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Organic agriculture, environment and food security

made many mistakes initially as any learner is bound to do, having no access to any information on the subject. But now he is confident that in the span of a single year he can take on any piece of land and "turn it organic" without any loss of productivity. His system has a great potential for diffusion to other financially poor, but natural resource-rich farmers. By observing his fields intensely and reflecting on the natural cycles and processes, Shoor Vir has turned into a philosopher. He entertains the visitors to his farm with deep insights into the sources of being, the inter-connectedness of all living things and the aim and purpose of life.

He is confident that in the span of a single year he can take on any piece of land and "turn it organic" without any loss of productivity.

CASE STUDY 3

Land development and revival of traditional agriculture with tribal communities in the Nilgiris, Tamil Nadu, India

Overview

Location

The project is located in South India, in the north-western part of Tamil Nadu, not far from the city of Ooty, the Nilgiris District's capital, on the border of the States of Kerala and Karnataka. The villages covered under the project are part of the Kotagiri and Coonoor Talukas[1]. Land holdings are very close to the forested areas at middle elevations of 800-1 000 meters. The entire Nilgiris range rises up to a maximum of 2 600 m. The area is in the humid/semi humid tropics.

Environment

The Nilgiris is one of the most ecologically fragile areas in India. The hills are steep. Traditional forests have been depleted and are under further threat, because of the increase in large tea plantations and substantial destruction of natural vegetation, through introduction of exotic commercial tree plantations. Consequently, soil erosion is rampant. Tea and coffee plantations have replaced large parts of the original vegetation and marshes have been converted into agricultural fields. Fifty percent (30 000 ha) of the cultivated area consists of tea plantations. Conventional tea plantations make heavy use of chemical fertilizers and pesticides and reduce the water retention capacity of the soil. The remaining forests are crucial for conservation of the flora and fauna and the sustenance of water bodies, consisting of the two major rivers Bhavani and Moyar and their numerous tributaries. They irrigate large areas and generate hydropower.

1 Talukas are administrative subdivisions of a district.

Land clearing in Nilgiris

The area is part of the Nilgiris Biosphere Reserve, as declared under the Man and Biosphere Programme of UNESCO. During the nineteenth and twentieth centuries, deforestation was carried out though the illegal and select cutting of valuable species. Vast areas of grassland belonging to the indigenous pastoral communities were taken over by the Forest Department and replaced with plantations of wattle, eucalyptus and cinchona. The negative effects of slash-and-burn practices, overgrazing, fire and the development of large plantations in the lower areas have been considerable.

However there are still good tracts of the original Nilgiris forest vegetation. Here, people live in harmony with the forest and collect non-timber forest produce (NTFP) like wild nutmeg, cinnamon, sugar cane, pepper, honey and herbal plants. These deciduous forests and thorny thickets are found at elevations between 800 and 1 200 m. Rosewood is the dominant species in the wet areas, teak and sandalwood in the drier zones. But, the biodiversity of the forests is much greater: *Erythrina, Dendrocalamus, Cedrella toona, Terminalia, Anogiessus latifolia, Pterocarpus marsupium* grow in the wet zones and *Zizyphus* and *Vitis* and many grass varieties and herbs in the drier areas. The area is rich in fauna, too. Elephants, bison, spotted and barking deer, bears, leopards and numerous smaller animals have their habitat in the area.

The history of change from traditional cropping to the newer commercial cash crops of tea, coffee and vegetables is interesting. In 1818, when the British entered the District, they found a "primitive population" practising slash-and-burn agriculture. In the 1820s, the British first introduced vegetables. The Badagas, in the plateau area of the Nilgiris took to the cultivation of beans, cauliflower, cabbage and carrots on a large scale. In 1897, 1 600 ha of tea was planted which by 1949 has increased to 8 900 ha. Today, tea occupies 50 percent of Nilgiris' total cropped area, significantly changing land use, destroying grasslands and marshes and replacing a mixed cultivation with the monocrop cash crop.

