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MAKING AGROECOLOGY VIABLE FOR SMALL FARMERS :

EXPERIENCES FROM THE FIELD

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FOCUS ON THE GLOBAL SOUTH

Making Agroecology Viable for Small Farmers : Experiences From the Field

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Contents

Foreword

The search for paradigms to underpin new agricultural intensification models that are able to feed the country now and in the future, while maintaining and enhancing the health of ecosystem functions, is an important challenge for policymakers. Alteiri M A, Funes-Monzote FR, Peterson P (2012) present case studies from Cuba, Brazil, Philippines, and Africa to demonstrate how agroecologically efficient agricultural systems of smallholders can develop into robust pathways towards productive and resilient agroecosystems. Case studies presented from India in this booklet are evidently of the farmers who are middle peasants with landholdings under 5-8 acres. They work on their own farm with their families and do not hire any outside labour. They take help only at certain points of time from fellow farmers, mostly for harvesting. Further the stories of these farmers signify the emergence of the pathway under formation in India in favour of a move away from conventional towards non-conventional agroecological farming. It is also significant that among the farmers who have shifted there are two to three tribal farmers who have never practiced non- conventional farming. The shift to agroecological approaches represent the tendency of middle peasants looking for how to reduce risk in production.

Furthermore, it is also clear that they represent the tendency of middle peasants becoming far more aware of the growing ecological and economic risks of conventional farming than ever before. This is also a new and emergent outcome of the phenomena of rapidly creeping adverse impacts of neo-liberal policies and deteriorating soil and water health on productivity. These farmers have consciously chosen to shift to ecologically and economically sustainable practices of farming. It is very encouraging to know that these farmers now understand that it is not correct to run after merely more production. Since their experience is that adoption of the agroecological farming practices also leads to better production on account of the realization of nutritional improvement and food diversity there is the need to take this fact to a larger number of farmers and to the policymakers. Similarly it is again promising to hear that they were also able to realise the new possibilities of assured income on account of higher food quality under realisation from the surplus taken to market after subsistence consumption and storage.

Case studies also reflect the practice of several types of agroecological approaches such as zero budget, permaculture, organic farming, zero tillage, vermicomposting, chemical free farming and others. Among the motivations and triggers for the adoption of agroecological

practices including chemical free farming by the farmers is mainly the concern for soil and water health. They are attracted to chemical free food that has positively affected the health of soil, water and other resources which in turn have led to the production of diverse and better quality foods. Case studies are equally inspiring because they are also actively pressing for local and traditional crops, especially the various varieties of millets and in alternate to rice and wheat, and there is stress on maintaining diversity on the front of food crops.

It is again a hopeful sign that these farmers have been able to achieve this measure of sustainability even when they are selling their produce at the locally available rates. And even those who shifted on account of better rates their prices are also a case of little better than the local rates. There is a clear message that these cases support equally the case that farming on small landholding is viable. With the adoption of agroecological practices of farming farmers can make farming ecologically and economically sustainable.

Finally it is important to point out that in India agroecology is making inroads through the efforts of farmers who have kept in mind that land has to be kept fertile with ways which are compatible with the strategies of ecological intensification of agriculture and not limit themselves to the practice of input change. Since the practice of agroecology has clearly the potential to go far beyond the perceived limits of organic farming there is a need to put in more resources for research on agroecological approaches. Policymakers need to be sensitized to the need to focus on the support required to be given by the state to agroecology. At the most , these farmers are known to have adopted agroecology on account of their association with non-governmental organisations (NGOs) who have introduced or reintroduced, trained and worked with them for different concerns: right to land, ecological rights, food security and sovereignty, anti-corporate takeover reasons, forest rights, gender rights etc.

Although sustainable farming is turning into a movement in many parts of the world, but not so much has happened in India. The imperative is obvious. There is a need for a social movement to take agroecology forward for various reasons as listed above on the basis of the evidence that the case studies have been able to bring out quite clearly.

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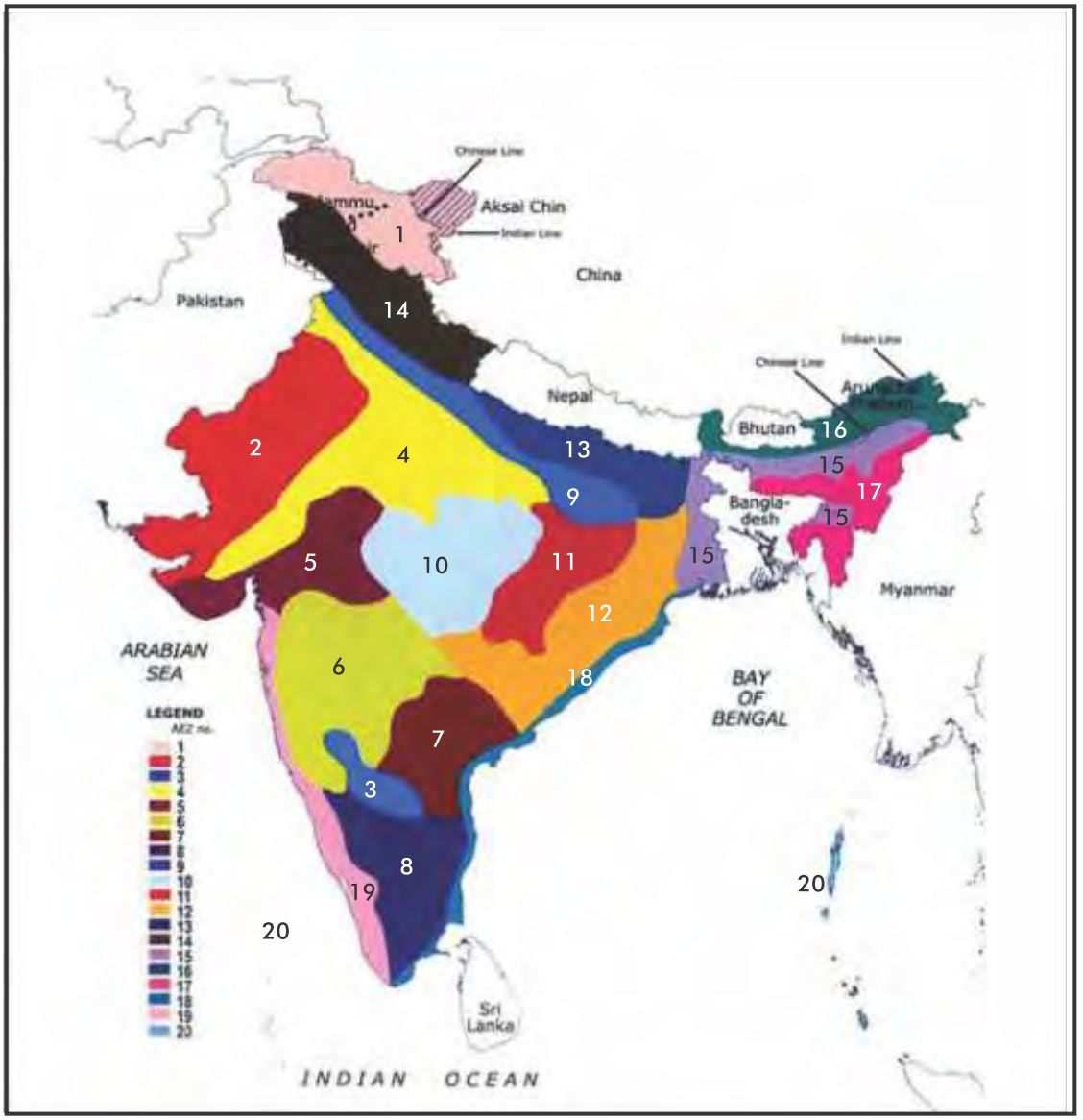
Introduction

A number of studies from across the world have established that agroecological practices are more successful than conventional farming methods. It is a multidimensional approach, founded on knowledge, know-how and peasants' ways of life, grounded in their respective natural, social and cultural environment. For many years, it was considered archaic and not adapted to "modern progress". Agroecology was banished, but is now making a big comeback. For small and marginal farmers, agroecology is seen as the best way to enhance productivity and increase profits.[1]

Agroecological farming weaves in the essentials so that there is profit for each – soil, seeds, traditional knowledge of communities, food security and food sovereignty. It places an emphasis on the social and cultural environment of naturally produced diverse food. However, agroecology is being taken over by large-scale industrial agriculture which is based on profit making, selected food crops and chemical inputs. Many governments and corporations across the globe are promoting chemical inputs, hybrid seeds, GMOs, monoculture, and grabbing natural resources. Subsidies and other benefits are provided to consumers to lure them in the name of bumper production. Over time, we have witnessed that such attempts have only led to losses. The condition of natural resources such as soil, land and water has only degraded and worsened over the years. Industrial agriculture has also contributed to climate change, which is a big and dangerous threat now, the source of floods and droughts and other natural disasters. Thus, it is essential that agroecoly be revived, especially among small and marginal farmers. Since it is adapted to the environment, it respects nature and provides space for biodiversity to grow. This, in turn, helps the farmer to not just grow more, but also to grow better.

This booklet presents the advantages of agroecological practices for small and marginal farmers. We travelled far and wide to understand how farmers are growing what they want to grow, preserving indigenous varieties of seeds, eating nutritious and healthy food, increasing the quantity of their produce and making profits by selling in markets. The practices illustrated through these case studies are being extensively shared among farmers from across the country. These local practices are not just ways of thinking or alternatives; they are based on the specialized knowledge and practices of people and communities. They contain insights that when appropriately applied, can help farmers and communities to promote local food, adapt better to climate change and enhance production to increase their incomes. Agroecology has yet again proved to be the key to enhanced yield in a sustainable manner for smallholders to ensure food security, food sovereignty and environmental balance.

