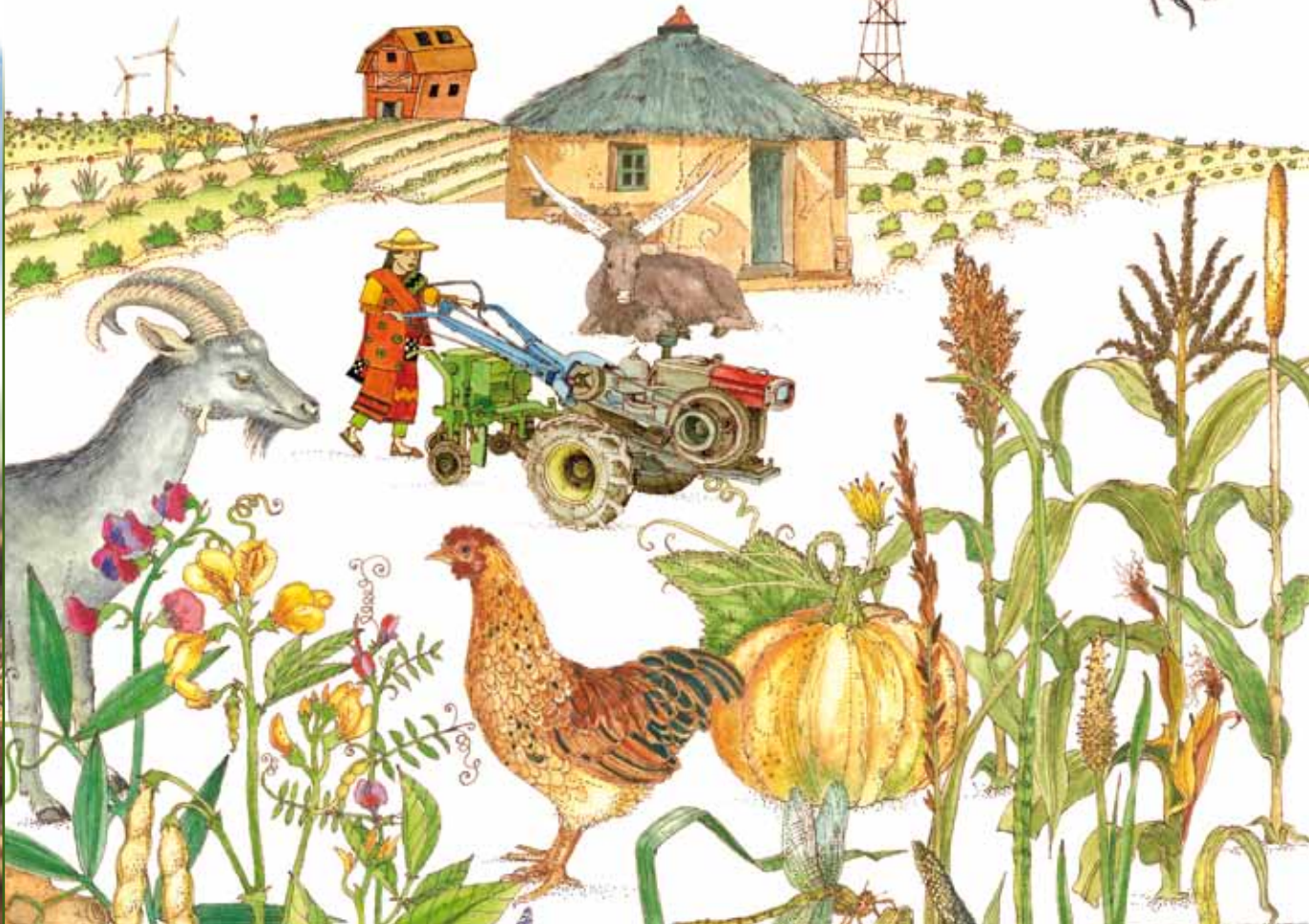




Food and Agriculture Organization
of the United Nations



AGROECOLOGY FOR FOOD SECURITY AND NUTRITION

PROCEEDINGS OF THE FAO INTERNATIONAL SYMPOSIUM

18-19 September 2014, Rome, Italy

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BIODIVERSITY & ECOSYSTEM SERVICES IN AGRICULTURAL PRODUCTION SYSTEMS