Coffee was also introduced to the slopes of the hills in 1838 and the zone where the hunters/gatherers lived. The Kurumbas, Irulas and Jenu Kurumbas were soon introduced to this crop, which spread within the forested lower zones. The main coffee plantations were in the Gudalur-Wynaad region but also on the slopes of Coonoor and Kotagiri Talukas. Coffee soon became an integral part of the homesteads of tribals and a popular beverage amongst them. Today, however, coffee is facing a threat from the more lucrative and hardy crop, tea.

The people

The Nilgiris District is one of the 26 districts in Tamil Nadu and is the least densely populated, with a population size of less than 1 million out of a total population of Tamil Nadu of over 60 million.

In 1991, the tribal population occupying the hills amounted to 25 000 (census of India, 1991), but may have gone up slightly since. The main hunting and gathering communities consist of: Alu Kurumbas (5 000); Irulas (6 000), Jenu Kurumbas (1 000), Betta Kurumbas (3 000) and Kasavas (1 000). They are Dravidian speaking and belong to the autochthonous Indian population. They are predominantly forest dwellers but have been gradually involved in agriculture as small cultivators. They use shifting cultivation and slash-and-burn techniques. Primarily it is a subsistence economy with some daily wage labour on the plantations. A study done by Keystone[2] in 1997 among the tribal hamlets revealed that 39 percent

[2] Keystone Foundation is an NGO in Tamil Nadu, India.

are landless, 14 percent have less than 0.4 ha, 35 percent between 0.4 and 0.8 ha and 12 percent between 0.8 and 1.2 ha.

With the increase of tea plantations, all communities lost their usufruct rights. Life for tribal people is on the edge, many depend for survival on daily wages earned from the plantations. Interestingly, the number of women as regular workers is much higher than the number of men. The maximum weekly income, including non-timber forest products, is Rs. 200-250 per week (US$4-5). However the type of work depends on the remuneration available and the season of the year. NTFP collection starts in January/February and ends with the honey harvest in May-June. Between July and November, people in the upper plateau have no option but to seek wage labour. In other zones, where it is difficult to get work, people supplement their meagre meals with forest roots. Still, survival is difficult, with little or no reserves. In times of illness, at festivals or funerals, they depend on moneylenders who provide loans at exorbitant rates of interest, up to 120 percent per year.

In conclusion, there are two main problems: a highly fragile environment and a marginalized community of tribals.

With the increase of tea plantations, all communities lost their usufruct rights.

Village nursery

It has been Keystone's conviction that environment and people are interrelated and improvement of the environment is impossible without strong involvement of the communities. Keystone mentions as its mission: "A conscious goal to enhance the quality of life and the environment. It means: breaking new paths that are innovative, yet relevant and dealing with diverse problems and issues in an integrated manner".

The agro-ecosystem

The pre-project

In 1995, Keystone started to work with the Irulas and Kurumbas tribal communities on apiculture. The main objective was to improve their techniques of honey-gathering and processing. It was at this time that the idea to develop alternatives for growing tea-plantations emerged. The reasons were the following:

- tea plantations, with the exception of the organic ones, make heavy use of chemical fertilizers and pesticides;
- tea is a monocrop, endangering especially the lower slopes of the Nilgiris;
- water retention capacity is reduced and vast tracts of primary forested land are destroyed for tea cultivation, further reducing food security for the tribals;
- moreover, the need for fuel-wood, which is commonly used to process tea, increases.

Some of these aspects are also true for coffee, except that it is not a monoculture and in fact is grown with a variety of shade trees: jack, silk cotton, pepper, orange, guava and a number of forest trees. The water retention capacity is therefore much better.

Traditional crops and coffee were introduced to increase biodiversity and to decrease the dependence of the tribals on wages. In 1996, 7 kg of millet seeds were bought from various villages and, together with pumpkin, chilies and mustard seeds, distributed in one village as an experiment. This yielded sufficient produce to start a seed bank

Traditional crops and coffee were introduced to increase biodiversity and to decrease the dependence of the tribals on wages.

in the same year. In 1997, these traditional seeds were sown on 0.6 ha of land, owned by the Kurumbas in the village of Semmanarai. Many tribal families became interested as they realised the importance of food crops and vegetables, especially for babies and children. In 1998, the experiment was boosted when three other villages expressed interest in clearing their land for planting millet and vegetables. Thus 44 villagers from four villages became involved.

