the 1990s. State R&D funding stagnated or marginally declined in most states during 1990 through 2003. Orissa and Himachal Pradesh, respectively, invest 0.76% and 0.55% of AgGDP in research and education. Uttar Pradesh, West Bengal, Bihar, and Maharashtra spend only 0.04–0.08% of AgGDP. The southern states also invest much less.

The Gap

There is clear under-investment in agricultural R&D despite higher rates of marginal returns from investment. For example, agricultural research has lost ground from 20% of all research funded by the central government in 1960–80 to under 12% by the late 1980s. Major increases in allocation have gone to the Department of Science and Technology and to space research.

The Remedy

- Allocate 1% of AgGDP for agricultural research and 0.5% for extension at the national level.
- Continue the strategy of launching national-level programs like National Agricultural Research Program (NARP), Agricultural Human Resource Development Project (AHRDP), National Agricultural Technology Project (NATP), etc. periodically for strengthening agricultural R&D.

Decline in Operating and Capital Costs

While the salary component in agricultural R&D expenditure keeps rising, the share of operating and capital costs has been declining. This imbalance degrades the quality of research output.

The number of scientists in the ICAR increased a little in the 1980s but the growth picked up in the 1990s; the number of research units more than doubled. Disciplinary diversification within ICAR itself has increased over time, from 51 disciplines in the late 1970s to 135 in 2001-2. Disciplinary diversification was high also in agricultural universities. There is high variability in human resources between institutes and disciplines. Nine units in ICAR have on an average five scientists. In contrast, eleven other institutes have more than a hundred scientists. The consequent paucity of operating capital lowers their scientists' marginal productivity. The number of scientists in agricultural universities declined by 24% in the last decade. At the same time, this number varies sharply between universities: eleven universities together have less than 250 faculty; these account for 12% of their staff strength; in sharp contrast, four institutions together have more than 750 faculty, accounting for 28% of the staff.

Integrated research, education, and extension is the basic function of agricultural universities. In terms of participation and time allocation 77–92% of the scientists participate in these core activities. Research occupies 70% of the time, and non-R&D activities such as administrative management take up the remainder. ICAR expenditure grew at 6.6% per annum between 1987-88 and 2001-2, growing steadily at 4.4% until 1996-97 and thereafter rapidly accelerating to 12.4%. Though ICAR has been able to provide a rational balance between human and material input for research, remuneration has formed 50% of the expenditure throughout 1988–2003. Strengthening operational support has been the thrust in recent years but operating expenses form less than 25% of the expenditure—triennium ending (TE) 1988, 25.3%; TE 1997, 21.9%; TE 2003, 23.3%.

The Gap

In terms of number of institutes, centers, directorates, and projects, research has grown significantly. The underlying idea has been to encourage research focused on region/zone/ecosystem, commodity, and issue/theme. Though desirable, multiplication of units has resulted in overlap of research work, lesser productivity per unit of research resource, more competition for available financial resources, and poor coordination among units. In addition, in some states such as Maharashtra the government has been consistently reducing funding to state universities. The international agricultural research centers that contributed to India's growth have also had their budgets slashed.

The Remedy

- Raise the share of operating and capital expenses.
- Attain and maintain critical infrastructure growth in each research unit.
- The managements of ICAR and agricultural universities must monitor balanced allocation.
- The central government either through ICAR or other channels should allocate more resources for infrastructure development and operating expenses.

Research Investment in Dry-land Agriculture

Considering that there is technological stagnation in irrigated agriculture and decline in resources availability, growth in agriculture will have to come increasingly from the relatively less favored regions. Characterized by resource-poor small and marginal farmers and poor infrastructure and supporting services, these cover 70% of cropped area. They contribute nearly 40% of the agricultural production and account for most of the commodities that are in short supply. About 90% of coarse cereals, 90% of pulses, 81% of oilseeds, and 69% of cotton are grown under rainfed conditions.

