CONSERVATION OF FAMILY FARMING HERITAGE

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Abstract

The most challenging goal for 21st century agriculture in the Asia-Pacific region is conservation of the family farming heritage. The region has the largest number of small farmers in the world, as well as the largest hungry population with more than 550 million people (and nearly half of it is in India). To avoid the growing crisis of food and nutrition insecurity, some of the countries in the region need to enhance their food production by 77 per cent by 2050. This can be achieved by converting every small holder’s farm into a bio-fortified farm where nutrient-rich diverse foods and dietary diversity are readily available. However, the most fundamental challenge for the millions of small farmers is to operate in the neoliberal era with market oriented economic policies that do not proactively support the viability of family farms. In order to produce nutrient-rich diverse food at every home on a sustainable basis, the policies and practices need to orient towards revitalisation of the four dimensions of family farming - cultural diversity, culinary diversity, curative diversity and the overall farm agro-biodiversity. The interventions of M.S Swaminathan Research Foundation amongst the farm families of Malayali tribe in Kolli hills, Kurichiya tribe in Wayanad, Kuttanad Below Sea-level Farming System and the Koraput Tribal Agricultural Systems in India confirm such an objective can be achieved. One of the practical strategies for achieving sustainable food production is a ‘C4 continuum’ that MSSRF promotes in many agro-biodiversity hotspots in India. Needless to add, the role of the state in making farming a viable activity is extremely important. It is therefore, necessary to immediately launch multipronged action oriented mission mode programmes that help revitalisation of the family farming heritage of the Asia and Pacific region.
Introduction

Family Farming or small holder farming is recognised for the sustainable management of farms as well as for ensuring the cultural, culinary and curative needs of the farm families. Family farmers particularly women, help to strengthen the conservation of biodiversity based on cultural, culinary and curative diversities. This is more evident in parts of the Asia-Pacific and African regions and Latin America where household labour along with several other inputs like seeds, manure, and energy generated in-situ are used to produce the bulk of household’s consumption needs for food, medicine, fodder etc. Such farming has been practiced for centuries with minimum negative externalities to culture, biodiversity and ecosystem services. However, the countries in the Asia-Pacific region are facing problems of food and nutrition security, and it is believed that unless the concerned governments take appropriate measures to increase their food production and address the problem of undernourishment, food insecurity issues will aggravate. FAO warns that in order to avoid the food security crisis, some of the countries in this region need to enhance their food production by 77 per cent by 2050. The Asia-Pacific region holds 60 per cent of the world’s population and has a hungry population of more than 550 million (and nearly half of them are in India) (FAO, 2014).

While investigating the issue of strengthening the in-situ on-farm conservation traditions of family farmers of the Asia-Pacific region to address the challenges of feeding 60 per cent of the world’s population, it can be seen that the issue depends on the effective management of four dimensions that are linked to family farming- cultural diversity, culinary diversity, curative diversity (i.e. medicinal plants and herbs) and the overall farm agro-biodiversity. Although it appears that these four dimensions have different objectives and require different approaches, in reality they are interrelated by function and thus need to be managed holistically and in partnership with the key stakeholders involved, especially the men and women of farm families, for yielding better results.

Amongst the four dimensions, agro-biodiversity provides distinct genetic variability in crops and breeds, agro-ecosystem variability with a range of biodiversity and ecosystem services. This ‘functional agro-biodiversity’ supports agricultural production and farm income in a long term sustainable manner (Bianchi et.al, 2013). The loss of ‘functional agro-biodiversity’- the beneficial insects and predators, pollinators and innumerable below ground biodiversity – from fragmented farms is a major challenge in keeping the sustainability of small-scale farming. Cultural diversity is valued in sustaining family farming as it leads to the preservation of locally appropriate agricultural techniques, innovations and practices. Culinary diversity becomes essential in sustaining family farming; although family farming itself may be even more important in sustaining culinary diversity. There has been very little research on understanding the role of curative diversity in sustaining family farming or indeed about the cultivation of medicinal plants in family farms and consumption of medicinal herbs at household level.

The small holders of China, India, Indonesia, Bangladesh and Vietnam – Asia’s five most populated countries alone account for 300 million small farms out of the world’s 500 million farms in this category. These ‘small farmers’ are engaged significantly in production of diverse grains, starchy staple foods like different roots and tubers to wide range of livestock and fishery produce (FAO, 1996; IFAD, 2014). However, emphasis on high-yielding and broadly adapted
varieties has greatly led to loss of crop diversity and genetic variability in crop plants. Although historically, families of artisans, pastoralists, gatherers, small peasants and indigenous communities have discovered some 50,000 varieties of edible plants, modern urban society has adapted to only a few crops like wheat, rice, maize and potato, because of the relative advantage of buying such varieties from super markets and due to various other factors. The demand for only market driven farm produce has resulted in a decline in farmland biodiversity and simplification of agro-ecosystems in various spatial scales. FAO states that almost all Plant Genetic Resources (PGR) of small farms will be extinct by 2050 unless concerted efforts are taken on the ground to save such diversity (2014). The greatest challenge for sustainable management of the family farms in the Asia-Pacific region is to integrate economic, social, cultural and environmental concerns. In this paper, we discuss the role of family farming in promoting agro biodiversity, cultural, culinary and curative diversities using case studies from India, in the operational area of the M S Swaminathan Research Foundation (MSSRF). The paper also gives a few suggestions to revitalize the Family Farming heritage in the Asia-Pacific region.

The Transition Challenges

The literature on Family Farming in the Asia-Pacific region is rich in terms of identifying the transition challenges the small holders confront with changing political, social and economic processes. The most fundamental transition challenge for the millions of small farmers in the region is to operate in the neoliberal era with market friendly economic policies that need not bring about any catastrophic qualitative change in the basic outcomes of the small holder farms. Poor access to technologies that are simultaneously beneficial for farm productivity and sustainability is also a great challenge. Often small farmers do not have either the resources to buy the technology, the infrastructure to support it or the specialised knowledge of how to use it to their best advantage. Therefore improving the access of family farmers to technology and skills can unleash their productivity potential and improve food security for their whole community (Grande, 2014). Communication technologies like use of mobile phones enable family farmers to access important economic and ecological information such as market prices, climate predictions, consumer trends and prior warning of adverse weather events. For example, (Silva and Ratnadiwakara, 2008) calculated that in Sri Lanka, information costs make up 11 per cent of farmers’ total costs and 70 per cent of transaction costs. This was a result of being uncompetitive in the market against more commercial farmers who were better connected with the state of the agricultural economy. The roll-out of mobile phones to sardine fisheries in Kerala allowed fisher men and women to find out the current sardine prices at different landing points whilst still offshore. Based on this information (and factoring in travel costs), the fisher people were able to decide where to land their catch that day in order to obtain the best profits. The scheme successfully decreased price volatility and variation, increased wages of fishers by an average of 8 per cent and, by eliminating waste, allowed consumer prices to fall by an average of 5 per cent (Mcnamara, 2009). Similar experiences have been recorded by farmers and fishermen in Tamil Nadu, Puducherry and Andhra Pradesh by MSSRF (MSSRF 2012; MSSRF, 2013a; MSSRF 2013b; MSSRF, 2014). Other economic challenges faced by family farmers include,
gaining access to financial services such as insurance which allow them to take more risks in growing and diversifying their business.