In Vagapanai village, after an initial failure of Keystone to increase beekeeping, new meetings were held in which earlier problems were analysed and new approaches agreed upon. In 1998, 18 families agreed to begin vegetable production and started to clear the land. This increased to the present 27, which virtually means the whole settlement. They took care of the land, built small huts on the cultivated land and moved in with their children, goats, dogs and chicken, only to go back once in a while to check their houses and buy provisions. They could therefore more easily weed and protect their fields against monkeys, wild boars, buffaloes and elephants. The first crop harvested was maize and as a festivity served to all guests. Other grains and vegetables soon followed.

Another interesting initiative by an individual Kurumba to set up a coffee nursery was taken in 1997. Approximately 4 800 saplings were grown; 350 were distributed throughout his village free of charge while the remaining 4 050 were sold. Keystone monitored the achievements and decided in 1998 to set up two more coffee nurseries in other villages and the saplings were used for planting in tribal lands. In total 9 500 saplings were raised, according to organic agricultural standards. Ecologically, coffee is a much better crop than tea, as coffee grows together with many other crops. Gradually, the idea emerged to change the livelihood of the tribals by growing food crops as well as cash crops (coffee) organically and to improve the agro-ecological environment.

Traditional agriculture was already in place. Before the advent of the British, the indigenous people of the Nilgiris, especially the Irulas, used to grow mixed crops on the hill slopes, practising slash-and-burn techniques. Even the Badagas, who were tillers of land, used to grow the same crop varieties in the plateau area. The most popular crops are listed in the table below.

Local Name	Common Name	Botanical Name
Ragi	Finger millet	*Eleusine corocana*
Samai	Little millet	*Panicum sumatrense*
Tenai	Italian millet	*Setaria italica*
Keerai	Amaranthus	*Amaranthus caudatus*
Kadaghu	Mustard	*Brassica juncea*
Milaghu	Chilli	*Capsicum frutescens*
Macca Cholam	Maize	*Zea mays*
Pusinakai	Pumpkin	*Curcurbita pepo*
Avarai	Lablab	*Dolichos lablab*
Tuvarai		
Takkali	Tomato	*Lycopersicum esculentium*
Manjhal	Turmeric	*Curcuma longa*

Objectives of the project

Initially Keystone used their own internal financial resources to start the project, until outside financial assistance was available. In June 1999, with financial assistance from Inter-Cooperation, (an organization created for the purpose of dealing with Natural Resource Management by the Swiss Development Cooperation), the three-year project started.

Keystone's programme looks at land use as a whole and aims to achieve the following objectives:

- promote traditional crop cultivation to ensure food security for tribal families;
- encourage cultivation of millet and vegetables to improve the nutritional intake;
- discourage the spread of tea on the lower hill slopes;
- promote tribals to start and develop their own coffee nurseries. The saplings to be planted in village lands;
- create a seed bank of rare millet and coarse grain seeds for use by other villages and for the conservation of local food grain varieties.

The overall objective of the project is to promote a form of land use which preserves biodiversity, enhances a mix of cash and food crops and is ecologically sustainable.

Specific objectives of the project

The specific objectives of the project are:

- initiate soil and water conservation methods for present land holdings;
- provide options for growing different crops/plants/trees in the land;
- provide food supplements to tribal families through reviving traditional agriculture;
- integrate off-farm activities of floriculture and beekeeping;
- promote a mix of commercial crops/oilseeds along with useful traditional varieties;
- document traditional indigenous practices in hill agriculture systems (for example, Darsi seed banks, barter systems, rodent control, social and cultural mountain rituals);
- establish a seed bank and nurseries for useful crops for the hills;
- enable greater biodiversity patches within hill agriculture areas through introduction of multi-tier shade coffee bushes;
- initiate greater awareness of the importance of sustainable land development against shifting, subsistence traditional agriculture;
- design a package of benefits combining gathering and agricultural production.