[1] Miguel A., Altieri, " Agroecology, Small Farms and Food Sovereignty", University of California at Berkeley, Monthly Review, Volume 6, Issue 3, July -August 2009



Source : *www.nih.ernet.in/rbis/india_information/ecological%20regions.htm*

Important Features of Agro-ecological Zones of India

AEZ No.	Agro-ecological region	Geographical area (million ha)	Gross cropped area (million ha)	Physiography	Precipitation (mm)	Length of growing period (days)	Major crops
1.	Cold arid ecoregion with shallow skeletal soils	15.2 (4.7%)	0.07	Western Himalayas	< 150	<800	Vegetables, millets, wheat, fodder, barley, pulses
2.	Hot arid ecoregion with desert and saline soils	31.9 (9.7%)	20.85	Western Plain & Kachchha Peninsula	< 300	1500–2000	Millets, fodder, pulses
3.	Hot arid ecoregion with red and black soils	4.9 (1.9%)	4.18	Deccan Plateau	400–500	1800–1900	Sorghum, safflower, cotton, groundnut, sunflower, sugar cane
4.	Hot semi-arid ecoregion with alluvium-derived soils	32.2 (9.8%)	30.05	Northern Plain & Central Highlands including parts of Gujarat Plains	500–800	1400–1900	Millets, wheat, pulses, maize; irrigated cotton & sugar cane
5.	Hot semi-arid ecoregion with medium and deep black soils	17.6 (5.4%)	11.04	Central (Malwa) Highlands,Gujarat Plains & Kathiawar Peninsula	500–1000	1600–2000	Millets, wheat, pulses
6.	Hot semi-arid ecoregion with shallow and medium (dominant) black soils	31.0 (9.5%)	25.02	Deccan Plateau	600–1000	1600–1800	Millets, cotton, pulses, sugar cane under irrigation
7.	Hot semi-arid ecoregion with red and black soils	16.5 (5.2%)	6.19	Deccan (Telangana) Plateau & Eastern Ghats	600–1000	1600–1700	Millets, oilseeds, rice, cotton & sugar cane under irrigation
8.	Hot semi-arid ecoregion with red loamy soils	19.1 (5.8%)	6.96	Eastern Ghats (Tamil Nadu uplands) & Deccan Plateau (Karnataka)	600–1000	1300–1600	Millets, pulses, oilseeds (groundnut), sugar cane & rice under irrigation
9.	Hot subhumid (dry) ecoregion with alluvium-derived soils	12.1 (3.7%)	11.62	Northern Plain	1000–1200	1400–1800	Rice, wheat, pigeon pea, sugar cane, mustard, maize
10.	Hot subhumid ecoregion with red and black soils	22.3 (5.8%)	14.55	Central Highlands (Malwa & Bundelkhand)	1000–1500	1300–1500	Rice, wheat, sorghum, soybean, gram, pigeon pea
11.	Hot subhumid ecoregion with red and yellow soils	11.1 (4.3%)	6.47	Eastern Plateau (Chhattisgarh Region)	1200–1600	1400–1500	Rice, millets, wheat, pigeon pea, green gram, black gram
12.	Hot subhumid ecoregion with red and lateritic soils	26.8 (8.2%)	12.09	Eastern (Chhota Nagpur) Plateau and Eastern Ghats	1000–1600	1400–1700	Rice, pulses, millets
13.	Hot subhumid (moist) ecoregion with alluvium-derived soils	11.1 (3.4%)	10.95	Eastern Plains	1400–1600	1300–1500	Rice, wheat, sugar cane
14.	Warm subhumid to humid with inclusion of perhumid ecoregion with brown forest and podzolic soils	18.2 (5.6%)	3.20	Western Himalayas	1600–2000	800–1300	Wheat, millets, maize, rice
15.	Hot subhumid (moist) to humid (inclusion of perhumid) ecoregions with alluvial-derived soils	12.1 (3.7%)	8.99	Bengal Basin and Assam Plain	1400–2000	1000–1400	Rice, jute, plantation crops
16.	Warm perhumid ecoregion with brown and red hill soils	9.6 (2.9%)	1.37	Eastern Himalayas	2000–4000	<1000	Rice, millets, potato, maize, sesame, Jhum* cultivation is common
17.	Warm perhumid ecoregion with red and lateritic soils	10.6 (3.3%)	1.56	North-Eastern Hills	1600–2600	1000–1100	Rice, millets, potato, plantation crops, Jhum* cultivation is common
18.	Hot subhumid to semi-arid ecoregion with coastal alluvium-derived soils	8.5 (2.6%)	6.12	Eastern Coastal Plains	900–1600	1200–1900	Rice, coconut, black gram, lentil, sunflower, groundnut
19.	Hot humid perhumid ecoregion with red, lateritic and alluvium-derived soils	11.1 (3.6%)	5.70	Western Ghats and Coastal Plains	2000–3200	1400–1600	Rice, tapioca, coconut, spices
20.	Hot humid / perhumid island ecoregion with red loamy and sandy soils	0.8 (0.3%)	0.05	Islands of Andaman & Nicobar and Lakshadweep	1600–3000	1400–1600	Rice, coconut, areca nut, oil palm

What Is Agroecology?

Agroecology is a set of practices that make farming sustainable and sensitive to local conditions. The goal is nutritiously rich and chemical-free crops. This type of farming builds the health and resilience of the ecosystem, while reducing dependence on external inputs like chemical pesticides and fertilizers. These inputs consume alot of energy and involve fossil fuel consumption and harmful emissions. They are also extremely harmful to people's health and the environment, as they contain chemical and synthetic enhancers. Meanwhile agroecology involves judicious use of in-house farm resources and locally available plants, trees, birds, animals, insects and microorganisms to interplay in a mutually beneficial manner. It emphasizes enhancing land and environment- both above ground and in the soil. Agroecology is well suited to withstanding environmental and economic stresses posed by pest pressures, input prices, crop failures and climate change, while being beneficial to land, soil, crop production and saving for the next cycle.

Globally, the world's smallholders produce 70 percent of the world's food on 25 percent of the land. Tragically, because they don't have enough land (or market power), they are also among the world's poorest people, and make up 70 percent of the world's hungry. Agroecology is becoming a more and more popular social movement for justice that recognizes and respects the rights of communities of farmers to decide what they want to grow and how to grow it. Agroecology addresses people's rights related to food sovereignty and food security, which are essential for survival.

Benefits of Agroecology for Small and Marginal Farmers




For a farmer, especially a small or marginal one, agroecology can provide solutions in the long run for making profit in different ways by increasing production. Let us understand how agroecological methods not only benefit the environment, but also contribute to a farmer's income and better health.

Enhancing production and variety of crops : Small-scale farmers in Africa have used agroecological practices to more than double crop yields within three to ten years of implementation.[2] Farmers use agroecological practices to improve soil fertility, adapt to climate change, and provide space for local and indigenous practices and multiple cropping. By using fewer resource in more intensive ways, small farmers can make profits on per unit of output, and thus increase their total profit. These practices also guarantee assured yield and enhance productivity.

Food security and storing for next cycle : Agroecology emphasizes on storing for the next season of sowing as well for household food consumption. The farmer grows food for his or her family's consumption, as well, and in this process becomes less dependent on the market for food supplies. Farmers who follow agroecological methods have been shown to have food security as well as, higher crop and diet diversity than conventional farmers. Since the practice is free of chemical fertilizers, the food is healthy and nutritious. By saving their seeds from the

[2] *"Agroecology and the right to food"*, UN Special Rapporteur on the Right to Food, 2011

last harvest, farmers again reduce their dependency on the market, and since they select the seeds themselves, they are likely to have better seeds than those available in the market. These seeds are also more adapted to the changing climate, as they are local and naturally built.

No dependence on markets and more savings to tackle debts and farmer suicides : Agroecological practices can significantly improve the income of small farmers. Conventional agriculture is characterized by the Green Revolution's technologies and heavily depends on outside inputs. It is resource intensive in every dimension- capital, land, water and chemical enhancers. Farmers end up taking loans for these investments. With agroecological methods, there is no external input required. Land size is small, irrigation practices are innovative, and bio-inputs are self-made from on-farm resources or not needed at all. This makes it almost a no-budget-capital investment. Even if the crop fails, the farmer is not left in any monetary debt because no outside investments are needed. This is why the grave issue of farmer suicides can be tackled through agroecology. When there is production, any amount of crop production results in profit and farmers end up saving more in this model.

Added income opportunities : Agroecological practices follow animal rearing for bio-fertilizers and naturally produced inputs that are found directly on farms or are made from household waste. This helps to directly reduce investments in farming. A farmer can end up saving money to buy more livestock, or land or enhance irrigation systems. Livestock, cattle and poultry rearing can provide added income opportunities for farmers.

Food Sovereignty : Food sovereignty stresses that people have the right to decide what they eat and grow, and that should be healthy and accessible to everyone. Local farmers should have the first right to access local- regional food and markets. Their produce should get priority over multinationals or imported products. When it comes to farm-produced food and the market, the current economy is not able to connect the two due to large-scale industrial farming and trade policies. Small farmers have the ability to change this. By choosing what they want to eat and grow and by selecting local food they can enable the rights of people to make decisions about their communities and farming. Farming and growing food can feed the world, but food sovereignty through small farmers will enable food systems that ensure good health, justice and dignity for all. The system gives farmers control over every aspect of farming including their lands, water, seeds and incomes.

Agroecological Practices to Enhance Production for Farmers

Let us examine the advantages of agroecological practices for small and marginal farmers. There are many ways for farmers to increase the production of crops and restore soil balance by using simple techniques.