Family farmers are also increasingly facing environmental challenges created by climate change and environmental degradation. An example of this is the problem created by declining productivity of rice and wheat in the Indo-Gangetic plains and East Asia. According to Thapa and Gaiha (2011) “rice yield growth in irrigated area of Asia declined from 2.31 per cent per annum in 1970-90 to 0.79 per cent in 1990-2000” primarily due to the displacement of cereals with higher value crops but also because of deteriorating soil and water quality; intensive paddy systems in several Asian countries have reported degradation of soils and build-up of toxins (ibid.). This, while an immediate problem for the commercial farmers, has a severe effect on family farmers who have to work with land degraded by commercial farming. For instance, pollution such as the influx of high levels of drug residues into the environment and the emergence of antibiotic-resistant strains of bacteria because of indiscriminate use of antibiotics is a very severe environmental challenge for family farmers of the Asia-Pacific region (FAO, 2014). Wet rice fields are also a major source of methane emission, a greenhouse gas which is twenty times more detrimental than carbon dioxide at trapping heat (EPA, 2014). Because so much of East Asia relies on irrigation, “land degradation in irrigated areas through salinisation and water logging” is a key challenge for family farmers (Thapa & Gaiha, 2011). This combines with fertilizer nutrient runoff and the subsequent algal bloom to destroy wetlands and wildlife habitats (ibid.).

The region’s family farming heritage systems and landscapes are quite a few, and have evolved akin to the multitude of social, cultural and ecological systems of the globe. Kolli Hills Malayali Agricultural System, Wayanad Kurichiya Agricultural System, Kuttanad Below Sea-level Farming System (KBSFS) and the Koraput Tribal Agricultural Systems are few prominent examples of family farming heritage in India. FAO has recognized the latter two systems as Globally Important Agricultural Heritage Systems. The recognition of these unique farming traditions instigated pride amongst the local communities and bestowed further inspiration for conservation and enhancement of such farming heritage. Details of functioning of these systems are presented as case studies (See Box I, II & III). The studies clearly outline the interrelationship between culture, biodiversity and household food and nutrition. They also highlight the multifarious struggle small farmers face to sustain their food production systems and cope with the socio-economic transition. The trend of moving away from household level farm production system to an alternative system of growing largely for the market continues in these regions.

**Family Farming and Agro-biodiversity**

The biological diversity present in agricultural landscapes and common property lands are managed by local communities, often poor farmers, herders, fishermen or indigenous people. Their role in the creation, management and conservation of agro-biodiversity still remains largely unrecognized or insufficiently conceived in strategies aimed at conserving biological diversity, even though it has been acknowledged officially in international documents, such as the Convention on Biological Diversity (CBD) and the International Treaty on Plant Genetic Resources for Food and Agriculture (ITPGRFA).
The single most environmental catastrophe in 21st century farming is considered as loss of agro-biodiversity. The process of losses occurring in diversity of crop plants which has been termed as ‘genetic wipe out’, is not restricted to staple food crops like wheat, barley, rice, millets, sorghum, potatoes; a number of fruit varieties also come under this category (Fowler & Mooney, 1990). In China about 10,000 wheat varieties were cultivated in 1949; after 20 years in the 1970’s, a mere 1000 varieties were cultivated. China also reported loss of wild groundnut, wild rice and an ancestral variety of cultivated barley. The Republic of Korea registered 74 per cent varietal loss in 14 crops within a time span of 8 years time from a particular farm (FAO, 1996). In Bangladesh, the promotion of high yielding rice varieties characterized by mono cropping has led to the displacement of 7,000 traditional rice varieties (Hussein, 1994). It is stated that in Bangladesh, the Green Revolution varieties covered about 96 per cent of wheat area in 1998 with 67 per cent of wheat land planted with a single variety. In Philippines, two rice varieties developed by the International Rice Research Institute (IRRI) occupied about 90 per cent of the entire rice growing area during 1984 dry season (FAO, 1998). During the last 50 years before the spread of new varieties of rice “Indian farmers may have cultivated 30,000 different varieties. It is estimated, in 15 years only 10 varieties may have covered as much 75 per cent of the total rice acreage in the country” (Jain, 1982).

MSSRF’s studies on *Malayalis* of Kolli Hills (MSSRF 1996; Vedavalli, 1998 & 2004; Vedavalli et. al, 2002) revealed that commercial cropping has resulted in extensive changes in the land use pattern. Traditionally most of the upland area or *uzhavukkadu* was utilised for raising their diverse food crops. In the traditional farming system, multiple use strategies were promoted to enhance the multiple functions of agriculture. The cultivated crops took care of food and nutritional requirements and provided them thatching material for their house roofs, fodder for their cattle, manure for their fields and various other household needs. The horticultural crops took care of their cash needs to an extent (Vedavalli 2004).

The intensive mono-crop cultivation in Kolli Hills at present affects the agro-biodiversity and other natural resources like soil and water. A major portion of the mettan kadu / *uzhavu kadu* or uplands has been taken over by tapioca, a cash crop and more recently by crops such as coffee, pepper, clove etc. The undulating rocky terrain known as *kolla kadu* or *kothu kadu*, where traditionally long duration varieties of *samai* (*Panicum miliare*) and *thinai* (*Setaria italica*) like *perum samai* and *perum thinai* were cultivated, is being converted into pineapple growing areas. In earlier times, only one season was utilised to raise crops like *samai* and *thinai* and the land would be left fallow for the rest of the year. Further, the household utilised only a portion of the *kolla kadu*. Hitherto unutilised *kolla kadu* is also being utilised for raising crops like silver oak and mango. These crops are gradually spreading to the hill slopes where bush-fallow system has been predominantly followed. On the steep slopes, the *Malayali* households in general, used to have a lot of tree species and fruit trees / crops. The tree species are generally utilized for green leaf manure, construction purposes, and to make agricultural implements. The expansion of tapioca cultivation followed by pineapple and other tree crops like silver oak has greatly affected the maintenance of different agricultural habitats that generated agro-biodiversity in the land under the control of the farmers. Grazing lands (*kirai*) are increasingly being converted into agricultural lands. With the decline in the number of cattle, gradually the grazing lands have also
lost their significance in the traditional agricultural system of Kolli Hills. These lands have either been converted to produce crops for sale or have been sold to outsiders (ibid.).