In March 2000, at the beginning of the project, ten villages were selected covering a total of 55.25 ha and 174 families. In April 2001, the area was extended to a further six villages. In all the villages, discussions were held, the most pressing problems analysed, an implementation strategy worked out and the financial, personnel and labour-related contributions by the farmers and by Keystone decided upon. The selection of villages was made on the basis of interest shown by a viable group of farmers, the status of their land and the village linkages with other Keystone activities.

The project has three distinct features. The first is the development of traditional/organic agriculture, which involves millet and vegetable cultivation to supplement the diet. The second is the development of cash crops, including coffee and vegetables. The third is the integration of off-farm activities as floriculture and beekeeping. Thus, the activities were:

- **Village seed banks:** to conserve and increase local varieties of food crops including millet (finger-, little-, proso- and fox-tail millet) and other seeds such as, amaranthus species, lablab, maize, mustard and beans.
- **Establishing nurseries:** as a basis for growing coffee and other cash crop species, including silver oak, pepper, silk cotton, tamarind and lime. Individual villagers maintain the nursery in a common place in the village.

Harvesting Amaranthus

- **Soil and moisture conservation:** these activities were only initiated after much debate and reluctance of the villagers. They argued that agricultural work on steep mountain land had never been done before. Moreover, deep-rooted practices of slash-and-burn were preferred, as it requires little effort. Keystone had to convince them that slash-and-burn creates serious problems for their food security and elaborated on the advantage of using many elements of their traditional knowledge system, favouring an organic approach. A few villagers accepted the ideas and started to work. Keystone initially had to put in ample financial and supervisory inputs. Following a watershed approach, trenches were dug, which filled up with the first rains. Crop yields increased. Stone bunds were constructed on steep slopes with loose soil and vegetative bunding in less fragile hill areas. Non-perennial water sources were provided with gully plugs.
- **Participating Rural Appraisal mapping and agriculture biodiversity study:** this participatory exercise is undertaken in the villages where land development work is going on. The lands are marked and their status and land use established. Stories about village history, former land use, water sources, habitat details and trade practices were collected. The movement of the water table was followed and key features in settlements established, such as the extent of land in different settlements, acreage owned by individuals, crops grown, and output per unit of land. Who are the beneficiaries of these crops? For human consumption only? For fodder as well? Who are the users? This research helps to define problems, and find solutions and approaches for the future.
- **Documentation of traditional practices:** the project documents the traditions and beliefs followed by the tribals in millet cultivation and the relation of the forest with agriculture. The reason for this is that existing practices, with the exception of slash-and-burn, form the best entrance point for further improvement, as they are often related to organic agriculture approaches and techniques. They include mixed cropping, intercropping with vegetables, techniques of seed preservation/selection and rotational cropping.
- **Resource centre:** in one of the villages, a resource centre has been completed. Built with local material and using the skills available in the village, it serves as a meeting place and training centre for farmers from the villages in the project area. Moreover, a village seed bank and an apiary are situated here. Another centre has been completed in a different village and will serve as a central meeting place, drying yard for coffee and pepper, and a centre for income-generating activities such as making pillows, cushions and bees wax candles.
- **Beekeeping and floriculture:** improvements in beekeeping had been the mainstay in Keystone's earlier long-term interventions and have been integrated in the project.
- **Buy-back mechanisms:** although buy-back arrangements for cash crops are not specifically mentioned under the project, Keystone took this up in addition to other activities, as it was regarded as an important component. The buy-back facility is provided to support income options. It encourages the farmers and acts as an incentive, while leaving farmers free to market their products elsewhere, if they can fetch a better price.

Keystone elaborated on the advantage of using many elements of their traditional knowledge system, favouring an organic approach.

Management

Efficient and effective management is required to obtain sustainable results in such a complicated project, using participatory approaches in combination with substantial farmer contribution. As well as the project personnel, trained tribal youth are present at the project sites to assist

wherever and whenever they can and to report to the project staff about achievements, problems and wage payments. With regard to farm tools, seed storage and nursery development equipment, the project developed linkages with the Tamil Nadu Agricultural University for post-harvest techniques and with an NGO, Kudumbam, working in the same field. An example of this cooperation is the development of a small millet pearler. Although initially there was interest in growing millet, farmers were reluctant to continue because of the drudgery involved for women in de-husking it. Through constant interaction and discussion with the university and a private manufacturer, a machine to de-husk millet was developed. It has since been installed in a village and is used on the payment of a small fee, reviving interest and enthusiasm for growing millet.