AGROECOLOGICAL PRACTICE	ADVANTAGES
Conservation cultivation	Little or no tilling improves soil structure-including aeration, water infiltration and retention capacity including organic matter.
Intercropping and poly cultures	Mixing crops in a single plot where biologically complimentary varieties are grown together improves soil nutrients. This practice is efficient as it reduces chemical inputs (thus lowering costs) and also utilizes space efficiently. This results in better pest regulation making crop yield stable.
Crop rotation and fallowing	Nutrients are conserved from one season to the next and the life cycles of pests, diseases and weeds are interrupted by this practice.
Mulching and covering crops	This reduces soil erosion and provides soil nutrition by lowering the temperature making it suitable for worms to grow. It also biologically controls pests.
Crop-livestock integration	This allows high biomass output and maximum nutrient recycling and also creates more options for economic returns through aquaculture, milk supplies and products for the family and selling in market.
Integrated nutrient management	Using compost, farm-produced organic manure and nitrogen-fixing crops allows reduction and/or complete elimination of chemical fertilizers.
Biological management (of pests and weeds)	Biological management decreases long-term incidences of pests and avoids the environmental and health hazards caused by the otherwise used chemical products.

Efficient water harvesting	Small farms use innovative irrigation practices that are energy and resource efficient. They help reduce water waste and expenses related to large infrastructure.
Using local resources and waste-recycling	This insures local climate adaptation and allows reduction in the use of external inputs as well as lessening pressure on natural resource base by their re-use.
Agro-forestry	Growing multifunctional plants and trees helps in improving soil fertility through nitrogen fixation, reducing soil erosion and maintaining cooler temperatures.
Designing a holistic landscape for better management	This can be a very useful method in land-use by fencing boundaries if planted with the right trees and shrubs for windbreaks and insect and pest protection. It also enhances biodiversity.

Note : *These practices are explained through case studies in the next booklet : Agroecological Handbook for farmers.*

Experiences From The Field : Reaping Benefits




The past has shown us that relying on hybrid seeds, synthetic fertilizers and chemical inputs will eventually rob the soil of its nutrients and biological life, resulting in poor yield. There has been a small but growing shift away from these practices in the last decade. Small and marginal farmers are successfully generating practices that attempt to undo the mistakes of the past by returning to the old way of chemical-free cultivation. The case studies presented here do not offer any magical solutions; they validate the lived experiences of small and marginal farmers. In most cases, farmers are moving towards conserving traditional practices, buying no chemical inputs from the markets, using locally and naturally available resources as inputs and making economic profits in this process. Agroecological methods and practices offer site-specific alternatives. They are shaped by the immediate cultural, social, economic and environmental backgrounds in which they exist. These local alternatives rely on the knowledge of people and communities. They have helped promote local food production systems that are adapted to climate change, conserve biodiversity and water, ensure food security and also empower women farmers.

Enhancing Soil Fertility

Kerandiguda village | Bissum Cuttak block | Rayagada district | Odisha

Land Preparation: *nitrogen fixating plants | mixed cropping | livestock and household waste | no external inputs (fertilizers and pesticides)*

Intercropping chilies and millet

Mulching

Loknath Nauri is a landless farmer who supports his family of ten members through farming. He grew Bt cotton on one and half acre area for a couple of years. He invested heavily in chemical fertilizers and other inputs from the market. He lost his entire crop to droughts. When there was no food, his family survived by consuming a local variety of weed. Now, he works on about two and half acres of land where he grows 56 verities of millets in addition to pulses, oilseeds and vegetables throughout the year. He is food sufficient and sells the surplus produce in the market as well. He practices various easy methods that involve no cash investment to enhance nutrition content of the soil through weeds, mixed cropping and composting to increase his produce.

Southern Odisha's Rayagada district mostly comprises of laterite soil. It is very poor in organic matter and offers low fertility. Like many others in the area, Nauri invested in Bt cotton. It is the most popular cash crop from the region. He lost his crop due to droughts. He also lost all the money that he spent to buy the Bt cottonseeds, pesticides and fertilizers from the market. He decided to not farm cash crops anymore and only grow food for his family's consumption. Since the soil is laterite and he had applied chemicals, he knew that he would have to work on its nutrition content. He took some easy steps that were followed by other farmers in his area to prepare the land before sowing seeds.

The first step was to make a compost pit. He dug a three and half feet deep pit to produce farmyard manure for the land. He put in nitrogen-fixating plants, dry and wet leaves, paddy husk, different kinds of millets and their seeds with cow's dung and urine. Additionally kitchen waste was also put into it. A few days before sowing seeds, he applied 60 percent of this

manure to the land and also left his cattle in the field for a few days. After sowing, with a gap of 15 days, the rest of the manure was applied to the farmland before the flowering stage. He follows crop rotation each time and mixes his crops as well.

Nauri stresses on the importance of certain weeds as well. He says *"Most people pull the weeds out as they compete for nutrients from the soil. They do not know that these weeds recharge the much-needed and essential nitrogen in the soil."*


Lantana Camara

The lantana camara is very important for this. His crops grow near the weeds. Most millet does not need much water to grow. He follows the weather pattern to understand rainfall and then selects his crops. He also mulches most of his crops so that rainwater and dew moisture is held for longer periods. This checks soil erosion and holds the nutrients in the soil as well. To treat pest attacks, he uses the locally available stem of sago palm. The stem is cut from tree and planted in the field. It has proven to be very effective in dealing with any kind of pests. He was very worried about the soil after applying chemicals and droughts. Now, he is happy that the soil is rich and full of nutrients.

There were times when Nauri's family survived by eating local weeds when there was no food. Now he has a different story to tell. He beams *"Things changed for us when I decided to not follow chemical farming. It was risky, robbed the soil of nutrients and involved heavy monetary investment. With agroecological methods, I am growing fifty-six types of long and short duration millets now. There is enough to eat, store and sell in the market as well."*

He grows oilseeds, pulses, paddy and vegetables as well. He also sells his produce in the local market. Last year he sold 80 kg of barnyard millet (sanwa), 70 kg of sorghum millet (jowar), root and tuber vegetables, green and black gram (moong and urad), horse gram (dark beans) etc. With different varieties of produce throughout the year, he is able to sell on a regular basis. He does not buy anything from the market except for salt. Mostly, he exchanges salt and seeds are exchanged without spending any cash.

Nauri clearly understands the perils of chemical farming and its effects on soil and

food. He concentrates on conservation and replenishing soil's balance for better productivity with natural methods. He actively promotes the practices that he follows. *"Most of these are local in nature and were lost due to cash crops and monoculture. They are not just economical but also help the soil. That means the soil will give back more quantity. I will keep working on my soil's quality to improve the quantity"*.

He hopes that others will follow agroecological practices for more and varied produce, nutritious food and environmental balance.

Protecting Crops with Natural and Bio-Inputs

Hariyancheri village | Chenekothapalli block | Anantapur district | Andhra Pradesh

Crop Safety and Growth: *bio-pesticides | microbial fertilizers | soil rejuvenation*

Sreenivasulu is a small farmer from India's second most drought prone district of Anantapur in Andhra Pradesh. He grows water-intensive paddy on the two-acre farm that he shares with his two brothers. He produces at least 30 bags (50 kg each) with every harvest. He was able to make this profit by switching to natural farming and ending the use of chemical fertilizers and pesticides from the market.

Each season a new variety of pest would attack Sreenivasulu's crop. In order to control and manage the spread of the disease, he would have to travel to the village market to buy chemical pesticides. Many times, the bought pesticides would not work and he would have to go back and buy new different ones. Pesticides were introduced with the promise of destroying or repelling pests but overtime they become ineffective in controlling pests. With time and use, pest species evolve and become resistant to particular varieties of pesticides and chemicals due

to their high birth rate. This kicks-off a cycle in which a more developed species of pests is born, and resisting them requires more and more different kinds of pesticides to stop the spread of diseases. Sreenivasulu realized that with every crop the inputs kept increasing in quantity and number. These pesticides did not help kill the pests and were upsetting the yield by a 30 percent produce loss. His family of seven had to make a choice : either sell the meager produce in the market or keep it for their consumption. Both methods did not help, either for next season's sowing or in any profitable returns.

With the help of other farmers who were practicing organic farming, he decided to try out natural ways of making pesticides. Small farmers started considering natural agricultural practices as a result of the increasing cost of chemical inputs. They did not have enough money to buy them. Sreenivasulu spent around Rs. 8,000 for each acre of his land and was not able to recover that investment due to crop loss. With yields decreasing every year, he noticed that the soil was degrading despite the use of expensive chemical pesticides and fertilizers. He had also heard of farmers consuming a cocktail of these chemicals to commit suicide and he got worried about the chemicals entering people's bodies through the food. He decided to practice chemical-free farming from then on.

Sreenivasulu started by preparing natural insecticides from locally available materials such as the local vaavi leaves (bitter in taste), cow urine and water. The leaves are boiled in water and later mixed with cow urine. After cooling, the extract is mixed with water to a 1:14 litre (mixture: water) proportion. This mixture is sprayed with the help of a small manual-pressure sprayer that runs on petrol. The same is done using neem leaves for stronger dosages. After using this, he has not felt the need to use any other chemical pesticide to fight pests. In order to stop using chemical fertilizers, he experimented with available resources again. He used a mixture of jaggery and leftover fish waste (excluding the fin) and stored them away from direct sunlight. After ten days of stirring and storage, he sprayed them with water. This has not only improved his crop's density but also helped in enhancing the soil's texture. These techniques were not previously practiced in their village but with the promising results, they are widely accepted and followed by other farmers. This has been very profitable for them as the raw materials used are either freely available or are waste products from their houses. This means they do not have to buy expensive chemicals, which saves them money by cutting the cultivation costs drastically-in Sreenivasulu's case, Rs. 16,000 per harvest.