For the long term conservation of this locally managed agro-biodiversity, different strategies are required, that go beyond a narrow conservationist approach. Rather, it is necessary to actively integrate agro-biodiversity into the overall issue of sustainable agriculture, giving equal consideration to its three dimensions – economic, ecological and social sustainability. Conservation issues, cultivation knowledge, consumption awareness and commercial aspects would all need to be integrated into one overarching policy strategy.

**Family Farming and Cultural Diversity**

Cultural diversity is important in sustaining family farming as it leads to the preservation of locally appropriate agricultural techniques. For instance, the origin of land tenancy system - the ‘nine squares’ in the northern part of the plains of China is rooted in ancient Chinese philosophy and culture of integrating positive (Xiang Cheng) and negative (Xiang Ke) relationships to get mutual benefit. Under the nine square system, large portions of land were divided into nine equal squares, of which the central square belonged to the landlord and the eight edge squares were managed by the serfs to the landlord. This tradition that dates back to 1100 BC resulted in gradual establishment of private land ownership and development of self sufficient farming system - crop husbandry, animal husbandry, silvi-culture, sericulture and domestic handicrafts, in which the family was the production unit (Li wenhua, 2001).

It was shown at the FAO 2010 technical workshop that - “Countries, communities and cultures that maintain their own traditional food systems are better able to conserve local food specialties with a corresponding diversity of crop varieties and animal breeds” (Dernini,et.al, 2010). Family farming is at the heart of local rural culture in the Asia-Pacific region. For example, amongst the tribes of Koraput region of Odisha in India alone there are 48 rituals that are associated with the planting, growth and harvest of rice or involve the presentation of rice in some way. Rice is used by the Bhumia, Paroja and Kandha tribes for bride price, by the Paroja tribe to remunerate the midwife upon the birth of a child, by the Bhatara and Bhumia tribes for fertility rites and the Gadaba tribe offer both rice and fish to a dead body on its way to the cremation grounds (Mishra, 2013). Amongst the Kurichiyas - a tribal community in Kerala in India, the whole process of rice cultivation is ritualistic from sowing of first seed for raising the nursery to the harvest of rice (Vedavalli & Anil Kumar, 1998). There are six different rituals associated with rice cultivation amongst them. All the six are observed in the first season (Nanja) of rice cultivation. This is one of the reasons that Kurichyas are very particular to cultivate traditional rice varieties during Nanja — all the specific rituals are associated with different rice varieties based on duration and special characteristics (see Annexure II).

The MSSRF study amongst the Malayali/ Malayalar tribal families of Kolli Hills shows the interplay of culture, property inheritance, income, and biodiversity conservation (Vedavalli, 2004). Property among the Malayalis, primarily, means landed property and house. Malayalars being an agricultural community consider land as a valuable resource. The other forms of property — the movable property include cattle, pig, gold/silver jewels, agricultural implements and household utensils. They consider pala maram (jack tree) as one of the components of the
property to be divided among the sons during partition because of its high economic value and its great potential as a significant source of income for nearly four to five months in a year. Interestingly, the land where the tree is located need not always necessarily belong to the person who inherits the tree. The tree may belong to one individual and the land where the tree is planted may belong to another individual. It has also been found that one single tree is divided among two or three sons. In such cases the total number of main branches in the tree is taken into account and accordingly the branches are allocated to the sons. Getting a branch or more than one branch of the tree by an individual is generally referred to as Kilai bagam (i.e. kilai = branch, bagam = share). The tree itself is thus considered as a property by the Malayalars.

Similarly, though not very often, tamarind trees are also divided among the sons. In this case, the sons share the yield of the tree when there is just one tree and there is more than one person to inherit the same. It is also a source of conflict sometimes among the kin members (ibid.).

In order to sustain such an elaborate ritual system, it is necessary to keep the traditionally conserved agro-biodiversity and input a large amount of time and resources into the family farm. Or, if looked at from a different angle, the dominance of agriculture in the day to day lives of the Koraput tribes, Kuruchiya and Malayali tribes has led to its central position in their ritual structure. After all, as Grande (2014) points out, family farms are embedded within local culture, and so one would expect them to substantially contribute to the shape of that culture.

**Family Farming and Culinary Diversity**

Culinary diversity is highly important in sustaining family farming; although family farming may be even more important in sustaining culinary diversity. Growing incomes and technological improvements in storage and transport have opened the way for the international food trade. This, along with intense media marketing, has led to a profound shift in diet from unprocessed, local, culinary diversity to a processed, imported, uniformity of refined fats and carbohydrates. This rising consumption of processed energy-rich but nutrient-deficient foods is leading to the double burden of obesity and chronic disease alongside malnutrition and undernourishment in many countries in the Asia-Pacific region (Dernini et al., 2010). Furthermore the intensive agriculture needed to produce these foodstuffs is increasingly leading to environmental degradation through overuse of fertilisers, soil salinisation, water logging and misuse of pesticides (ibid.). Hence it has become increasingly urgent to promote sustainable diets based on local agricultural diversity. Culinary diversity is a key in preventing micronutrient deficiencies which affect thirty per cent of the world’s population (FAO, 2013). Micronutrient deficiencies can lead to stunting in children, a condition which affects twenty-five per cent of the world’s children or some one hundred and sixty-five million individuals. It is particularly prevalent in the South Asia region where 40 per cent of children are stunted (ibid.). This can be easily prevented with more a varied diet; the only thing required to supply it is greater agro-biodiversity of the kind found on family farms.