AGROECOLOGY FOR FOOD SECURITY AND NUTRITION PROCEEDINGS OF THE FAO INTERNATIONAL SYMPOSIUM



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NILGIRI BIOSPHERE RESERVE: A CASE STUDY FROM INDIA

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ORGANIZATION AND DESCRIPTION OF THE AREA

The Keystone Foundation works on eco-development initiatives with indigenous communities in the Nilgiri Biosphere Reserve in the Western Ghats, spread mostly across Tamil Nadu and partly in Karnataka and Kerala. It has established strategies and practices that conserve biodiversity and address the livelihoods of forest dependent communities. Currently it has programmes with bees and forest biodiversity, traditional and organic agriculture, water and wetlands,



environmental governance, organic market development and culture and local governance (see: www.keystone-foundation.org).

The Nilgiri Biosphere Reserve in the Western Ghats is home to the moist, dry, evergreen and montane (shola) tropical forests. The Western Ghats, and the Nilgiris in particular, harbour a wealth of flora and fauna; much of which is endemic to the region, e.g. the endangered Lion-tailed Macaque and the Nilgiri Tahr. However, the Nilgiri forest ecosystem is under pressure from the encroachment of tea and coffee plantations, commercial vegetable cultivation, illegal logging, and commercial tree plantations with exotic species initiated by the Forest Department.

The Nilgiri Biosphere Reserve is home to a large number of indigenous *Adivasi* communities, most of them forest dwellers and hunter-gatherers dependent on natural resources for their livelihoods. These distinct ethnic groups have small populations and live in geographical concentrations. Significant land-use changes have taken place in the Nilgiri forest over the past 200 years, with a steady shift towards the cultivation of commercial species and crops, both in the forest and in agricultural lands. The Kurumba and Irula communities cultivate minor millet, vegetable and fruit trees in their community land holdings. Variable rainfall and crop raiding by wild animals are two factors that threaten their food security. Many times, these threats have forced the community to discontinue farming practices, leading to large tracts of land becoming fallow and semi-wild. In addition, the collection of non-timber forest products (NTFPs) is an important traditional activity for the communities to meet their livelihood requirements. Previously, the entire family used to go into the forest to collect gooseberries, soapnuts, gallnuts, barks, roots and phoenix leaves (according to the season), which would then be sold to small traders. However, due to restrictions on the movements of the *Adivasi* and fluctuations in the yields of forest products, this activity is no longer as productive as it once was.

THE KURUMBAS' TRADITIONAL COMMUNITY AND FARMING PRACTICES

The Kurumbas are classified as a hunter-gatherer community. Traditionally they lived off of forest resources and practising cultivation of an 'old' nature; some of which continues to the present day. In this system the land is cleared in the month of April and food crops like *ragi* (finger millet), pulses, greens and oil crops (sesame) are sown. This season is popularly known as *kar pattam*. The second cycle of sowing begins in the second week of July, which is a major cropping season for all the farmers. During this cycle, a variety of crops are cultivated. Crops are harvested in a continuous sequence from August until the end of December. This traditional system of farming is practised locally with numerous ceremonies, community participation, rituals, traditional governance, seed and pest management controls. Historically, this system has ensured the food and nutrition security of the Kurumbas.

When they lived in the forest, the community knowledge of the Kurumbas informed their practices, as reflected in the cultural aspects of their cuisine, birth, marriage and death, sacred groves, rituals and ceremonies. The community maintained certain beliefs and taboos for their fields and millet crops. However, displacement from the 1960s onwards because of various reasons has led to a gradual loss of these knowledge and traditions.