This opened up other profitable options for him. He invested that money in installing a bore well that he could not previously afford. Now, he is not dependent on rainfall.

"Earlier I was dependent on the market supplies and rainfall. With natural methods, things have changed. I have water for harvesting my crop throughout the year. I produce about 30 bags of paddy (50 kg each) each time now. The produce has increased and is steady now as there are no losses due to bio-pesticides. We are able to store for our own consumption adequately and also sell," he says.

Assured irrigation has had a big impact on small farmers like Sreenivasulu. The rains have not come this year. His farm is the only green patch between the otherwise dry and water less fields, thanks to the well he could afford after he started using self-made natural pesticides. Water is now available for his farm throughout the dry season. This has led him to grow different crops and significantly increase his income. Now he also grows groundnuts, another commercial crop from the region.

Believe it or not : *Sreenivasulu and his neighbor planted paddy at the same time. The results can be seen clearly here.*

For Sreenivasulu and his family, everything has changed. With the increase in production they are able to store for their consumption and sell in the market as well. Now, he is also making farm manure by composting his household and cattle waste. He has marked out high-density areas of his crop production and stores seeds from there for the next cycle. He wants to be completely independent from the market from buying any kind of input for his farming, as this would ensure profit each time. He hopes that other farmers will learn from his experience and switch to agroecological practices as well, not just for healthier crops, but also for economic benefits.

Benefits of Multiple and Intercropping Practices

Sindhegetta village | Krishnarajapete block | Mandiya district | Karnataka

Crop Selection : *agro-biodiversity conservation | multiple cropping | bio-inputs*

S.J. Muddukumar of Sindhegetta village of Karnataka has been farming sugarcane for 25 years on his four-acre land. With several small sugar mills in and around his village, sugarcane is the most important cash crop of the area. He was able to produce only 20-25 tons of sugarcane and there was no profit from this cultivation. This was due to heavy competition in the market and high money investment for several inputs. Several times, he lost portions of his produce to pests and the soil quality was deteriorating with each harvest due to chemical inputs. His family of nine members was on the brink of migration and planned to sell their land. But he was not sure, as he knew only farming and had heard of stories that city living was harsh for migrants like him. Then, he learnt about agroecological farming which stresses the practice of multiple and intercropping. He also met and saw some farmers who were practicing agroecological methods in and around Mysore. Following them, he shifted to agroecological farming in 2005. Now his four-acre farm produces 40-50 tons of sugarcane along with other local vegetables. He is a regular seller to a store that only houses chemical-free products and local vegetables. This was only made possible by switching to multiple and intercropping methods that improved the soil's health and productivity.

Water-intensive sugarcane and paddy are the main cash crops of Muddukumar's village. Farmers have regularly used chemical fertilizers and pesticides regularly for each crop since the Green Revolution. Soil degradation has been a pressing issue along with steady decline in crop productivity over the years. Muddukumar was told that chemical fertilizers add nutrients to the soil, but the fertilizers displayed the opposite effect on his soil. It seemed devoid of any life. He noticed that the local paddy plant crab also vanished from his fields within a couple of years. With the inputs, limited water resources and intensive labor, he was producing far less

with each harvest. In addition, several small and marginal farmers like him faced challenges due to the glut of sugarcane in the area.

Muddukumar began to prepare herbal pesticides from local leaves for his production of single-hybrid sugarcane. For enhancing soil's texture, he prepared a microbial mix made of cow dung and urine, jaggery and pulses. All these were available on his farm as he started growing them for his family's subsistence. Also, he planted biodiesel plants like pongemia and other legumes for soil-nitrogen. He multi-cropped sugarcane with onions, chilies and local vegetables. Even during the drought year, only his main crop of sugarcane suffered and he received a moderate yield of other crops. He still had vegetables to eat due to intercropping local vegetables that required much less water. He found this cultivation practice to be more resilient to the changing environmental conditions. It provided an assured yield in both low and excess rainfall conditions.

He beams *" The same piece of land was producing more yield with no chemical inputs. I practiced multiple and poly cropping of seeds that required similar moisture content. It is always better to plant a taller crop with shorter ones for best results. It has assured me of a crop even when there is failure due to drought or any natural disasters. "*

He also points out the benefits of mulching (spreading a layer of green waste on the field) and worms on the farmland. Sugarcane fields are usually watered every four days but he does not follow this practice and yet his fields remain healthy because of the mulch. Remembering the drought year, he says, *"With mulching, less irrigation was needed as the vegetation cover prevents evaporation and retains moisture in the soil. It also keeps temperature down, which is suitable for the growth of soil microbes and worms."* He is also very happy that certain species that were disappearing from his farm and surrounding by areas are also finding their way back. This has aided in biodiversity conservation, as the presence of different species reflects richer soil and healthy natural surroundings.

Earlier he spent about Rs. 30,000 for pesticides and other chemical inputs to grow tomatoes. He made a marginal profit but was left wondering about healthy food. When he switched to agroecology, he made sure to use local seeds for better adaptation so that nothing external from the farm would be required to make the growth better. Local seeds and crops are able to survive and adapt to climate change. Intercropping and the natural methods led to soil replenishment more quickly than he imagined. He makes and uses natural herbicides to spray on his crops that are cheaper than market supplies. Now he produces a minimum of 50 tons of sugarcane annually with other vegetables for his family and selling in the market.

Earthworms present throughout the farmland

He adds, *"To get maximum results in farming, I used to rely on external inputs, whereas all inputs should come from within the farm. So-called wastes should be recycled and used as input. agroecological practices promote indigenous crop varieties, healthy food and help the soil to breathe. We try to talk to more people who want to switch from conventional practices and show them the results. In turn, it also strengthens the local economy and stops out migration as well."*

Ensuring Irrigation

Siriguda village | Gudari block | Rayagada district | Odisha

Irrigation Practices : *mulching | small canals | farm trenches | rainwater harvesting | groundwater recharge | farm ponds*

Sumani Jharia was not able to produce enough food for her family of ten. She received very limited produce through shifting cultivation on hilly slopes. Regular water supply was the biggest issue for her land. Her two-acre field produced only one crop a year with rainfall. In the dry years, that, too, was lost. Other farmers in her village faced similar challenges. They decided to turn the situation in their favor by collective work. All the families came together to make a small mud canal that linked a nearby stream to their fields. Now, a continuous long pit or mud canal runs through their field that has water throughout the year. The canal and other small pits collect rainwater that percolates down, resulting in rising groundwater levels. The stream allows perennial water supply through the mud canal.

Kashipura block in Rayagada, Odisha has witnessed distressful times including malnutrition, hunger deaths, unreliable water conditions and extreme poverty. This tribal belt has faced intense forests and land rights issues as well. These concerns are related to conservation and preservation, as issued by State authorities. Agriculture is a risky option, as most people are landless or hold very small *patta* lands. Nearly sixty-years old, Sumani Jharia belongs to the Jharia tribe, who practice shifting cultivation on hill slopes. She and her family work on the land to support themselves. There was a time when they were only growing ragi and chilies for their consumption. She could not grow anything else and had no income to buy anything else from the market. Jharia has changed her family's conditions by practicing agroecological methods for several years now. Today, she is an entrepreneur.

Siriguda village tackled each problem collectively to fight hunger through agroecological methods. First, they set up a small seed and grain collective in their village. Each family contributed to the seed bank. The rule was simple : borrowing families must return thrice the quantity of seeds. The rest of the supplies were made from the farm. Villagers dug a compost pit and filled it with cow dung and urine, *neem* leaves and food waste. They covered it with fertile

soil for about three months before it was ready for use. Another step was to practice multiple cropping for food security. Growing a single crop was risky and drained the soil of nutrients. Mixed cropping has helped the crops to grow better in just under a year. The bigger problem that she faced was that of water supply, an issue faced by her entire village. Earlier, they managed one season of produce with rainfall, but in the dry years that produce was also lost.


Jharia stands on the mud waterway on her farm

The village had a stream nearby, but there was no way to ferry this water to their fields. Villagers planned to build a mud canal to move the water. The young and old came together to dig the pit using their farm tools. In this way, water was channeled from the stream to their fields. Now, the pit also holds rainwater above the ground and recharges ground water as it seeps down. It stores water all year round and supplies water even when there is no rainfall. This ensured irrigation for Jharia's field throughout the year, and now she doesn't have to worry about water scarcity. She plans to make more trenches throughout her land so that more water can seep down and retain moisture.

She beams with satisfaction, *"I grow many vegetables and fruits on my farm now. We make our compost here and have good water supply. My grandchildren will not face hunger like us and have healthy food to eat. Now, I have enough to eat and sell."*


Added Income : *Jharia's mango saplings on her farm*

Jharia grows spinach, tomatoes, garlic, cauliflower, jackfruit, brinjal, papaya, beans, radish, banana, chilies and potatoes in addition to ragi and at least six varieties of mangoes. She sells brinjal, potatoes, tomatoes, tubers and yams regularly at the local market of Kashipura. In addition to this, last year she began storing and selling mango saplings. She has over 800 saplings of over six varieties and has already sold 3,000 this year. Her family now has food supply all year round. The village grain and seed bank has stored supply for over two years for the entire village of 44 households. They plan to use the stock during natural calamities like a drought or when crops fail due to unforeseen climatic conditions.