The plight of Malayali women and men of Kolli Hills substantiates this statement. “Ratha kothippu (hypertension), sarkarai vyadi (Diabetes) were unknown to us. We never felt fatigue and weakness. Such was the quality of our food”, lamented Muthammal, an old woman around 70 years old and there were many other voices, which echoed this sentiment. They said “consumption of ragi kali/kanji (Ragi gruel) and samai soru (cooked samai rice) used to make us..."
feel energetic throughout the day”. Their day-to-day diet consisted of diverse foods like samai/thinai/ragi kanji (gruel) in the morning, for lunch samai soru/ragi kali with kuzhamu prepared with pulses (like karu mochai or sem mochai or avarai mochai) or greens and for dinner’ ragi kali (a semi solid porridge) or samai soru with some pulses as a side dish. Since they consumed a variety of food, they got different essential nutrients from them that were necessary for their physical fitness. These days, physical exhaustion sets in after a little bit of work done in the field, mentioned the villagers. They also mentioned that, as the traditional subsistence crops are mostly cultivated with organic manure, the the food grain harvested, was also of good quality, very nutritive (sathanadu) and often with pleasant smell. The regular consumption of these diverse nutritionally rich crops by the people made them very strong and resistant to disease. It was very rare for people to consult the doctors in those days. According to them oosi and marundu (inoculation/injection and medicine) are recent happenings (Vedavalli, 2004).

Despite these benefits, people have been brought to a situation today where they have overlooked the advantages of their traditional food crops. A majority of the villagers, including youngsters, share the view that cash inflow is much more now than what it used to be some 20-30 years ago. At the same time they realise that it is at the expense of their food security and nutrition security that they have easy access to cash. Malayalar farmers, who were once the producers and also the consumers of their produce, essentially play the role of only producers these days (ibid.).

It is evident that family farms, in their preservation of intra and inter-species biodiversity provide nutrition security for the community relying upon them for food. This is one of the main reasons that family farms are so important; they are a key pillar of sustainable agriculture. Family farms preserve traditional agricultural techniques and are embedded within local markets, meaning that their income goes back to the community and creates jobs, and act as major employers in the agricultural sector (Grande, 2014). With five hundred million family farms worldwide, family farms act as the main producers of day-to-day foodstuff (Dernini, et.al, 2010). Add to this the fact that most of the people facing food insecurity are smallholders (small-time family farmers) and it becomes obvious that the support of family farmers is integral for reducing hunger and poverty.

**Family Farming and Curative Diversity**

There seems to have been very little research conducted into the role of curative diversity in sustaining family farming or indeed into the cultivation of medicinal plants on family farms at all. MSSRF is attempting to address this gap, but further research is urgently needed in order to assess the impact of medicinal plant cultivation on the sustainability of family farms and further to this, on the health of the farmers.

There are about 8,000 plant species in China and around 7,500 species in India with known medicinal value, mostly found in semi-wild habitats (Sara & Martin, 2012). MSSRF studies amongst a few indigenous communities in India shows botanical remedies have been employed by the majority of the families inhabiting the fringes or interior forests, over generations. Often herbal treatment is part of their culture and dominant mode of therapy due to their long history of interaction with the plant kingdom. One such study by MSSRF conducted amongst the families of Irula tribal community in Tamil Nadu shows that around 14 edible greens are used
as medicine by them, which are generally prepared as vegetables and consumed. *Paasati* (Assystasia violacea), *kolemukku dagu* (Polygonum chinense), *mullu dagu* (Amaranthus spinosus), *povi dagu* (Cansjera rheedii), *lingakatti dagu* (Bryonopsis laciniosa) are few of the leafy vegetables found wild on their farmlands, that are used in therapies for ailments like dysentery, indigestion, gastric trouble, swelling in the hands and legs and body pain etc by the families of this community (Kumar & Vedavalli 1996). Similarly, the tribal families of Koraput region of Odisha have developed and standardised innovative methods to control diseases and pests in the rice field and protect the grains from storage insects. Leaf diseases like leaf blast, leaf rot and leaf blight are controlled by fresh green leaves decoction of *Neem*, *Bel* (Aegle marmelos), *Karanj* (Pongamia pinnata), *Tulsi* (Ocimum sp), *Turmeric*, fresh cow dung and urine. The decoction protects rice plants by making the young leaves bitter. Leaf folder, Caseworm, Stem borer and Gundi bug are controlled by fruits of *Neem*, twigs of *Kendu* (Diospyrus melanoxylon), Kerosene oil and snails. Powdered leaves mixtures of *Lemon*, *Neem*, *Turmeric* and *Karanja* (Pongamia pinnata) are mixed with rice grains to protect them from storage insects. Big bamboo baskets sealed with straw and plastered with a mixture of red soil and cow dung are used for grain storage. Seeds of millets and pulses are mixed with red soil and powdered leaves of *neem* and the seeds are sun dried (to reduce the moisture level and to protect them from insects) before storing them in earthen pots (See Annexure III: Koraput part).

One would expect that cultivation of such diverse medicinal plants would be more common on family farms than in large commercial agriculture as medicinal plant use is generally linked to local traditional knowledge of the kind kept alive by *Irula* community and tribal people of Koraput. However much more research is needed before these claims can be given any evidential backing. Studies of more in depth inquiry in relation to nutritional and medicinal properties of medicinal plant diversity found in the agricultural landscapes are urgently needed in order to assess the potential of medicinal plant cultivation on the sustainability of family farms and further to this, on the health of the farmers.

**Conclusions and Recommendations**

The review and the case studies brought from India illustrate the role and functions of family farming – it is both a way of life and livelihood for millions of people in the Asia-Pacific region. Family farms play a significant role in maintaining agricultural biodiversity, the local customs and traditions, sustainable diets, and healing herbs compared to larger farms, which mainly specialise in monocultures. The variability in such diversity, plurality in cultural traditions and knowledge domains, developed and safeguarded by small holder families are extremely important in providing vital goods and services to humanity and for the genetic enhancement efforts in modern agriculture. But, maintaining such farming system heritage is very challenging in view of the changing socio-economic situations. Therefore, revitalisation of the on-farm conservation heritage and rejuvenation of resilience of agricultural landscapes assumes much relevance especially in view of sustaining the gains already accrued in agriculture, biodiversity, ecosystem services and the livelihoods of local communities. Examples from many other heritage sites show this is possible by strengthening the local community efforts that promote integrated conservation methods, selection, enhancement and sustainable use of local genetic
resources along with traditional knowledge and innovations benefiting both the socio-economic systems and ecological systems of the present and future generations of the world.