FEATURES OF THE KURUMBAS' TRADITIONAL PRACTICES AND KNOWLEDGE

The roles of women and men in agriculture

The practice of millet cultivation among the Kurumbas was the backbone of their culture and agriculture, as well as their relation to the land and forests. Millet crops were primarily dealt with by the women who, after playing an important role in the sowing, weeding and harvesting, were fully responsible for post-harvest, storage and use throughout the year. Men and women played an important role in this system, which also involved wider members of the family. Exchange of grains took place between relatives and many visits were made during the harvest time for eating delicacies in the fields like roasted maize, popped amaranthus with honey, etc.

Crop diversity

The community grew a diverse variety of main crops (tenai kadu), including both cereals and vegetables. Due to their proximity to forest areas, many wild varieties were also utilized in their millet fields (see Table 1 for a list of crops and wild foods including cereals, legumes, vegetables and fruits). Having such a high diversity of foods within a single field, combined with the knowledge of seed selection and storage, methods of storage, varied recipes of cooking and their nutritional factors was particularly valuable to the Kurumbas.

Table 1. Diversity of crops and wild foods grown by the Kurumbas

SERIAL No.	CEREALS	LEGUMES	VEGETABLES	FRUITS
1	<i>Amaranthus</i> spp.	<i>Avarai</i>	<i>Amaranthus</i> spp.	Banana
2	Finger millet (<i>ragi</i>)	<i>Dolichos lablab</i> (<i>mochai</i>)	Arrow root	Cape gooseberry
3	Foxtail millet (<i>thenai</i>)	Horse gram (<i>kollu</i>)	Beans	Guava
4	Little millet (<i>samai</i>)	<i>D. lablab</i> (<i>dora avarai</i>)	Brinjal (<i>kathirkai</i>)	Gooseberry
5	Maize (<i>makka cholam</i>)	<i>Ola avarai</i>	Small chilli (<i>jeeni malagai</i>)	Jackfruit
6		Pigeon pea	Wild chilli	
7			Coriander (<i>kothamalli</i>)	
8			Greens (<i>chukuti keerai</i>)	
9			Manathakkali	
10			Mustard (<i>kadugu</i>)	
11			<i>Nannari</i> (<i>sarasaparilla</i>)	
12			Tomatoes (<i>thakalli</i>)	
13			Small tomatoes	
14			Yam (<i>Dioscorea</i> spp.)	



Among the indigenous peoples of the Nilgiri Biosphere Reserve, intensive systems of agriculture were not common; rather, cropping systems featured high biodiversity and relied on traditional knowledge. Practices were closely woven into the communities' knowledge of medicine, child rearing and everyday foods. Their traditional farming practices emphasised the role of the *mannukaran* (farming expert), who held a great deal of knowledge about the soil, seasons and seeds. This meant that the community could cope with climatic variations and aberrations, which now threaten the cash crops in the area.

Ecological diversity

Millet fields had many wild species due to their proximity to the forest areas, and this had positive impacts on the health and nutrition of the Kurumba families who lived in harmony with nature (see the inset box below). The zero-level application of chemical inputs to farming systems that was traditionally practised by the Kurumbas played a critical role in maintaining the mountain ecosystems, water resources and a variety of life forms, including soil organisms, insects, reptiles, birds and mammals (although the birds were often considered a menace as they ate the crops off the panicles). The ecological diversity in these mixed farming systems was enabled by pollinators, seed dispersers, soil fertility and crop raiding.

Nostalgia

"In our old village we had common agricultural lands where our parents were doing millet cropping which was natural farming. Our main crops were finger millet, foxtail millet, little millet and pigeon pea (see Table 1). It was very simple and sustainable agriculture. We had a variety of foods, which provided us a lot of stamina. Our parents were well-built and very strong; as children we were also strong. We could walk long distances, do hard work (today's generation hardly works) and efficiency was our trademark. We had plenty of greens, fruit and other vegetables along with millets and pulses, which nourished our body, mind and soul. Our traditional food dishes were very delicious – the following are a few delicacies that we still remember:

- *Ragi rotti, kali, udur putti*
- *Samai: sapadu, upma, payasam*
- *Thenai: sapadu, kanji*

Makka cholam: kali, pori, suttu, pullungi vegavacchi chinna cholam: kali, kanji

Compared to our children, we were very healthy and good in stature, with lots of activities bubbling around our day-to-day life. We used to collect different fruits, tubers and greens from our fields and forest. Our families were very close. We were always with our parents and there was a lot of observation and communication which created deep connections with our culture."