Jharia says, *"The supply is rotated with fresh grains after every two harvesting seasons. We are doing our best to save for ourselves from what we grow. If every village can do this, then we will never see hunger and deaths. We do not have to rely on others for our food. Agroecological practices have changed our lives, and if it has for us, then it will for others too."*

Improved and Effective Farming Techniques

Sohdih village | Harnaut block | Nalanda | Bihar

Farming Techniques : *vermicompost | local seeds | double row planting*

All photos by Dhananjay Kumar
District Agriculture Office, Nalanda

Rakesh Kumar inherited a three-acre farm from his father. Due to smaller land size and total reliance on rainfall, he could not grow wheat or paddy. He concentrated on growing all kinds of vegetables with chemical fertilizers and pesticides. He was able to produce 500 quintal of potato per hectare. Then he switched to agroecological methods in 2009. Today, he holds a world record for potato production, at 1088 quintal per hectare. He also holds a world record for onion output at 660 quintals per hectare. He credits this to a combination of local seeds, vermicomposting and improved farming techniques. He bought one more acre of land from the profits of his farming. Now he sells his home-producedseedsto other farmers and exports his own line of seeds (called Sri Bihar Sanskar) to Bangladesh.

Kumar's family has been farming for generations. His grandfather and later his father, taught him to farm and save seeds for the next cycle. While they bought and used chemical fertilizers and pesticides and heavily relied on rains for agriculture, Kumar has gone step ahead and changed that for himself.

In the past, he used chemicals like urea and DAP, diethane and fumigants to kill pests. Five years ago, he decided to cut down on chemicals so that soil's health was not compromised. In the first year, he made a vermicompost unit with earthworms, vegetable waste and cow dung. He used this vermicompost manure on half acre of land. When he received better quality results, he decided to switch to agroecological farming completely. Now, he has ten units of vermicompost. They are watered lightly everyday in the preparation period. He sprinkles his field with manure one day before sowing. It helps in making the soil porous and requires much less water. It works each time, strengthening the soil's nutrients, unlike chemicals that have to be used each time in more quantity. He says *"Now, my soil does not have any kind of chemical in*

them. I have seen the results myself. The soil is not lifeless like before. With less investment, I have no pests. This helps me in saving much more money."

Kumar also produces his own seeds, which has a huge effect on his production. He saves them from his produce so that they are local and are more resilient to the climate. They are dried and stored in a ventilated space, and can be used for up to one year. Now, he does not rely on anyone and can ensure good quality seeds for production. He does not have to spend money to buy seeds. Instead, he shares his seeds with others in and around his village, and created a line of home produced-onion seeds called *Sri Bihar Sanskar*, which he exports to Bangladesh.

Another interesting practice that Kumar followed while farming potatoes was that of double row planting. As the plants grow closely, natural mulch is created as leaves group together. This blocks sunlight, inhibiting weed growth. This more productive use of space is very crucial for small and marginal farmers, for it helps them increase production.

By following simple techniques that are extremely farmer friendly, Kumar has been able to increase production on his small farm. He has made profits and invested that money in buying another acre of land. He is growing potatoes, onions, ladyfingers, cauliflower, eggplant, spinach, pumpkins and several varieties of gourds and other vegetables. Each harvest results in increased production from earlier ones. He does not rely on the market for any kind of inputs at all and is saving more money by selling home produced seeds as well. Agroecological methods have shown that it is very easy to increase production and make profits in small farms.

He beams, *"Productivity has increased and cost of input has decreased. The vegetables are better in quality and quantity.The plants are disease free and this has helped in increasing the production at least one-and-half times over. Besides this, soil fertility has also improved and the produced food is healthy for human and animal consumption."*

Land Rights and Food Sovereignty

Collective Farming : *women farmers | land rights | food security | food sovereignty*

Fifty-five year old Shashikala, a mother of three, from Vellore is a landless dalit farmer. Her husband, also a farm laborer died five years ago. All her life, she has worked as a laborer on other people's land for as low as Rs.60 a day. All that money was spent on buying food, but still there was never enough to make ends meet or feed her family of five. Starvation was the only way. Then, she met Women's Collective, a nonprofit working out of Tamil Nadu. She attended their conferences and trainings. There, she learnt about collective farming through ecological methods. She now practices ecological farming on a shared piece of land. Things have changed since then. Last year her youngest child started going to school. Her one room house has ragi, pulses, beans and other millets stocked up to last at least six months. She doesn't have to buy food anymore. Through a government scheme, she has four goats and an ox as well. Leaving behind the days of starvation, she is happy that her children are eating nutritious food now. She likes to grow local millets instead of paddy or wheat, as they are more nutritious, use less resources and are much better for soil's health.

Shashikala and 11 other dalit women from her village work together and share a one-acre plot. Together, they decide whatever they want to grow and prepare bio-fertilizers as well. Some of the eleven women are widows like Shashikala, some were abused and abandoned by their husbands and some are single and live with their parents. Like the majority of women farmers in our country, none of them own any land. But all of them have enough to feed themselves and their families. They transitioned from being landless to food secure today, by working together in a group.

These women are a part of the Women's Collective of Tamil Nadu. They came together under a program where they looked for uncultivated land in and around their village and started farming, with a little startup fund through a self-help group. They approached landowners who

were not farming and government bodies to ask to lease any piece of unutilized land to them. Their objective of collective farming was not only to ensure food security but also to ensure local and chemical free healthy food through adaptation of agroecological farming. They decided to switch back to traditional crops that were more suitable according to their limited resources; they agreed to grow local food crops for themselves. They grew native millet varieties that are nutritious, drought resistant and much easier to grow than the more popular rice or wheat.

The Women's Collective works to empower women like Shashikala and make them aware of their rights. They seek to increase women's participation in local government systems, groom them as political actors and work towards multifunctional and sustainable agricultural practices for rights related to food security and sovereignty. With the knowledge of their rights, the women became aware of a particular state scheme that provides livestock to marginalized and small farmers. Now, most of them have four goats and an ox.

She says *"I am vey happy to have a piece of land where we work together for ourselves and decide what we want to grow. We are all proud to produce, eat and feed our families with poison-free food. If the food we grow is healthy, so will our children and us who eat it."*

The focus of Shashikala's collective farming group is primarily to meet subsistence needs and then to sell any surplus production in the market. One-third of the produce is given to the landowner in lieu of money for the land. Another third is kept away as seeds for the next cycle of sowing. And the rest is shared between the collective or other families in the village, if there is enough. The groups also maintain accounts and records for transparency of the process. Nothing is bought from the market and this makes them completely independent of any monetary investment, thus avoiding debts. This has also put a check on migration. When there is food security in the village, family members do not need to migrate to far off places.

Along this journey, there have been several challenges as well. Acquiring land for cultivation can sometimes be an uphill task. There is an acute shortage of land as vast lands are sold off to commercial realtors in the name of development, and this has heavily brought reduced the cultivation area. In Vellore, the tannery industry is guzzling up land and also creating groundwater pollution. Thus, farmers must look for fallow or wasteland to cultivate. Most of the time, the land that they work on is of very low quality. However, they have come up with different

bio-inputs for land preparation, crop enhancement and herbal insecticides and they continue to improvise with naturally available raw materials. The *jeevaamrutham* or traditional organic fertilizers are prepared from their livestock's dung and urine. Even pesticides are created from freely available *neem* or other bitter tasting leaves. These mixtures are applied without the use of any machinery. These collectives or farmer groups are heavily dependent on rainfall heavily. They grow traditional varieties of local crops that are more adaptive in nature. When the rains are delayed or scanty, the women try to improvise and go for different crops and vegetables that require much less water.

Another important issue that is that of recognizing women as farmers even though they are involved in every aspect of farming. It is essential to know that women play a major role in food production. Over 80 percent of women work in agriculture, from sowing to harvesting crops to collecting and caring for seeds to caring for livestock, collecting water and such chores. The role of men in agriculture tends to be limited to plowing, applying pesticides and the business side of farming such as marketing the produce. Although women form the backbone of agricultural production, they are not formally recognized as full-fledged farmers, rather as farm laborers or helpers. Without this formal recognition, women don't have access to credits, compensation and relief benefits offered by the government.

Today,60,000 women living in 15 districts in Tamil Nadu follow this model. These women, mostly *dalit*, are taking the lead in organizing themselves on issues surrounding women's rights and farmers. They understand that farming is not an isolated issue, and that they would have to raise their voices against land-grabbing and pollution along with issues of food security. They have been campaigning against industrial pollution by giving *dharnas*, talking about issues like the ill effects of pollution, toxins entering our food chain and water security at various public meetings and schools

Mary, a member from Vellore district group sums up, *" Working together in collectives can be very rewarding. We learnt so much from each other while farming. It has made us all aware of our rights and is mentally satisfying. Even thought I don't have my own land I still contribute towards feeding my family without asking for anything in return. That has changed everything for me and us."*

Women Power : *Farmers Group near Chennai*

Forest Produce and Food Security

Telengapodar village | Muniguda block | Rayagada district | Odisha

Food Security : *cultivation techniques | mixed cropping | traditional farming | food sovereignty | forest produce | climate change adaptation*

Kidko Kilaka is a small farmer from Ryagada, Odisha. She belongs to the primitive Kondha tribe which relies on forest produce and farming for survival. Kilaka is nearly 65 years old and has been farming since she was a child. Her family has 18 members who work on a two-acre land plot that she acquired through the patta system from the government. She has never used any fertilizers or chemical inputs on her crops, and swears by natural techniques that she learnt from her mother. Shifting cultivation is a prevalent practice in the area. She cultivates a variety of long and short duration millets, vegetables, paddy and spices. She collects as many as 33 varieties of mushrooms, yams, spinach, fruits and honey from the forest to eat and sell. She grows what she wants to eat, buying nothing and only exchanging honey for salt at the market. She is also well versed in understanding rainfall patterns and changing climate conditions. This helps her carefully select her crops for better productivity and avoiding crop failure.