Creating conditions for revitalisation of millions of small holder farms requires a major shift from the current policy of ‘mass production of food’ to ‘production of food by masses’. As Prof. M. S. Swaminathan advocates, the major objective of Family Farming should be to enhance every small holders’ farm in to a bio-fortified farm where nutrient-rich diverse food and dietary diversity are readily available. The success of vitalising family farms towards this direction will greatly depend up on the approach and methodology adopted at different spatial scales. One of the practical strategies for achieving sustainable food production is a ‘4C continuum’ that MSSRF promotes in many agro-biodiversity hotspots in India. In this approach equal importance is given for Conservation which includes enhancement and sustainable use of biodiversity and comprises in situ, on-farm and ex situ conservation methods, Cultivation that promotes low external input, sustainable agriculture based on principles of sustainable farming, Consumption that covers food security and nutrition, and revitalisation of traditional food baskets and Commerce that creates an economic stake in conservation through options in livelihood security. Implementation of the National Food Security Act in India that provides for distribution of millets to eligible households will add impetus to the C4 approach by guaranteeing market for nutritious millets grown by small farmers.

In view of these observations, we recommend following framework and objectives for intervention:

Revitalisation of Family Farming should be undertaken as a Mission by every country of the region by integrating it in their National Biodiversity Strategy and Action Plan (NBSAP). The ultimate success of this Mission would be in achieving the Zero hunger goal by all countries by 2020. The thrust of such a Mission should be establishment of an enabling social, economical, and physical environment at community level that revitalizes and enhances local heritage in the areas such as (i) food production, (ii) promotion of nutrition-sensitive dietary diversity and (iii) conservation of agro-biodiversity and ecosystem services.

The overall objective of the Family Farming Revitalisation Mission has to be improvement of the living standards of small holder farm families through the ‘4C continuum’ approach by undertaking thoughtfully selected actions in conservation, cultivation, consumption and commercialization pertaining to their agriculture. In all these actions, adequate care should be taken that farm women are not overburdened.

The core objective can have the following three sub objectives:

- **Research, Documentation and Policy**: Undertake scientific research on the functional aspects of family farming and bring out high quality outputs on the issues and problems related to three priority topics (i) ‘Functional Agro-biodiversity’ (FAB) with a focus on improved scientific understanding of FAB’s contributions to sustainability of regional farming; (ii) ‘Food Biodiversity’ giving emphasis to its integration in traditional foods and promotion of sustainable diets (iii) Family Farm Resilience with reference to climate vulnerabilities and risks. Advocacy workshops should be conducted to disseminate the
findings to policy makers from local to regional and national levels.

- **Education and Training:** Improve awareness on nutritional importance and need of consumption of diverse edibles and impart skills in horticulture amongst youth, mothers and children through nutritional literacy campaign and intensive trainings targeting all important stakeholders including marketing groups. The trainings also need to focus on the four key areas of functional capacities identified by FAO – (i) knowledge and skills; (ii) partnering; (iii) implementation; (iv) policy and normative.

- **Livelihoods and Development:** to develop sustainable livelihood options by maximizing the local food production and nutrition security by finding opportunities for utilization of modern technologies for the community members, particularly youth in processing, value addition and marketing of produces from the family farms as well as the “socio-ecological production landscapes” of the rural areas. The concept of functional foods/bio-fortified foods should get practiced with the full involvement of the local food producers.

To conclude, though the family farmers are at the heart of preserving diversity of food systems, their capacity in terms of resources and technologies to meet the challenge of feeding the growing population of the region, is woefully inadequate today. Technology integration in production enhancement, value-addition and marketing of produces from family farms and landscapes, promoting new innovations by synergizing traditional knowledge, technologies and modern science would help small farmers for achieving many of the global and national targets. Needless to add, the role of the state in making farming a viable activity is extremely important. It is therefore, necessary to immediately launch multipronged action oriented mission mode programmes that help revitalisation of the family farming heritage of the Asia and Pacific region.

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Annexure I
Case Study on Farming Practices of Malayali families of Kolli Hills

Malayalis are patrilineal families with patri-local residence. This case study explores the farming practices of Malayalis of Kolli Hills of Tamil Nadu, India. Land and property inheritance and succession to various political authority offices are accomplished along the male line. Besides the patrilineage, another important component of the Malayali social structure is the clan or kulam that is independent of the lineage. The Malayali people are organised into a number of exogamous clans. Often, the inherited lands of lineage members are found adjacent to each other.

Economy

The main economic pursuit of Malayalis is agriculture. The average landholding size of the households in our genealogical study (of three hamlets consisting 53 households) is 0.36 and 1.92 acres in wet and uplands, respectively. Their livelihoods revolve around collective agriculture and related activities being shared by all members of the household: men, women and children. Agro-biodiversity is a fundamental feature of Kolli Hills traditional farming system. Agro-biodiversity conservation has been tied with rich cultural diversity and local knowledge particularly that of women. Ecological, cultural and food values have been major determining factors in the choice of crops cultivated. Women play a significant role in crop choice, selection and storage of seeds and food grains. Subsistence farming was practiced with crops cultivated mostly for household consumption; and with little trading mainly of their horticultural crops. Fruits from their home gardens and excess pulses (cultivated in their farms as a mixed crop) provided them cash income enabling them to meet their minimum needs such as oil, salt, cloth etc. from the market. Food grains like ragi (Eleusine coracana) were exchanged or bartered for other items like cooking pots, winnowing pans etc. Their traditional agriculture has been characterised by mutual dependence of the entire household members and others in the same hamlet/village or surrounding ones. Even about 15 years ago, the agricultural fields were characterised by a variety of food crops grown during their main agricultural season. The crops included variety of cereals, millets, pulses, oil seeds, fruits and vegetables. After the harvest of one crop, it was followed by another food crop. The same crop was never repeated in a year in the same plot of a field. Malayalar’s traditional agriculture heavily depends on timely and sufficient rainfall. With the onset of southwest monsoon in June-July their main sowing season begins. Vaigasi (May-June), pattam (season) or Adi (July-August) pattam are considered the optimum periods to sow the traditional food crops.