(Janaki Amma, Village Pudukkadu, 24 July 2009)



Food sovereignty

The traditional biodiverse cropping system of the Kurumbas provided them with food and livelihood security. Millet was consumed for three to five months as this was the typical millet yield from a season. Millet was not sold in the open market in this region. Finger millet and foxtail millet preparations were the staple foods of the Kurumbas, providing about 17 meals per month (in general, tribal families have two meals a day, one each in the morning and evening). Uncultivated foods such as natural tubers, green leafy vegetables, wild fruit and mushrooms collected from the millet fields and forests also served as important food resources.

Livelihood security

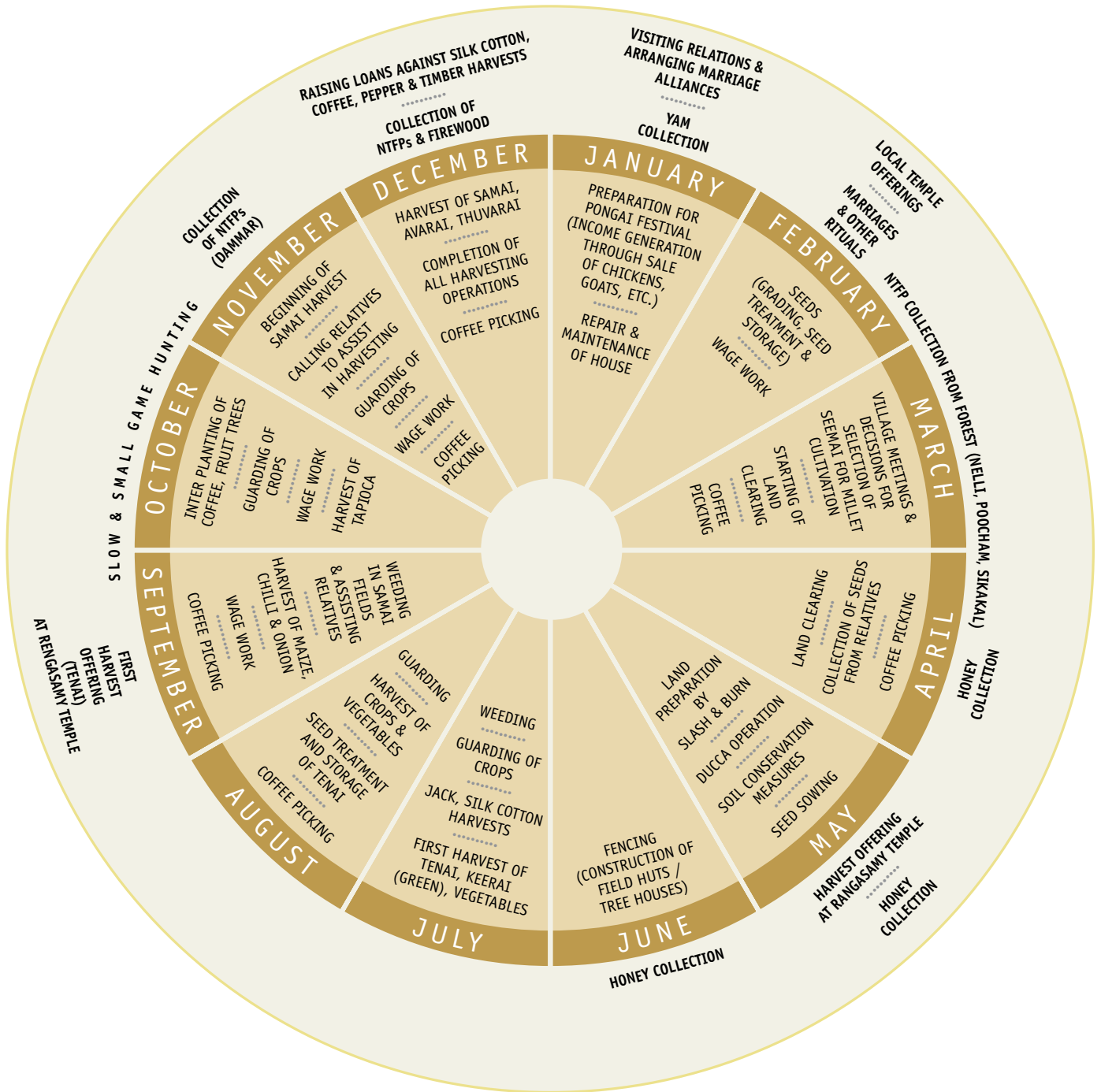
Grain rather than money was given as wages to relatives and community members who contributed their labour to the agricultural operations such as weeding and harvesting. The traditional land was valued as an asset that was retrieved from the forest and protected from erosion, while the health of the soil was maintained. Millet cultivation was undertaken in vast tracts of rainfed land on hill slopes that required no irrigation. The cost of land preparation and cultivation was less expensive than for vegetable cultivation. The stalk and hay from the finger millet, little millet and foxtail millet was stored as fodder for livestock in the winter (see Figure 1: Calendar of livelihood activities).