HYV coverage increased tremendously in the irrigated environment in the early phases of the Green Revolution. About 85% of rice area was planted with modern varieties in Punjab, followed by Tamil Nadu (82%), Haryana (68%), and Andhra Pradesh (54%) during the 1970s. HYV coverage was low in rainfed areas throughout and has even now met with only partial success. HYV suitable for these areas are still not available.

The Gap

Research investment addressing the problems of dry-land agriculture is disproportionately small. The contribution of both public and private extension agents (farmers' organizations, producers' cooperatives, input firms, media, voluntary organizations, etc.) is skewed more towards well-endowed regions. In regions where there is some significant presence of various agencies, their efforts are not integrated. Evaluation studies on the Training and Visit system have revealed impressive productivity gains in irrigated areas and failure to make an impact in the larger part of rainfed areas.

The Remedy

- Gain greater understanding of farmers' practices and features of technology that would best suit this harsh environment to prioritize developing stress-tolerant varieties and improving management practices.
- Invest more on development of dry-land technologies.

Refocusing Research

Marginalization of farm holdings, decelerating technological advances in staple crops, declining investment in agriculture, and increasing degradation of natural resources have thrown up many challenges. They call for diversification of agriculture in favor of more competitive and high-value commodities. Estimated Herfindhal Index for irrigated environment, particularly for Punjab and Haryana, was 0.27 and 0.15 respectively during the 1990s, up from 0.19 and 0.07 during the 1970s. Rainfed environments in West Bengal, Madhya Pradesh, and Maharashtra show less diversity than irrigated environment. With the General Agreement on Tariffs and Trade (GATT) and World Trade Organization (WTO) in operation Indian agriculture with all its structural weaknesses must compete with the highly commercial agricultural systems of the developed countries. Meanwhile, growth in agricultural production has slowed down from 3.82% per annum in the 1980s to 2.09% since 1990, though it is an improvement on the 1.95% growth rate of the 1970s.

There is already a gradual diversification of crop sector in favor of high-value commodities. Punjab plans to diversify crops in 1.5 million acres in the next four years through contract farming with Pepsi Food, ITC, Hindustan Lever, Mahindra Shubhlab Services, Punjab Agro Food Grains Corporation, and Escort Limited. Already 3 lakh acres under contract farming have been diversified from paddy and wheat to commercial crops like maize, barley, white mustard, basmati rice, and oilseeds. In Karnataka, wide varieties of vegetables, gherkin, lime, pomegranate, grapes for resins, pearl onions, asparagus, and mangoes for pulp are covered under contract farming. Contract farming in gherkin, cotton, maize, etc. is being introduced in Tamil Nadu. Rallis has allied with Hindustan Lever for a wheat contract farming project in Madhya Pradesh. Sami Labs has ventured into contract farming in medicinal plants in Karnataka, Tamil Nadu, and Kerala.

In ICAR 68% of commodity-oriented research is devoted to food (food crops, livestock, and fisheries). Pulses are under-emphasized at 12% share. Rice accounts for more than half of the cereal-based research; wheat and maize claim another 34%.

The Gap

Agricultural research has not cared adequately for basic research, which is critical for scientific breakthroughs. Most of the research is application-oriented. Coarse cereals, horticultural crops, and natural resource management have received inadequate attention. Research on livestock, fisheries, and forestry sector is yet to be developed fully. Allocation for social sciences is low and formed only 0.6% of ICAR expenditure during 2001-2.

Intensive application of agricultural inputs in the Green Revolution areas is seen as the major cause of soil salinity, groundwater pollution, nutrient imbalances, emergence of new pests and diseases, and environmental degradation. In fragile and marginal environments rising biotic pressure and lack of suitable land management system and inputs to realize optimum natural resource potential have led to land degradation, loss of biodiversity, soil erosion, water-logging, water pollution, deforestation, and environmental pollution. Research and extension intensity currently is inadequate to address these challenges. A paradigm shift is required for designing a new production system well aligned with the carrying capacity of the natural resources.