Land use and crop management

The Malayalis distinguish the land types based on the type of land use – cultivable fields, land for grazing the cattle and garden lands (that are normally found around the household). The cultivable lands are further classified, based on the type of cultivation. They practice two types of agriculture – one that is irrigated mainly through natural springs and the other is rain-fed. Spring irrigated terraced lands in the valley are known as vayal. In the valleys, only the rice crop is cultivated. The rain-fed land is further classified based on the land type and the method of ploughing. Land terraces that are moderately sloping and medium size are normally referred to as mettankadu (upland). This type of land is also referred to as uzhavukadu.
(uzuavu=ploughing, kadu=land). It is known by this name as wooden plough and bullocks are used for ploughing this type of land. The steep stony area is karadu (stony/rocky) or kollakadu or known as kothukadu where digging stick, locally known as kothu is used for turning over the soil. Traditionally, in uplands or mettankadu minor millets particularly ragi, puzhudicar nellu (upland paddy) and pulses are cultivated. If a farmer had four plots of upland, two or three were used for ragi based mixed cropping. Another one for upland paddy called puzhuthikar nellu or samai (either a short or medium duration variety like mallia samai and sadan samai) are normally cultivated. In kolla kadu low water requirement crops such as samai and thinai are grown. Normally, in these lands long duration and late sowing varieties like perum samai and perum thinai are usually cultivated. In the vayal or terraced lands in the valleys, only rice crop is cultivated.

While mono cropping is adopted in the vayal, the widely practiced farming system in uplands is mixed cropping. Mixed cropping is a strategy where four to five crops are grown on the same plot. Farming system based on mixed cropping allows farmers to maintain diversity of crops. Mixed cropping and crop rotation as followed by the farmers were essentially risk-minimising strategies. They aimed at food availability throughout the year. Ragi, lablab, mustard, pumpkin, thinai, amaranthus have been cultivated as mixed crops. Ragi was the most preferred crop and was cultivated as the main crop under mixed crop cultivation. According to the people, it can be consumed throughout the year and it is also very nutritious. It is also easier to process than samai. According to the farmers, the benefit in practicing mixed-cropping is that it enables them to reduce risks and to get a variety of crops for consumption throughout the year.

Mixed cropping has been useful not only for the households’ food security, dietary balance and nutritional benefits; it also enabled the farmers with additional monetary benefits (where their primary staple food was ragi, followed by samai, paddy and thinai). The household generally has surplus food like mustard and pulses cultivated as crops in the mixed farming system. It generally ensured profitability, as there are a very few incidences of pests/disease problem. Weeds in this kind of farming do not pose any major problem, ascertained both women and men cultivators. Benefits of mixed cropping and mixed farming include soil fertility, moisture retention, erosion control and fewer weeds. They are less vulnerable to pests/disease, erosion of soil. This system minimizes soil erosion, and keeps in optimum utilisation of soil nutrients. Cropping patterns (mixed and mono crops) yield security, duration of the crop, taste, land availability, cultural and climatic and edaphic conditions and other functions of the crop, determined the choice of the crop to be cultivated.

Thottam or garden land, by and large found near houses and villages is another type of farming system practiced by the Malayalar farmers over generations. Thottam is part of their agricultural production unit where the crops grown are essentially for the market. Jack tree, goa and citrus species are common crops raised / found in the thottam. The other crops like coffee, cardamom and banana and in few areas tamarind are cultivated in the garden land. Another type of land is kirai, which is the grazing land for the cattle. Traditionally, cattle was an integral part of their traditional farming that almost all the households set aside a portion of the land primarily for grazing purposes. The Malayali farming practices enable the farmers to maintain different land use and vegetation units. The farmers believe that diverse cropping systems have been followed to ensure food security of the people. The study revealed that this system enabled the people to have a reasonably balanced diet, which consisted of nutritious millets and protein rich pulses.
These food grains have good storage potential. They are well adapted to the local environmental conditions. It was characterized by low level of commercialisation.

**Soil nutrient management**

Generally, the traditional crops were cultivated with the locally available resources. Green leaf manure was extensively utilised for wetland paddy cultivation. Organic manure has been utilised for the upland and in stony areas *(kollakadu)*, where they cut and burn the thorny shrubs which serve as manure. In the case of HYV paddy variety, Tapioca and other plantation crops chemical fertilizers like Urea etc are used. The common method of manuring the uplands has been to keep the cattle in the agricultural land after the harvest, to manure the field with cattle refuse. This method of manuring is locally referred to as *Patti adikkaradu*. Depending on the soil quality and on the crops to be cultivated, some of the land is intensively manured by keeping the cattle for a longer period. Once a particular field is sufficiently manured, the cattle is shifted to another plot/portion of land. However, the *Patti* method has almost disappeared from this region. The use of plant species as manure in the wetland is less these days as compared to earlier times. As it is time consuming and involves hard work people prefer chemical fertilizer to leaf foliage.

Livestock formed an important component in the traditional *Malayali* agricultural system. Today it has lost its significance. Only few households own cattle and goats. People have stated that cattle population has reduced considerably. It was common for the *Malayalis* to posses one or two pairs of bullocks. Presently, in the population studied only eight households have draft animals. The villages mentioned that they do not have sufficient cattle manure even for their paddy fields. Piggery is common among the *Malayalis*, though in the sample population we found no households domesticating pigs.

**Loss of crop diversity vis-à-vis reduction in land holding size**

In trying to understand whether reductions in the size of land holding caused decline in crop diversity in Kolli Hills, various other factors emerged as crucial ones. Although these factors seem quite common and not unique to Kolli Hills, what may be worth analysing is the process and the manner in which these interrelated factors affect the society and economy of *Malayalis* in Kolli Hills. Land fragmentation is certainly a major issue. The information generated through a genealogical study does not suggest that reduction in land holding size has been the primary cause for the disintegration of their traditional food crops particularly,, the minor millets. On the other hand, the study reveals a strong link between the loss of crop diversity and different developmental activities initiated by the government in the post-independence period. Coupled with these developmental activities is external pressure, which also has its toll on the decline in crop diversity. As these are interrelated, no one factor can be seen in isolation. Interplay of various factors pushed people to exploit the land for commercial purposes.

It is quite common in a society mainly in a patrilineal society like Kolli Hills, where the landed property is equally divided among the male siblings for land holding size to shrink over generations (unless otherwise the members keep accumulating property by way of purchasing or restricting the inheritance to one person). Besides the shrinking of land size, land also gets fragmented. In Kolli Hills, land division over the generations has reduced the size of holdings. It
is because, as has been already pointed out, among the Malayalar, the landed property gets equally divided between all the male children (except in rare cases) based on their customary law. Interestingly, if one goes by this study, the crops cultivated and the cropping pattern do not show any marked variations until late 1970’s. Invariably almost all the households irrespective of their land holding size followed similar cropping pattern, which meant that their agricultural activities centered on subsistence farming until two decades ago. Younger generation who are in their late 20s and early 30s vividly remember the variety of crops cultivated and cropping patterns practiced in their lands in different seasons. The land holdings are usually small in size and fragmented. Even in the smallholdings the farmers cultivated diverse food crops.