The practice of shifting cultivation has raised questions from policymakers and has been banned in several parts of the country for various reasons. In this system, cultivators use plots of land temporarily. Small shrubs and plants are burnt while trees are left untouched. The land is abandoned after a period of three years so that it can revert to its natural vegetation and regeneration. A cultivator then moves to another plot for farming. People believe that a practice like this can damage forest covers. However, smaller land plots (one to two acres) are utilized to ensure conservation and maintaining ecological balance. Recently, new efforts have been made to promote the more responsible regeneration of forestland. Tribal groups like Kilaka's

are planting saplings on the utilized plots instead of merely abandoning them. This helps regenerate the forest land and also maintains an organized system of food supply.

Shifting Cultivation in Odisha

Seeds are stored after each harvest or borrowed from other families in exchange for other local seeds or grains. This process ensures that the seeds are local, more suitable and adaptive to the soil, and available in abundance. To keep a constant food supply throughout the year, Kilaka practices mixed cropping of paddy, several long and short duration millets, vegetables and spices. She grows as many as 18 varieties of millets on her land including finger millet, foxtail millet (long and short duration), ragi, pearl millet, sorghum etc. Along with these she grows maize, velvet beans, tomatoes, ladyfingers, black sesame, turmeric, sweet potato, yams, castor seeds, chilies and more. This results in increasing soil's fertility, as she carefully plants legume-fixing plants (like as beans) with a crop such as maize. As one crop takes nutrients from the soil, the legume crop replenishes those nutrients. This ensures that soil fertility is maintained throughout without heavy depletion. Kilaka uses several local plants that are used as insect repellants such as the locally grown sago palm. Its stem is cut out and planted in the field to keep insects from attacking the plants. This has helped tackle several different insects at the same time. There are several other pairings or companion plants that help control pests as well. For example, growing a ring of marigold around groundnuts checks pest attacks, on as the former releases a chemical (thiopene) that repels worms and insects.

Sago Palm leaf keeps pests and insects away

These practices help Kilaka ensure maximum produce with each harvest and a constant food supply for the whole year. In addition to what she grows, she also collects food from the forest. There are leafy vegetables (several varieties of spinach), fruits (several variety of mangoes), mushrooms,

yams, mohua leaves (used to make local alcohol), bamboo shoots, eggs (from wild chickens, peacocks and birds), honey (from bees and termites), fish, crabs etc. Although food produced by farming is sufficient for her family, she depends on the forest's produce as a cultural practice. She also sells the forests produce in the nearby market for cash or in exchange for salt.

By carefully selecting her crops, Kilaka is able to practice minimal irrigation. She watchfully chooses her crops in accordance with rainfall and temperature patterns before every sowing season. She has learnt several observation methods from her family that help in understanding the changing patters of rainfall. Her sowing time and techniques (making use of local millets that require less water and time to grow) are guided by timely or late rainfall. She experiments with the variety of crops to quantity of produce so as to ensure minimum loss in case of less rain, late or no rains.


Food Secure :
Kilkdo Kilake of Kondha tribe

Kilaka and other tribal farmers in close-by villages are food secure. So for, market institutions and corporate agriculture have not been able to influence their survival for now. This has enabled them to follow their traditional farming methods and they are able to produce, consume and save for the next cycle. By using local seeds that are more adaptive, Kilaka is able to produce not just several varieties of nutritious food but also raise its quantity without the use of any chemical inputs, advanced irrigation techniques or high yield seeds.

Rooting for Multiple Cropping

Sarpataha village | Sant Kabir Nagar district | Uttar Pradesh

Marginal farmer : *women farmer | multiple cropping | food sovereignty | food security*

Photo by : Ashok Dutta / Hindustan Times Photo

Ramrati Devi is a small farmer from Gorakhpur, Uttar Pradesh. Her husband was a farmer too, but he abandoned farming as debts kept increasing. Most of their money was used to buy chemical inputs for farming. However, poor yield led to more losses with each harvest. That was when Ramrati decided to start farming on their one-acre land. She became a member of Laghu Seemant Krishak Morcha or Small and Marginal Farmers Front, Uttar Pradesh. There, she learnt about agroecological practices. With organic farming techniques she has changed things around for her family today. Simple practices like multiple cropping has led to growing as many as 32 different varieties of crops that include wheat, mustard, sugarcane, garlic, coriander, spinach and potatoes for her family's daily consumption. Her twelve-member family depends on the farm's for food.

56 years old Ramrati Devi started agroecological farming in 2012. When her husband left farming, she was determined to change her family's fortune using her once-acre land. She was able to achieve that by learning agroecological techniques from *Laghu Seemant Krishak Morcha*, a farmer's organization based out of eastern Uttar Pradesh.

Ramrati's first step was to stop using chemical inputs for farming. Composts and farm manure was an easy step as it was made with farm waste on her land. Another issue was that of mono cropping. She started with multiple cropping to increase the production. This worked very well for her land and herself. She saw the results in one year. In addition to wheat and maize, she grows several vegetables now on rotatory basis. She grows tomatoes, brinjal, chilies, potatoes, cauliflower, mustard, bitter gourd, garlic, carrots, coriander, spinach, sugarcane and other vegetables. This has facilitated in providing food for her family's daily need. She recalls a time, *"There were times when we had nothing to eat because we could not buy anything from the markets. We had no money as the yields kept decreasing. Then, I decided to plant several vegetables. We do not have to depend on the market now. Even if there is no money, we have food for ourselves."*

Another advantage of multiple cropping has been the increase in production of her primary

crops, maize and wheat. Ramrati harvested about five to six quintal each of wheat and as much maize from her land. That is much more than what her husband ever managed. She noticed that the soil has become more fertile and nutritious. She was able to buy livestock through this money. In order to continue to keep the soil high in nutrients, she also made manure our of cow dung and cow urine in addition to compost from waste material of the farm. Earlier, she bought organic manure from the market as well, but decided to use the one made by her as the former was not as good. For natural insecticides, she prepares a mixture of bitter leaves and water to spray after every 10 days. She has also started saving her own seeds for the next round of sowing. In rare cases, she exchanges seeds with her neighbors but avoids the market, as she does not rely on its seed quality and finds them expensive and lower in quality. She stores her own seeds for a year and uses the vegetable seeds for sowing on a rotatory basis throughout the year.

Her family members help her on the farm with manure, sowing, weeding, harvesting and selling crops. She is very happy that she does not have to take any loans, for farming and has been able to cut costs for her farm. Everything is prepared from the farm produce and saved for the next cycle. This makes the whole practice sustainable, for the farmer and for the environment.

She says *" I am able to earn at least thirty to fifty thousand from each harvest of wheat and maize. After taking care of our own consumption, there is plenty left. So, we started selling vegetables in the market as well. They are sold regularly in a gap of every few days, so there is more profit. I have been able to pay off a loan, got my son married and also started using boring engine for taking water from river for crops. Agroecological methods are sustainable and cheaper for farmers like us. It is very profitable indeed. "*

Utilizing Freely Available Farm Supplies

Sonale village | Jalagaon district | Maharashtra

Making Profit : *cash crop and subsistence farming | mixed cropping | biomass-composting | natural pest control*

Bhimrao Patil and his wife Sushma are small farmers from Jalgaon, Maharashtra. They started farming in 2001 on his two acre plot. Initially, Patil used chemical inputs for his main crop of cotton on his farm. Even though production of cotton was satisfactory, he realized that he was not making any profits, as he had to make heavy investments for the inputs. He shifted to agroecological practices soon. His investments have gone down and last year he earned about one and half lakh from his farm produce.

Bhimrao Patil started farming in 2001. His village, in the district of Jalgaon in Maharshtra, is rich in volcanic soil that is very well suited for cotton farming. Like other farmer, Patil started with cotton farming with heavy chemical inputs to get a good yield. He realized that even though the yield was all right in the beginning, he was not making any big profits. Buying seeds, several fertilizers and pesticides resulted in heavy input costs, lowering his profits by huge margins. That was when he decided to shift to agroecological methods of agriculture. He met several other farmers and read books on agroecological farming methods. His farmland, a little over two acres, produces up to 25 crops in a year, including hybrid cotton, wheat, onions, jowar, urad, moong, arhar and green vegetables. His investments have gone down by 75 percent and that has directly helped in raising his profits.

Patil makes optimal use of his farmland in optimal ways. On one and half acre, he grows the primary crop of hybrid cotton. On another half-acre, he grows the seasonal *rabi* and *kharif* crops. The rest is used for experiments. He grows different crops to understand the suitability and growth of the plant to carry it out in the coming years. There are several ways that he follows in order to ensure that the soil benefits and the productivity goes up. He stresses that mixed cropping is the easiest and best method to ensure both. It also secures food for his family's consumption, directly from the farm. In addition, in case of crop failure due to climate change, there is assured production of at least a few crops.

Patil also believes that biomass is one of the most important components of farming, and he uses farm waste in every way. Dry leaves, twigs and other plant wastes are used for biomass production. He spreads them throughout and on the edges of his field. He sprays jeevamrutam on these so that composts can be made throughout his field. This helps in enriching the soil with nutrients as it is renewable and has no harmful emissions. Biomass is an efficient way of cutting out dependency on other fossil fuels. Patil also shares a well with his brothers near his

farmland. Due to shortage of water he only gets to water his field for 10-15 minutes each day. To keep his plants irrigated, he follows intercropping and mulching. He has also grown different types of trees on the edges of his farmland. This helps keep moisture in soil, lowers temperatures for the plants, and attract birds that keep pests naturally at bay.