The Remedy

- Extend the spectrum of R&D to cover nutritional security (diversification into vegetables, dairy, poultry, etc.).
- Emphasize natural resource management and competitiveness in production.
- Invest in new areas, such as breaking yield barriers in foodgrains and evolving crops with more protein and micronutrient content through genetic engineering, biotechnology, and optimized agronomic practices.
- Ensure sufficient expertise in agricultural universities and ICAR institutes to develop cost-effective technologies and quality traits of the commodities for exportability. Shift research from production system to consumption, which is a prerequisite for promoting exportability.
- Strengthen social sciences research, including training of social scientists of ICAR and agricultural universities, on policy analysis, policy interfacing, and supporting agro-biological scientists in research problem diagnosis, prioritization, and agricultural markets and trade analysis.

Extension

The current liberalization process has adversely affected countries with a weak public system of technology transfer. Farmers well equipped with infrastructure and technology benefit more and participate in supplying international markets. Technologies are generated based on demand and may not be within the reach of small farmers. Rural areas in India are weakly integrated into markets and most private-sector innovations do not reach them. This underlines the need for improving delivery mechanisms of the public extension system to disseminate technologies.

During 1994–96 the share of investment on extension was: government extension (main), 76.1%; ICAR and agricultural universities, 14.1%; public industries, 2.1%; and private system, 7.7%. The pattern is likely to have persisted over the years, except that the contribution of nongovernmental organizations (NGOs) may have increased marginally. Extension investments by states vary widely. Agricultural universities spent only 5% of their budget and employed only 4.7% of their staff strength on extension education. The corresponding figures are 17% and 17.3% on administration, 33% and 40.4% for academics, and 45% and 37.6% for research. With the current policy of creating a Krishi Vigyan Kendra (KVK) for each district, many agricultural universities have established new KVKs, with about 7.5–10% of the resources going for extension. For extension delivery system producers' cooperatives, farmers' associations, and the Department of Agriculture have a reasonably good technical staff–cultivator ratio—at least one technical person for less than 1500 farmers. However, the presence of all extension agents is skewed more towards well-endowed regions and generally they have poor coordination among themselves. Farmers' associations and producers' cooperatives exist only for a few crops and commodities.

Because of increasing costs of providing services and government's reluctance to fully support extension activities many organizations in the public sector such as the Department of Agriculture, research organizations (ICAR and agricultural universities), and training organizations (KVKs) tend to emphasize services that could generate resources. Considerable scope exists for initiating paid extension services, particularly in nonfoodgrain crops—horticultural crops (fruits, vegetables, flowers, and spices) and oilseeds. Promotion of private and community-driven extension needs priority. In this direction, the Agricultural Technology Management Agency (ATMA) program was implemented in twenty-eight districts in seven states with World Bank support with the objective of institutionalizing the farmers' participation in planning and implementation of innovations.

The Gap

Diverse sources have indicated an interest in funding extension. Public sector extension needs to be alert to these opportunities. Many staff positions in public sector extension remain vacant and operational capital and infrastructure provision are suboptimal. To remain relevant the extension system has to strengthen its understanding of technology, markets, prices, demand, and policies. It is essential to develop an effective linkage between research and extension. Many technologies available in laboratories and universities—which offer tremendous scope for yield increase—have not reached the end-users. The complexity of second-generation technologies and heterogeneity of production environments warrant much more intensive extension efforts.