**The changing trends in traditional farming**

How and what caused the traditional food crops to recede to the background? The process set in during the post-colonial period particularly, after 1960’s, when state with a view to improve the socio-economic conditions of the people, built-up necessary infrastructure in Kolli Hills. In order to address the needs of the local communities, the State put together a social agenda to work for the overall development. The planned intervention of the State has been towards multifaceted development. It was with this in mind that in 1960, Kolli Hills was formed into a separate community block. It was later converted into a tribal development block in 1963. It is one of first two such blocks formed in Tamil Nadu. Launching of Integrated Tribal Development Programme in 1973 was the State’s attempt to understand the specific needs of the tribal communities. The facilities/developments came in the form of construction of roads mainly that connected the Kolli Hills with the plains (1959-60), various government offices and departments like Panchayat Union Office (1961), State Horticultural Farm (1974), Agricultural Development Office, Sericulture, Electricity, Co-operative (LAMP) societies (1977), Public Distribution System, Schools (middle school- 1965, Higher Secondary School -1978) and so on. These developments opened up the lands and the people to external forces and accentuated contacts at many levels. Simultaneously, a new generation was emerging which was exposed to school education. For this transitory generation education gave or exposed them to opportunities to have access to information outside Kolli Hills. Exposure to urban culture and way of life is reflected in different aspects of Malayalar lifestyle. The urban lifestyle has spawned a host of desires and needs for them such as desire for a variety of clothes for themselves, and for their children, their wish to celebrate marriages and other social functions in a grand manner, a preference to replace their thatched roofs with tiles and a variety of other needs. Satisfaction of all these requirements required money.

Fortunately or unfortunately it was during this period (1970s) tapioca, a commercial crop entered into Kolli Hills. A gradual process of commercialisation of agriculture in Kolli Hills had set in leading to reasonable cash inflow to the Malayalar households but resulting in loss of valuable traditional crop diversity and scores of associated ecosystem services. Rich traditional knowledge related with the local crops and farming practices are almost on the verge of disappearance. Their cultivation has undergone extensive transformation (from subsistence mode of production to commercial mode of production) over the last two /three decades. While the developments (mentioned above) are important for the socioeconomic improvement of rural and tribal communities what is disturbing is the subsequent displacement of traditional farming systems in these areas. Malayars of Kolli Hills have now primarily become producers rather than
the consumers of their farm produce.

Agriculture is not considered viable, these days. There is a preference for non-farm jobs - a tendency increasingly surfacing particularly among younger generation of Malayalar Community. Traditionally, the farm activities require the full and active participation of family members. Relatives and others in the hamlet are obliged to work for each other or render assistance during the peak season. Slowly, it is also changing. Dependence on outside work for livelihood was not common. The process of selling their labour to outsiders has begun and may increase.

Annexure II

Case Study on Kurichyas of Wayanad: one of the largest family farmers of the world

Kurichya farmers of southern India practice collective family farming by holding large area of land under possession through unique family organisation. Kurichyas, the landed agriculturalists of Wayanad district of Kerala are organised themselves in to big joint families (Kumaran, 1996; Varma 2004; Chakko, 1994). They are well known for organised game hunting, conservation of diverse plant and animal species, and for the immense traditional knowledge they possess on the natural resources around them (Kumar et.al, 2010). Kurichya community have a unique social organisation, characterized by matrilineal joint families, which prevent land fragmentation and alienation through collective ownership. Their land governance system and co-operative farming by kinship labour is a model for the whole world. But they are in a stage of policy and political negligence within the agrarian and land policy frame work.

Kurichya Family Organisation

Kurichya as ‘one of the largest joint families ever reported in anthropological literature’ (Aiyappan & Mahadevan, 2008). A Kurichya Mittom is a joint family of more than 100 members living in one single house complex with large area of land under possession (Varma, 2004). The agrarian system of Kurichya is based on collective ownership of land, cooperative agriculture and kinship labour (Aiyappan & Mahadevan, 2008). It resembles the agrarian society of Kerala before the introduction of caste system in Sangam period. The unique social organisation based on matrilineal succession and the subsistence based agriculture of Kurichya complemented each other to survive as a sustainable natural resource management model.

Kurichyas follow matrilineal joint family system. The joint family live in a single house complex under the leadership of an elder male member called Odekkaran. As an agricultural and hunting community they found land and their members as important assets of the family. They worship the ancestral spirit (Negal/Muni) as the sole owner of these properties. The man who established the Mittom by acquiring land and people becomes a Negal (shadow) after his death. The whole system works in the belief, that the land and the family is the property of the Negal. Present generation has to protect these resources as custodians. Kunjukuttiyum Makkalum (the sisters and their children) are the second concern of Kurichya system. The property right or membership of the family decent through the females of the family (Kunjukuttiyum Makkalum). As agriculture is the main economic activity of a Kurichya Mittoms male and female members involve in farming activities year round both in dry and wet lands. Farming, herding the cattle, maintaining the house and cooking are the main chores of a Kurichya Mittom.

Labour organisation

In the joint family, the male and female members organised under a family head called Odekkaran (pittan). Odekkaran is in charge of managing the property and organizing the members for family affairs and agricultural activities. Odekkaran is given special respect by all in a Kurichya Mittom (Aiyappan and Mahadevan, 2008). The Odekkaran will be one of the eldest male members of the family elected by all the elder male members. The decision will also be approved by the ancestral spirit (Negal) and the three main gods through the shaman. The main duty of Odekkaran in the day to day affairs is organising male members for the agricultural
activities while his wife, *Odekkarathi*, depute women members for works in agricultural field and kitchen and act as a leader of the women folk. *Odekkaran* is the custodian of grain storage and seeds of the *Mittom*. Distribution of grain for cooking is the daily duty of *Odekkaran*. Distribution of cooked food among the members is the duty of *Odekkarathi*. But the decision making council of all male members called *Kootam* has to approve all the decisions. Cooking for the large family in the common kitchen is always a group work of women in different generations. *Odekkaran* as the custodian of common grain storage has to release sufficient volume of grain for daily cooking to *Odekkarathi*. She fixes a group of women for that days cooking and hand over the grain to them. They do all necessary steps to cook the food including collection of vegetables from the yard in different sub groups. Distribution of cooked food among the members is always the duty of *Odekkarathi*. The groups of women who do cooking farming activities and maintaining house will work in rotation basis. Likewise men in groups do different works in the field, such as cattle herding, land preparation, in wet and dry land, sawing, preparing manures etc. All the agricultural and other works of *Kuricha Mittom* are done by the residents of the joint family. Everyone has to do their duties in turn they are supplied with food and other basic needs of life like dress, medicine and shelter. Even the *Odekkaran* and *Odekkarathy* work in the field in their turns with others.