Cultural aspects

Grain was communally offered to the deities during the annual rituals. The first harvest of all types of millets and cereals (a bunch of earheads/panicles) were selectively offered to the deity by placing them in the temple premises during the annual ritual or festivities. These grains were then shared among all the community members. Communal harvesting and threshing, *samai okkal*, was an event in which the men, women and children from the Kurumba community participated in the threshing and separation of the millet/grain. Threshing began in the late evening and went on throughout the night until all the harvested grain was threshed. This enabled the community to avoid the hot sun, and ensured communal participation because of the availability of labour in the evening. *Samai okkal* served as an opportunity for a cultural fest – songs, actions, traditional music and drumming, as well as the sharing of stories and interesting incidents from the time of guarding the field.



Figure 1. Calendar of livelihood activities in Kurumba communities





FACTORS THAT THREATEN THE TRADITIONAL KNOWLEDGE SYSTEM AND GENETIC RESOURCES OF THE KURUMBA COMMUNITY

Migration has led to great losses for the Kurumba community. At times, the food producers are now forced to become food purchasers. Their independence and dignity of life has been lost. Elephant attacks, which are directly attributable to the increase in urbanization at the foothills, have sometimes led to resettlement and rehabilitation without attention to the Kurumbas' needs and lifestyle. These processes are leading to a loss of their heritage. The changes of habitat and livelihoods have also impacted the transfer of knowledge from *mannukarans*, as these depend on cultivable land which is no longer available in many areas.

Discussions held with the Kurumba women were focused on nutrition, specifically related to their children who are now being raised on food available through the Public Distribution System (PDS). According to the women, the lack of traditional foods has negatively impacted on their health as they only eat rice and pulses grown with chemical inputs. They discussed the possibility of the PDS supplying millets, which would greatly enrich their diet. Millet cultivation is becoming rare in the Nilgiri, endangering seed stock, and resulting in the loss of several hill varieties of millet (especially little millet, beans and amaranthus varieties). The PDS system that provides rice rather than the Kurumbas' traditional diet of millets is slowly changing their food habits, leading to a nutritional and cultural loss.