In the early years, Patil bought seeds and organic inputs available in the market. However, he decided to change that by saving seeds and making manure by himself. The importance of sowing the right seeds is also very crucial for him. For his primary crop of cotton, he does not use BT cotton. He has been looking for seeds that are of good quality and are of local variety. For other vegetables and crops, he saves his own seeds now. This helps in saving money and also ensures that he has the best seeds for the next sowing season. Since he does not have any livestock, he borrows cow dung and cow urine from other farmers to prepare *jeevamrutham*. In two-three years his production was more than before. He says, *" Since then, it has only increased every year. One year back, I stopped applying jeevamruthan. I still got good results. This means that my land has become very good and fertile. When you do it every year, you see that the soil gets better, so production increases. I am confident that production will only increase in the future and not decrease."*

Patil's farming practices are a very good example of agroecological methods that enhance farm produce and also bring big monetary returns for small farms. He has made big leaps in increasing his income from his farm produce. *"For cotton, my land is producing 15-20 quintal per acre. This is directly sold in the market in Jalgaon. After family needs are taken care of, we sell the rest of the crops and vegetables too. This means additional income for us. I earned one lakh and fifty-three thousand with my last harvest. This was after wheat failed and some cottonseeds did not flower in some areas. I had a good year and made profit: only because I did not spend any money. I am very happy with agroecological practices for farming, "* he beams with satisfaction.

Chemical Free Farming for Better Prices

Darveshpura village | Katri Sarai block | Nalanda district | Bihar

Selective farming : *vermicomposting | chemical free | land preparation | soil health*

Vermicompost units

Awdhesh Singh owns a very small piece of land. He works on 12 dismils (0.12 acre). In order to reap maximum benefits from his land, he selects his crops wisely. Through mixed cropping and practices such as vermincomposting, he has made very good profits with his last harvests. He plans to buy more land for farming very soon. Arun Singh works on his 28 dismils (0.28 acre) farmland to support his family of four. He is a big fan of naturally produced manures and composts. His income has doubles with the use of agroecological practice. He plans to never go back to chemical inputs.

These two small farmers are producing very good yields from their small farmland and making profits for the last three years.

Awdhesh Singh was growing paddy on his small land. Like several other farmers in his village he bought chemical enhancers to improve his yield. As a small farmer, he spent all his money on inputs form the market and irrigation facilities. He struggled to make any kind of profitable returns, as he had to buy several pesticides and insecticides. He switched to agroecological farming methods in 2011 and stopped buying any chemical enhancer. He started growing chilies as his main crop and intercropped it with turmeric. He also worked on improving his soil's nutrition. His neighbor, Arun Singh, also a small farmer switched to chemical- free farming at the same time. Since they both had small land holdings, they worked collectively to improve their land's fertility.

Vermicomposting was their biggest ally in this process. It took them a month to build and produce vermicompost and manure with the help of worms (bought from a neighbor's vermin compost set up), vegetable and farm waste. This was left in the field before sowing for three days. Another natural fertilizer was made from cow dung, cow urine and ash from traditional chulha or earthen stove. This is spread on the field after 8 days of sowing. It helps in enhancing

natural growth. Awdhesh Singh harvests a minimum of 1-quintal chilies from his small field. He sold them for Rs. 2500 each time (growth time spans about 5 months). In addition, his turmeric yield has also given him very good returns. He sells them for Rs. 1500 a quintal each time (growth time spans 8-9 months). Awdhesh is very excited about with the results and plans to buy more land with these profits. He wants to grow vegetables and paddy so that he does not have to purchase any food item from the market. He says, " Once, I buy a little more land, I plan to grow local variety of paddy and mix them with vegetable farming. I need to only concentrate on increasing soil's fertility through vermicomposting. It has worked for chilies and turmeric; it will work even better for vegetables. Chemical-free products fetch far better prices and have no costly inputs. I should have switched to agroecology earlier. "

Green Chilies : *Awdesh Singh on his farm*

Local Manure : *Arun Singh stands next to locally made manure from ash*

Arun Singh grew potatoes and left his field fallow for nutrients to come back. Then he moved to intercropping potatoes with vegetable such as spinach, turmeric, ladyfingers, onions, tubers, sweet potatoe, gourds and brinjal. His crop yield went up after using vermincompost and manure mixture. He sold more than 600 kilograms of potatoes for Rs. 40 per kilogram. He also sells vegetables steadily in the market. He earned more than Rs. 60, 000 from his harvests every 4-6 months. He has steady returns from his farming now as he does not need to leave his field fallow and wait for nutrients to return. The mixed cropping practice took care of that. *"Agroecological methods are chemical free, so there is no investment and only profit. Plus, the soil has become so much better. My crops are healthy, bigger and nutritious. Surprisingly, they require much less water also. In front of others, my vegetables win the price battle. They bring back the best price from the market."* he beams proudly.

Awdhesh and Arun Singh have multiplied their incomes while working on the same land, by increasing their farm yield in a span of three years. They plan to learn more agroecological practices from other farmers and are very vocal in helping out other small farmers in the area. They both want more farmers to adopt these practices, as they are not just simple but also very good for the soil's health, which in turn has a positive impact on any farmer's profit.

Profits from a Drought Year

Hariyancheri village | Chenekothapalli block | Anantapur district | Andhra Pradesh

No Irrigation : food sovereignty | millet farming | no or low irrigation | fodder

Anantapur in Andhra Pradesh is infamous for groundnut mono cropping. With scanty rainfall and high input expenditures, the farmers face grave danger of debts. This has led to very high suicide rates. However, this was not always the case. Before farmers grew sturdy drought resistant crops with rotatory crop patterns that helped in the growth of agro- biodiversity us the region. That also led to making land nutritious for next cycles. Nagalaxmi B Krishnappa of Hariyancheri village in Anantapur decided to go back to follow those practices. He noticed that the soil was turning coarse in texture with high erodability and low organic content. After several losses of groundnut cultivation, mostly due to scantly rainfall, he turned to agroecology. He has made a heavy profit of Rs. 25,000 this year, even though it has not rained at all.

Krishnappa bought 6 kg millet seeds for Rs. 60/- for his one and half acre farm. He had heard that millet farming requires less water and take lesser time to grow. He also bought some compost and sheep manure from other farmers. He owns a goat and knew that more dung would be required to make natural fertilizer for his land. Before sowing, he applied this manure to the soil for 15 days. Then he sowed the seeds, hoping for at least 1-quintal production. He did not water his crop, relying only on morning dew. In addition, he also decided not to pluck out any weeds and grass. At the end of 3 months, he harvested 3 quintals from his land. He is overjoyed with the results. According to the market price, he would be selling this for at least Rs. 12000. He plans to continue millet farming for some more harvests so that he can buy more land with his earnings. He says, *"The elders in our village used to cultivate millet, but we moved to groundnuts. I knew that the production would be good. But, this is like a bumper harvest. Our soil is suited for millets and not paddy. Groundnuts may be the most popular crop as it brings money, but it is also very risky, as it requires more inputs because of pest attacks. My millet needed minimum attention and no water at all."*

He plans to learn more about agroecological method to increase production and raise his earnings. He hopes to stop using chemicals completely and replace them with naturally available raw material, reducing expenses. This would aid in lowering investments and expenses will drop. He plans to concentrate on making the soil healthier by using different organic fertilizers and pesticides. He hopes to pay off his debts very soon.

In addition to the millet, he also harvested more than three quintals of grass from his land. This is commonly used as fodder for livestock. He plans to trade this fodder for cow dung to make more manure. He will sell the rest to other farmers according to the market price, will earn around Rs. 15,000. *" This drought year has taught me lessons in farming. I had no idea that I could make so much money without any rainfall. Agroecological methods are very useful for small farmers like me",* he says.

Connecting with Markets

Mysore | Karnataka

Markets : *chemical-free products | small entrepreneurs | collectives and support groups | farmer organizations | consumer awareness*

Nisarga : *Fresh and processed products*

One of the biggest challenges for small and marginal farmers is how to steadily sell their farm produce. Storage, fair- pricing and marketing of agricultural commodities are as important for profits as the process of production. In the absence of amenities such as roads, vehicles, storage facilities, kisan mandis, cooperatives and price regulations, farmers fall prey to middlemen and local moneylenders. Several commodity markets function under the mechanism of supply and demand and while the government fixes support price or statutory price for some crops (mainly for paddy and wheat), other are not regulated. Farmers are left in a compromising state, lacking

necessary infrastructure and vulnerable to malpractices. In addition, most market policies do not give importance to traditional crops such as millets and indigenous varieties of paddy. Farmers are left with no choice but to produce limited varieties for the market. This has led to loss of traditional crops and is affecting the agro-biodiversity. Small initiatives have sprung up across the country to help connect farmers with consumers. These initiatives are also shaping up as movements. By encouraging agroecological practices, farmers can produce quality products that are healthy and pass on traditional knowledge (which has evidence of being climate adaptive) to the next generation. Also, the greatly reduced investment costs help the farmers to remain free from financial risks.

Small farmers in Mysore and nearby districts were facing similar challenges with regard to processing, storing, acquiring gunny bags, and transportation fees. These farmers followed agroecological models to produce chemical free products such as local paddy varities, millets, maize, pulses, coconuts, sugarcane, vegetables, fruits and spices. Sidharaju, a farmer himself, faced the challenge of selling his produce regularly to manage good returns. He and some others farmers from nearby areas were involved in learning agroecological methods. They decided to jointly build a network to sell their produce without involving any middlemen.

They faced an up hill battle. Being small farmers, they had no experience in this area. They rented a shop to store and sell their products registered the Natural Food Produce Trust. Their aim was to invest the all the returns and profits back into managing and building the shop. Trustees and other members who wanted to support the venture shared its invested capital. In its initial years, they were unable to pay the shop's rent. Eventually, they moved to a neighborhood where the rent was lower. Their footfalls increased gradually with word of mouth. The most beneficial factor was the presence of chemical-free products. Besides moving away from the net of middlemen, they also wanted to make consumers aware of naturally produced food products. Since its humble beginnings around eight years ago, *Nisarga*, which means natural, has managed to do both. Around 150 farmers both nearby and from far, now

Sidharaju at Nisarga

send their chemical-free products directly to *Nisarga*. Many farmers are added to the shop's list every month.