Keystone also works with the Coffee Board on improved seeds and on-farm coffee trials, following organic practices. Furthermore a good working relation was developed with the Tamil Nadu Forest Department in order to seek a solution to the problem of tribal land, often insufficiently demarcated and without a clear status.

With the onset of the project the management staff proved to be sufficient, but as the project has expanded, the present capacity will not be enough and budgets are becoming constraining. Moreover, a project of three years is too short to achieve and consolidate its objectives in the areas of biodiversity conservation and food security. It is therefore hoped that after an evaluation, the donor will take appropriate steps to safeguard this project.

Results

Traditional knowledge, mapping and biodiversity transects

After five of its six semesters, documentation of traditional knowledge, mapping of areas and biodiversity transects of the villages have been completed. A readable document still remains to be worked out.

Participation of farmers

Meetings with, and participation by farmers, have gone up considerably as interest in working on the land has increased, to the detriment of waged labouring on plantations. In 1999, the community contributed 20 percent to the costs of establishing nurseries. This percentage increased to 60 percent in 2000. In the same year the contribution to the costs of land clearing amounted to 25 percent but increased to 50 percent by 2001.

Seed banks and nurseries

Seed banks have been installed in three villages and 25 kg of seeds were distributed in 1999, rising to the present 150 kg per season. Nurseries were installed in four villages and produced over 75 000 saplings in 1999-2000. In 2000-2001, when fewer saplings were needed, three nurseries in three villages produced over 40 000 saplings.

Soil and water conservation

Training in soil and water conservation has been successful. In 1999, minor irrigation was established in four villages; live fencing and earthen check dams in one village; 644 trenches were dug and 583 m of stone fencing constructed. This drastically increased to 2 800 m of stone bunding, 178 m^3 of gully plugs, 9 144 m trenches and 4 267 m of staggered trenches.

Buy-back mechanism and marketing

The buy-back mechanism has proved to be an important incentive for the farmers to remain "organic". Buy-back is guaranteed for any quantities of honey and bees wax collected. The present quantity is about 4-5 tonnes per year. The purchase price is about 50 percent higher than the local rates. The price is set at the beginning of the season, as per the custom. Honey is marketed at rates slightly lower than the market rates of companies like Dabur, (one of the largest honey companies in India). This indicates the large margin for traders.

The buy-back mechanism has proved to be an important incentive for the farmers to remain "organic".

Buy-back quantities for coffee (1 ton) and pepper (700-800 kg) are more limited so far, as Keystone has not fully explored the markets in order to absorb full production. For these products a 10 percent premium is paid over the prevailing wholesale rates in the nearest market. As it is farm-gate price, no transportation costs are incurred by the farmers and thus the actual premium is higher. These products are sold in local markets at slightly higher prices than conventional products and more than 60 percent of all cash products are sold in the Nilgiris.

Analysis

It is never easy to transfer new technologies, especially in a situation where old traditions and beliefs are so deeply rooted. What helped immensely was that Keystone took these traditions seriously and used them as a starting point for the improvement of their practices. However, convincing tribals to abandon their slash-and-burn technique was no simple task. It is much easier to convince them of bunding and trenching and working the soil, especially on the steeper slopes. Moreover these tribals basically belong to hunting and gathering communities and interest in agriculture was initially very low. However, the project has been successful in quite a number of villages.

Another difficulty, which is experienced in most rural projects in India, is dependence on the Government. It was not easy to convince the tribals that taking fate into their own hands would yield much better results than waiting for assistance that may not come. Once this was accomplished, farmers would make their own contributions.

During the second and third semesters, the rains were poor, leading to much lower yields than expected and limiting interest. Minor irrigation was installed in a number of villages; however it is still insufficient and must increase. Another problem was the raiding of crops by wild animals and only where the tribals guarded their crops, was this problem overcome.

The training of tribal youth for day-to-day assistance proved invaluable. As the project expands, this training has to increase. There is also a need for training of trainers in the effective application of traditional knowledge and organic agriculture. However, there are few, if any training institutions on organic agriculture systems in hill areas with tribal communities and the fact that training for tribal youths has to be in the local language is another difficulty.