The Remedy

- Provide adequate commodity-specific or problem-specific training and extension infrastructure at block level.
- Initiate problem-solving consultancy services and need-based training programs, especially on nonfoodgrain crops.
- Prioritize initiating, sustaining, and promoting farmers' organizations.
- Set a policy framework to encourage private agencies in extension activities; involve NGOs and self-help groups.
- Extension workers belonging to different agencies (public, private firms, NGOs, commodity boards, cooperatives, banking, etc.) must acquire new skills and knowledge with well-specified frequencies to keep pace with trends in agriculture.
- ICAR should allocate adequate funds to agricultural universities for research on extension education and coordinate the activities at the national level.
- State governments should enhance allocation for extension and formulate guidelines and procedures for effective coordination between public and private extension agencies.
- KVKs should play an increasing role in providing updated technological and market information to farmers.
- Continue periodic training of extension personnel by national training institutes like the National Institute of Agricultural Extension Management Institute (MANGE) and National Institute of Rural Development (NIRD).
- Promote agricultural clinics on a large scale.
- Appoint social scientists in all KVKs for better coordination among the technocrats and for better information flow.
- Impart training to extension personnel on broad-based extension and information technology (IT).

Public–Private Interface

Funding for R&D comes from the central government (50%), state governments (20%), private companies and cooperatives (16%), and foreign donors (14%). Private sector research is expanding rapidly, especially in hybrid seed and horticulture. There is also a significant private input to R&D on agro-chemicals, machinery, agro-processing, livestock feed, and livestock health products. In general, private sector research is strong in resources and results. Public sector research is more policy-driven, private sector research is market-driven. In cost-effectiveness the private sector performs better on account of focused product development, timeframe for delivery of the research product, productivity of scientists, optimal use of research infrastructure, and competitiveness of rivals. Private sector R&D has accounted for more than 11% of TFP growth.

Public research institutes in India provided considerable stimulus to private plant-breeding research. ICAR and agricultural universities are important sources of germplasm. At the same time, the public system did not support private sector research except undertaking verification and efficacy trials on cost basis. There have been some initiatives like provision of contract research and rationalization of seed regulation, and entry of transnationals recently to encourage agricultural research and extension by the private sector and NGOs. ICAR has taken a policy decision to encourage public–private partnerships.

The Gap

The private sector benefits from the research findings of the public sector but private investment leads to proprietary technology. Will it benefit poor farmers? Will private sector research address the problems of food security, protection of the environment, and poverty reduction? The increasing rate of investment by the private sector the world over in biotechnology and other emerging areas worries developing-country farmers that the cost of seeds will be prohibitive. Mostly, materials emerging from private research weigh against small and marginal farmers. Currently, most of the genetically modified (GM) crops are owned by corporate entities. If this trend continues, the full spectrum from upstream research to production and distribution could eventually be under the control of a few global corporations. There is, therefore, a strong case for not weakening the system of Consultative Group on International Agricultural Research (CGIAR) and public research and extension system. But international donors and governments do not seem concerned enough to counter this kind of development.

Public research aims at larger social benefits whereas private research investment is profit-oriented. This basic difference in philosophical orientation creates mistrust between the two groups of researchers. Also, there is no mechanism and agreed procedures for systematically tapping private sector funding to support problem-oriented research in public institutions. Collaboration opportunities for the two sectors in areas of environment, plant biotechnology, genetic conservation, seed production, information system, and training are tremendous. They must be assured freedom to collaborate, generate own revenues, enforce contracts, and strengthen intellectual property rights (IPR). While the private sector may be encouraged in seed, fertilizer, machinery, biotechnology, and environmental technologies, the public sector has a much larger responsible role such as germplasm collection, maintaining gene banks, basic research for marginal areas, research in natural resource management, and social science research relating to agriculture. Contribution from the private sector for biotechnology and molecular breeding is essential due to capital intensity.

The Remedy

- Double public research investment in areas of its specialization.
- Exchange knowledge with the private sector on an assurance that it will not patent the shared knowledge. Stronger IPR legislation and enforcement will enable farmers to access advanced, relevant technologies.
- Devise a mechanism to institutionalize mutually acceptable procedures in order to forge new alliances that may address investment needs in some key socioeconomic issues, such as food security and environmental quality.