To achieve an efficient system of buying and selling, they tried various arrangements - picking up produce sent by trains, farmers individually dropping off their vegetables individually, and even paying for local transport for some marginal farmers. Now, Sidharaju also processes some products besides packing and labeling some. Some products are from other producers, like the non-profit organization Timbaktu Collective from Andhra Pradesh and zero-budget farmers from Karnataka and Gujarat. There is only one basic principal to selling through *Nisarga* – products must be natural and chemical- free and from farmers that do not have any corporate backing. No certification is required for this as Sidharaju visits farmers to check their farming techniques over a period of time. He also motivates other farmers to convert to and practice agroecological farming and join *Nisarga*. Now, he wants to build a sustainable and regular supply of vegetables and fruits, as they are the most popular and sell out everyday.

"Finding the right market and better prices for the produce is a big challenge for small farmers", says Gowda, a farmer who sells his produce through *Nisarga*. Like other farmers he was also struggling to get better prices instead of loan waivers from the government and market. He met Sidharaju in Mysore, through a network of other farmers who were practicing natural farming methods. By strengthening such market-related services, positive impact on small farmer's productivity can be assured and made sustainable. *" These shops that buy directly from farmers like us are few in numbers and very hard to find. There are about one hundred fifty farmers who send their produce to Nisarga throughout the year. We are also trying to help in opening more branches of Nisarga in and around Mysore so that more people, both farmers and consumers can benefit"*, he says.

Agro-Biodiversity Conservation and Knowledge Sharing

Karnataka

Markets : *food sovereignty | reviving traditional knowledge | knowledge exchange | indigenous crops | fair trade, people's movement | no market policy for agroecological products*

Photos by :
Sahaja Samrudha

There has been a modest yet steady growth in the number of agroecological farmers. Like other farmers whose livelihoods are marred by trade policies, these farmers face an even more challenging situation in order to sell their produce in the market. In the absence of exclusive or dedicated markets for selling agroecological produce, most products end up in common market, thereby defeating the whole purpose. Even the few outlets that are running in cities, are very expensive and out of the reach of commoners. The high prices of these products widen the gap between buyers, sellers and producers. Sahaja Samrudha Organic Producer Company Ltd. was set up in 2010 to address this issue and others affectingchemical-free farming and markets, like eliminating middlemen and initiating a common price system. In 2006, the *Jaivik Krishi Society (JKS)* was established as a federation of organic farmers and farmers' groups to promote fair trade in organic farming. Sahaja's shareholders are agroecological farmers and food processors. A dedicated network of producers (farmers), organic outlets and consumers was formed for a smooth supply chain. However, *Sahaja* aims to do more than just sellproduce. Besides creating a chain of producers and consumers, it offers capacity building for farmers, increases incomes through on-farm processing, and works on expanding product market

through consumer awareness and publicity.

Traditional knowledge plays a fundamental role in meeting the food, agriculture and health needs of millions of people, and it is central to indigenous peoples' cultural identies and spiritual belief systems. *Sahaja's* research with such communities aims to improve understanding of customary laws and practices for protection of traditional knowledge and natural resources by working with the communities. They promote farmers who look to conserve traditional and local varieties and agroecologically cultivate them. The farmers working with *Sahaja* save local seeds to revitalize traditional knowledge so that future generations can benefit from this practice and be independent from outside sources (such as markets). Farmers meet at forums and workshops to exchange knowledge and seeds. Different practices of multiple cropping, mixed spices cropping and other methods to improve soil fertility and suppress pests and diseases are discussed to increase farm productivity. Farmers also discuss specific lessons in terms of adaptive management, soil health, soil biodiversity and ecological functions. There is direct focus on methods that reduce cost of cultivation but also increase grain yield. Their vision is to restore biodiversity, ensure sustainability and thereby empower the farmer so that he can benefit as much as the environment. Hoysala S Appajji of Holenarasipura says, *" I am practicing zero tilling method for Rajmundi rice. Once the seed is sown, I come back only to harvest it. My cultivation cost is nothing except for minimal work of harvesting. The rice also tastes better. "*


Photo by : Sahaja Samrudha

Sahaja Samrudha helps farmers to exhibit and sell their produce at good prices. The produce is procured directly from the farmers and supplied to the network outlets, so that it reaches the consumer directly. The range of products is fast growing – 20 different varieties of rice, wheat, millets, pulses, fruits and vegetables, baby foods, processed foods like – *pappads*, health drinks, multi grain flour, value-added products and ready to eat foods. Only traditional and agroecologically produced rice, millets and pulses are promoted. These crops are in great demand in urban areas for their nutritional and medicinal value, especially several traditional types of millets, black and red rice. *Sahaja* is working with 786 producers from different parts of south India and there are over 1,000 farmers who are converting from chemical to agroecological farming. Sahaja supplies their organic products to 16 outlets on a regular basis in major cities around South India and is slowly growing by adding more outlets that only sell agroecologically produced supplies.

Part of the success of this bio-enterprise relates to the civil society partnership it creates: farmer groups, women's groups and consumer groups work together in a like-minded manner to revive the dying farming culture and community in South India. Pricing policies, group certification of products, packaging (with minimal use of plastic bags) and such practices are participatory in nature. This enables planning and feedback to be utilized in a more effective manner that is in tune with on the ground realities, so that the results are better and more inclusive each time.

Initiatives like *Sahaja* and *Nisarga* are mere beginnings. There is a need for several more platforms like these to increase awareness amongst consumers and farmers to enable healthy eating, fair pricing and celebration of biodiversity. This will convince more farmers to transition to agroecological farming in order to build livelihood resilience and adapt better to climate change.

Why Is Agroecology Good For Everyone?

With an emphasis on **sustaining the environment and social inclusion** through participatory frameworks, agroecological models have produced impressive economic results in terms of yields, productivity, nutrition and efficiency.[3] Agroecologyalso makes a significant contribution to food security and sovereignty. Agroecology models are redefining the relationship between farmers, agriculture and nature, where instead of machines, farmers and their families work together happily; instead of costly external inputs, they use farm-based inputs such as bio-pesticides and bio-fertilizers. Monoculture is replaced by biodiversity, and women farmers have an equal status with men in activities of seeding, weeding, threshing, harvesting and selling produce.

When farmers employ practices such as intercropping, crop rotation and double or wide cropping methods, the yield increases several fold. With the use of legumes and other nitrogen-fixing plants, nutrients are not robbed from the soil, but rather, they are replaced, ensuring better health of the soil. Also, with farm-produced manures and vermicomposts, chemical inputs are not utilized. This leads directly tochemical-free and healthy food. All these practices cut down the inputs that are bought from the market (seeds, fertilizers, weedicides, pesticides), thus ending farmers' dependency on credit and loans. This can also help prevent farmer suicides in a big way.

Agroecologically managed farms are rich in biodiversity. Their diversity of crops, well utilized landscaping, use of livestock and forest produce builds environmental resilience into the farm system. This is essential for confronting extreme weather events resulting from global warming such as droughts, floods, heat and cold waves – all of which can hurt crop production. Unlike genetically engineered crops (GMOs) that attempt to build resilience into the genomes of specific plants, agroecology strengthens the resilience of the entire agro-ecosystem. It has the means of solving the crisis of food, fuel, finance and climate change.[4]

Agroecology is becoming a dominant agricultural paradigm for small-scale,resource-poor farmers around the world. Farmers are adopting this technique not only for their sustenance, but also to resist the corporate agriculturemodel pushed through the green revolution and"gene revolution." In this age of ever-increasing production costs, indebtedness and large-scale suicides, farmers have to make a choice for change their agricultural practices towards a holistic and ecological model. The diversity of agroecological models being

[3] McKay, B., *(A Socially Inclusive Pathway to Food Security, Centre for Inclusive Growth, 2012)* http://www.fao.org/fileadmin/templates/agphome/scpi/Agroecology/Agroecology-IPCPolicyResearchBrief23.pdf

[4] Ho, M-W and Ching, L.L., (edited and drafted), *The Case for a GM Free Sustainable World*, ISS and TWN, 2003

practiced in India offer them this option in the form of Natural Farming, Zero Budget Natural Farming, Chemical-Free Farming, Permaculture, Organic Farming and *Rishi Kheti*. However, agroecology-based organic farming is different from the neoliberal organic farming model being promoted by the same corporations that thrived on green revolution technologies, making farmers dependent on non-sustainable and costly external inputs.[5]

We don't need to produce more food to end world hunger. We need to create an equitable food system for the people who actually produce the world's food. Smallholders need more access to water, basic infrastructure, education and health services - not GMOs, large-scale agriculture or global markets. They need more agroecology to produce nutritious food.

[5] Agroecology and Climate, Nyelini Newsletter, 2014 http://www.nyeleni.org/DOWNLOADS/newsletters/Nyeleni_Newsletter_Num_20_EN.pdf

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Focus on the Global South

Focus on the Global South is a policy research organisation based in Asia (Thailand, Philippines and India). Focus provides support to social movements and communities in India and the Global South by providing research and analysis on the political economy of globalisation and on the key institutions underlying this process. Focus' goals are the dismantling of oppressive economic and political structures and institutions, the creation of liberating structures and institutions, demilitarization, and the promotion of peace.

Rosa Luxemburg Stiftung (RLS)

The Rosa Luxemburg Stiftung (RLS) is a Germany-based foundation working in South Asia as in other parts of the world on the subjects of critical social analysis and civic education. It promotes a sovereign, socialist, secular and democratic social order, and aims to present alternative approaches to society and decision-makers. Research organisations, groups for self-emancipation and social activists are supported in their initiatives to develop models which have the potential to deliver greater social and economic justice.