Although buy-back mechanisms were not included in the project, they also proved to be indispensable to enthuse the farmers and to keep them from falling into their old habits. To be able to buy back, however, Keystone has to market the products at least without loss, in order to maintain some reserves for the inevitable risks in such ventures.

Internal control on organic production is in place, but to obtain higher retail prices in the local market or even for export, proper certification in the near future will be necessary.

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Lessons learnt

Duration

From the onset it was realised that a project with tribals, primarily interested in hunting/gathering and hardly any interest in agriculture would be a difficult task. Despite Keystone's ample experience

Village meeting

in the area, it took more than six months to set up the project and make an actual start. It is therefore an illusion to think that such an ecosystem project with a substantial participatory element can be accomplished within three years.

Approach

No doubt, a more directive, supply-driven approach, with free physical inputs would have yielded faster and more measurable results. But experience has shown over and over again that these results are usually short-lived and disappear even before assistance stops. The chosen approach, to analyse the problems with the tribals, finding long-term solutions with them and coming to an agreement on their own contribution, obviously took a long time. But once done, it gives a stronger realization of ownership and thus sustainability gets a better chance. This does not mean that Keystone's task is finished in the villages that have been successful so far, especially if a return to the old system is to be avoided as soon as the first problems, such as poor rains, occur. Moreover, the activities and farming cycles have to be planned well in advance to keep the people's interest and to prevent the land from going fallow again.

Seed banks and nurseries

It was an excellent move to start simultaneously with the set up of village seed banks for food production and own consumption and nurseries for cash crops. Thus seeds could be sown and saplings planted as soon as clearance of fallow lands, trenching and bunding were completed. Moreover, the villagers could already observe that Keystone meant business. They could get used to the idea at an early stage that a larger variety of pulses and vegetables not only enriches the environment, but contribute to sufficient yields, especially when rains are below expectation.

Traditional knowledge

Documentation and the use of traditional knowledge has been an important strategy for further improvement. But it needs to be better analysed and put to wider use in the organic farming context. However slash-and-burn is also part of traditional knowledge, but in order to protect this fragile environment, it needed to be abandoned. The tribals had to be convinced that this technique threatens the forest and damages the soil, endangering the ecosystem in which they live and consequently their own existence.

Training and management

Training of local youth and engaging them in day-to-day monitoring and supervision worked very well. These youngsters learn to adopt useful traditional knowledge and upgrade them with organic agriculture practices. The training has to be intensified further, for which manpower and finances are needed.

Youngsters learn to adopt useful traditional knowledge and upgrade them with organic agriculture practices.

Marketing and buy-back

Keystone's ability to market cash crops and off-farm products may well prove to be the litmus test of the project. Economic considerations are the most powerful in any project of change. Farmers receive a better price from Keystone, but to compensate for this, Keystone has to make sure that its handling costs are lower than other traders and/or its selling price is higher. Quite some effort has been made in this regard, but given the quantities involved, more is probably needed. This, however, requires capital and professional marketing skills, and in addition, proper organic certification will be needed in the future.

Linkages

Keystone has engaged with some institutions, notably the Tamil Nadu Agriculture University and the Coffee Board for assistance in finding the best and most cost-effective solutions for pressing problems. Moreover Keystone makes use of organizations from their network, notably the NGO Kudumbam, which works in the same field. Keystone is still open for new practical ideas and advice in this regard is more than welcome.

Partnership with the community

The results so far were largely due to Keystone's partnership with the community. The communities increased their financial contribution from 25 percent to a staggering 50–60 percent. Most of the recording/documentation and all planning were carried out at village level, the community being involved from the onset.

This led to a revival of traditional crops and emphasis on organic agriculture and food security for at least six to eight months was provided. Any cash income becomes a surplus which is mostly used for children's education, medicines, house repair or construction.

The dignity of tribal people has therefore increased, they now work their own land rather than on somebody else's land and because of this partnership, the fragile ecosystem has improved and is improving further. Environment and self-interest can be inter-linked.