THE KEYSTONE FOUNDATION'S COMMUNITY INTERVENTIONS

In areas where the Keystone Foundation is engaged with local communities, the possibilities for the future will require a substantial effort for the revival of community agricultural practices and community land rights. The Forest Rights Act (2006) enables claims to establish rights back to traditional lands. Coupled with appropriate technological interventions such as micro-irrigation and solar powered fencing, this can help to revive the traditional, diverse agricultural system of the Kurumbas and maintain the existing knowledge held by the older generation. Therefore, the Keystone Foundation is emphasising the importance of the nutritional qualities and environmental benefits of these foods and crops through food festivals and recipe competitions among the community, and by supporting community seed banks to help restore genetic diversity and agrobiodiversity. Through these efforts, the Keystone Foundation will help to enable the traditional knowledge and practices of the Kurumbas to be passed on to the younger generation.

Keystone has initiated the revival of traditional agriculture by documenting practices, creating seed banks and promoting millet and mixed cropping in the lands of the indigenous communities in the Nilgiri Biosphere Reserve. These interventions have had a wider impact on ownership, land-use patterns and livelihoods among the communities:

- » Efforts to integrate agriculture and forest ecology have helped to conserve biodiversity. A study conducted in 2006 comparing different land-use practices in the Nilgiri Biosphere



Reserve revealed high insect and bird diversity in mixed plantations, i.e. coffee with traditional agriculture;

- » Timber, medicinal, fibre, food and fuel species planted on *Adivasi* lands have increased the livelihood opportunities for families. High value crops like coffee, spices and fruits were promoted and grown organically for the market. Seed banks of traditional seeds ensure the free exchange and buildup of seed stocks;
- » The cultural impact of efforts to revive traditional agriculture has changed the respect accorded to traditional leaders such as the *mannukaran*. Once again, the community works together to conserve seeds, guard the fields, celebrate sowing/harvest festivals, etc. Children and youth have been closely involved, drawing them back to their lands to sample a taste of their heritage;
- » Community interventions have strengthened food sovereignty. From an overall well-being aspect, this has supported the health and wellness of *Adivasi* families. It has revived traditional cuisine and recipes and built nutritious diets. These efforts have also sparked interest among the *Adivasi* in other areas to follow the initiatives in their own way.

THE WAY AHEAD

While Keystone's initiatives have experienced some success, the Kurumbas still face many challenges. For example, soil fertility remains poor, rains are highly erratic, pest incidence is high under the forest canopy and there is hardly any return from coffee for the Kurumba families. Threats to food sovereignty, low incomes and poor nutrition are further concerns. In such a scenario, the revival of biodiversity on their lands is important to the community. They would like to enrich the coffee plantations with a variety of trees in order to provide food and income. However, the government schemes promoting tea and coffee cultivation, horticultural loans and subsidies are not designed for the Kurumbas' hilly lands, which have become neglected and fallow. Keystone's interventions with the community are seeking to regenerate these fallow lands by reviving the biodiversity of the traditional millet cropping system.

Looking forward, efforts to enhance agrobiodiversity and the livelihood security of the Kurumbas will require several interventions at the community and organizational levels:

- » Document the biodiversity and sustain agriculture in the context of livelihood security;
- » Research on-farm productivity and forest harvests, particularly yields and responses in the context of changing weather conditions;
- » Increase the diversity of tree and crop species that are suited to the local climatic conditions in coffee plantations on forest land to provide natural yield insurance against pests, diseases and the vagaries of nature;
- » Promote an exchange of learning between farmers, community-based organizations (CBOs) and network partners;
- » Encourage biodiversity with sustainable farming practices on small landholdings;
- » Enable farmers to conserve their own seeds/genetic resources;
- » Document and identify local breeds for viable livestock rearing;
- » Enable the rights of farmers and NTFP collectors in policy-making at the different levels of formulation and implementation.



AGROECOLOGY is the science of applying ecological concepts and principles to the design and management of sustainable food systems.* It focuses on the interactions between plants, animals, humans and the environment. Agroecological practices work in harmony with these interactions, applying innovative solutions that harness and conserve biodiversity. Agroecology is practised in all corners of the world, with the traditional and local knowledge of family farmers at its core. Through an integrative approach, agroecology is a realm where science, practice and social movements converge to seek a transition to sustainable food systems, built upon the foundations of equity, participation and justice.



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