Institutional Linkages

Linkages between CGIAR institutions and public research and extension system have been inadequate. Synergy is universally absent. Linkages between CGIAR institutions and overseas foundations are especially important in emerging areas like biotechnology, germplasm enhancement, and development of biotic and abiotic stress-resistant varieties.

The Remedy

- Encourage mobilizing competitive grants and contracting mechanisms to foster partnerships and alliances, both within the country and internationally. National and CGIAR institutes should develop guidelines and directions for effective collaboration on frontier research areas.
- In the interim, institutions should foster *inter se* information networking on exchange of educational materials, research materials, and library resources.

Human Resource Development

India's agricultural research and education system employs about 33,020 scientists. Most of them are engaged in the triple functions of education, research, and extension. But the investment of Rs 4.20 lakh per scientist in 2001-2 was a decline from Rs 4.32 lakh during 1992–94. (This investment largely goes into remuneration.) Scientists' intensity per 1000 hectares of gross cropped area was 8.34 during 1992–94 and declined to 5.90 in 2001-2. De-emphasizing development of human resources lowers its quality. Public sector scientists could also update themselves better. Agriculture is emerging as knowledge-intensive. Growing resource scarcities of land and water, emergence of IT, biotechnology, space technology, weather forecasting, disaster management, etc. exert a strong influence on it.

The Remedy

- Fill up vacancies.
- Increase the number of scientists in private sector R&D by at least one-fourth the current level.
- Increase per-scientist investment by at least 50%.
- Make the system more responsive and efficient through a conducive research and extension policy environment and decentralization of management and resources at the level of region, scientist, project, and institute, by recognition and incentive. Monitoring and evaluation must be concurrent.
- Develop mechanisms to infuse accountability and responsibility among scientists, institutions, and their management.

- Encourage scientists to train and update themselves in new developments in basic sciences and cutting-edge sciences through centers of excellence, sabbatical, visiting scientists schemes, overseas fellowships, etc.

Education

The agricultural education system in the country offers degree programs in eleven specific disciplines in agriculture and allied areas—industry, banking, and cooperation. About thirty-four agricultural universities, four deemed universities, a number of conventional universities, and private agricultural colleges and institutes admit about 17,000 students annually. About 5000 candidates are admitted for postgraduate studies. Postgraduates are specialized in 55 different fields. It is, by and large, an optimum blend of different disciplines, being demand-driven. The number of qualified candidates is burgeoning steadily. However, many agricultural graduates are unemployed. Obviously, the quality of education has declined, specifically in private and public-supported colleges affiliated to conventional universities. While many agricultural universities do not rise to the set standards in education, to meet the demand for low-level educational needs many institutes are offering slipshod diploma and certificate courses.

In ICAR and agricultural universities there is unbalanced staffing, academic inbreeding, and falling quality of education. The number of scientists in agricultural universities declined by 24% over the last decade and intake of students increased. ICAR has been periodically introducing schemes and incentives for quality improvement of agricultural universities faculty but well-endowed institutes bag most of the incentives, aggravating the quality gap. Guidelines have been set for curriculum development but grading, mode of admission, duration of course, course structure, etc. vary.

The Remedy

- Emphasize producing graduates as job providers, not job seekers, through rural agricultural work experience (RAWE) or industrial tie-up program and vocationalization schemes covering students unable to pursue higher education.
- Make ICAR accreditation compulsory within a timeframe.

- Avoid inbreeding.
- ICAR must make continuous curriculum changes and monitor quality standards.
- Refocus undergraduate and postgraduate education with strong information communication technology (ICT) and management components to improve career opportunities.
- Institutions should develop regular linkages with other leading institutions and industries both within and outside the country for research and training.
- Continue reserving 10–25% seats for students from other states.
- Promote open distance learning and certificate courses for nonformal groups like input dealers, self-employed nonagricultural graduates, leading farmers, agricultural processors, and marketers.

Prioritizing Research

Research agenda has considerably expanded. How to allocate research resources among regions, commodities, research problems, and disciplines? What weights must be assigned to parameters of growth promotion, equity promotion, natural resource management, trade, and food-nutrition security? For India with a population of more than one billion, providing food and nutritional security and preserving and more efficient use of natural resources must receive the greatest weight.

Until recently, objective research priority setting received little attention. Since the launch of the NATP more awareness has been created among policymakers and agricultural scientists, with the leadership given by the National Centre for Agricultural Economics and Policy Research (NCAP) of ICAR. A good amount of training has been given to hundreds of agricultural scientists in the country on this theme. More literature has appeared on the concept and on methods of research priority setting.

The Gap

The main objective of agricultural research and extension was attaining food self-sufficiency. New objectives have been added to it, such as equitable growth, sustainability of production systems, diversification of product mix, export promotion, etc. In commodity coverage, the focus has expanded from research on crops to livestock, horticulture, fisheries, forestry, and natural resources. However, resources are allocated without prioritizing different socioeconomic objectives, regional imbalances, and criteria.

The Remedy

- Institutionalize research priority mechanisms in terms of commodities, regions, sustainability, poverty, and equity.
- Set up a planning, monitoring, and evaluation (PME) cell in all agricultural universities, to act as an apex body to train their research managers and advise policymakers on priority allocation of funds. NCAP will train the personnel of the PME cells periodically. ICAR should financially support setting up the PME cell and the state government should support its functioning.
- In assigning weights, food security comes first. Nutritional security and natural resource and environment management come next. Poverty reduction comes third. Trade must receive the least weight. In the long run weight assignment must be flexible to adjust to changing socioeconomic objectives.

ICAR Decentralization

ICAR was reorganized in 1965 for coordinating, directing, and promoting agricultural research in the country. This led to centralization of funding, execution, and management of research, with greater autonomy and empowerment to ICAR. A Department of Agricultural Research and Education (DARE) was created in 1973 in the Union Ministry of Agriculture to establish direct linkages of the ICAR with central and state governments and international organizations. Major expansion under ICAR took place on the lines of commodity research. Competitive Agricultural Technology funds like AP Cess Fund Ad-hoc Research Scheme were initiated to support short-term result-oriented ad-hoc research projects. Similarly, National Professor Scheme, National Fellow Scheme, and Young Scientist Scheme were started to recognize eminent scientists and develop strong centers of research and education around them and encourage and recognize young scientists. NATP Competitive Grant Program was implemented to support the main thrust of agro-ecosystem research under NATP with enhanced basic and strategic research, product, process, and market development, and promote greater partnership between the public and private sectors.

The Gap

Dual control of agricultural universities by ICAR and state governments often leads to conflicting interests and misallocation of resources. Institutions are either well supported both by the state concerned and the Center or they are doubly disadvantaged. Proliferating agricultural universities, which come about more as a political decision, often dilute the very concept of agricultural university. An agricultural university is supposed to combine crop production, animal husbandry, horticulture, forestry, home science, agricultural engineering, and fisheries. Now there is the phenomenon of veterinary university, horticultural university, etc. Priority provision of funds to these proliferating institutions and monitoring is difficult. For instance, it takes about 18–24 months to get a project sanctioned for ICAR funding.

The Remedy

- Decentralize ICAR with zonal offices for the eastern, western, and southern states under the direct supervision of the Deputy Director General, with adequate budget and power. This will facilitate researchers' and extension workers' approach to ICAR resources and facilities, etc. and also facilitate effective monitoring by ICAR. The northern zone can be served by the central office of ICAR.
- Develop mechanisms to infuse accountability through prioritization, monitoring, and evaluation of all activities.

Asian Development Bank
India Resident Mission
4 San Martin Marg
Chanakyapuri
New Delhi 110021