There is a clear gender division of labour among the members; cooking and maintaining the house is solely women’s responsibility. In agriculture land preparation, sowing, manuring are men’s domain while replanting, weeding, reaping, cleaning the harvested grains etc are women’s domain. In the process of land preparation, sowing and harvesting, both men and women have different inevitable interdependent tasks and roles.

### Contribution to Biodiversity conservation

Currently they conserve 12 land races of paddy and many vegetables and 13 verities of banana and numerous medicinal plants and tubers in their homesteads. In dry land they cultivate coffee and other cash crops. *Kurichya* homesteads are diverse with food crops, medicinal trees, sacred groves and alternate life-saving crops which stands over adverse environmental conditions like drought, flood etc (tubers and wide varieties of traditional rice germplasm) (Kumar et.al, 2010). The culture and tradition of *Kurichya* is associated with biodiversity. The rice verities like *Chennellu, Veliyan, and Gandhakasala* are inevitable for offerings to god, feasts and other rituals. *Kurichya* observe six different rituals in the life span of a rice plant. *Kurichya* have all service specialists with in their community -traditional healers, basket weavers and skilled carpenters. There are a number of native plants associated with the *Kurichya* healing, handicraft, weapons and implement making tradition. More than 50 species of inland fish and numerous plant species seen in the paddy fields are part of *Kurichya* diet. The game meat from the neighbouring forests was integral part of *Kurichya* culture and food basket until the enactment of Indian wildlife protection act in 1972. The cultivated diversity of vegetables, rice and other cereals and tubers in *Kurichya* homestead is still heist among other communities in the region.

### User rights on land and produce

All the properties of the *Mittom* including land, houses and agriculture produce are collectively owned. All the members work together in the land to produce food, especially rice. The matrilineal rules give minimal but essential rights for all individuals. *Kurichya* developed
different strategies to meet the individual rights on land. Rice cultivation in Wayanad is usually divided into two seasons called Nanja (June-December) and Punja (January - May). The first season (nanja) mostly depends on rain and the second (Punja) on irrigation from rivers, streams and ponds. Kurichya Mittom with large land holdings usually does nanja cultivation for the common use to meet the food needs of all the members. They allow individuals to use pieces of land with the permission of kootam for individual cultivation in second season (Punja). This produce can be used by the individual families for any need of cash (additional income). There is also practices of individuals, both male and female, cultivating ginger, turmeric and other such short duration crops in the dry land for individual financial needs. This way, the system allows a kind of individual user rights on the land they collectively own. These user rights are not restricted to the matrilineal members of the family but all residents of the family. That is the women residents, the wives of male members who are not the members of the family and their children are also have the opportunity to use the land and resources. Women of the joint family collectively do organised vegetable cultivation in the second season for the consumption of the family. Each women or women groups maintain beautiful small sections of vegetable gardens in different portions of the commonly owned land.

Rituals

The continuity of Kurichya joint farming system is rooted in its culture. It is expressive through numerous rituals and beliefs. There are three types of rituals observed in a year. The life cycle rituals of individuals, annual offerings to the deities and rituals associated with agriculture. Important life cycle rituals are observed on birth, puberty (for girls), marriage and on death of the individual. All these rituals are the responsibility of the maternal Mittom of the individual, irrespective of gender. It is the responsibility of all members to be present and organise the annual offerings to the family god and goddesses. There are six different rituals associated with rice cultivation. All of these are observed in the first season (Nanja) of rice cultivation. This is one of the reasons that Kurichya are very particular to cultivate traditional rice verities during Nanja. For all the specific rituals are associated with different rice verities based on duration and special characteristics. Thus variety conservation is very much integrated with culture.

The whole process of collective rice cultivation is ritualistic. Sowing of first seed for nursery (Vithidal) is observed in the very next day after Vishu (the popular harvest festival of Kerala). Before this they call Koottam, to get permission from Negal and Thampayi (God). Every stage of cultivation is started with a ritual. Beginning of transplanting of rice is nattivaekkal. This is started with a big feast called Sambalamoot. They worship buffaloes before starting ploughing and land preparation. They believe that the day Makam in Malayalam month Kanni is the birth star of rice. To celebrate the day, they worship the blooming first rice panicles. Next month is the celebration of reaping the first rice panicle of the season. The ritual associated is called Kathirukettal and after this they go for a ritualistic game hunting in the nearby forests. Koythu thudakkam is the official beginning of harvest. After finishing all harvest they conduct Puthari kolu which is the offerings to the God as a “thanks giving” for a good harvest.

Changing cropping patterns and agrarian distress in Wayanad

20th century witnessed large scale peasant immigration from the southern plains of Kerala, to Wayanad. The then government encouraged immigration under the programme ‘Grow more food’ to address the food crisis after the world war by leasing out the forest lands. This migration
continued for 20 years and led to extensive dispossession of Adivasis, mainly Mullukuruma and Kurichya, from their agricultural land. Encroachments and illegal transfers of Adivasi land made many of these traditional agriculturalists agricultural labourers and they lagged behind the general development scenario of the state (Prasad 2003, Wayanad Initiative 2006). This course of migration changed the demographic profile of Wayanad by making the Adivasi population a minority. In 1942 the Adivasi population of the region was 61,000 out of the total population 74,000. But currently the Adivasi population is only 17 per cent of the total population of the district (Krishnaprasad, 2010).

The migration along with state agricultural policies changed the cropping pattern and ecology of Wayanad by starting intense food crop production and then shifting in to cash crops in small holdings. The capitalistic cash crop economy could not ensure sustainability in the economic development and biodiversity management of the region (Kurup, 2010). The price fluctuation of cash crops in international markets and crop failures collapsed the agrarian economy of the district. Over 400 farmer suicides were reported from Wayanad during the period of 1999–2006, owing to the indebtedness associated with farming (Mohankumar and Sarma, 2006). Incidentally none of the Kurichiyas belonged to those ‘ultimate’ lists; in fact the unique model of joint family farming had given them greater chance to survive the pressures and they could keep their traditions more or less intact.

The agricultural policies that aim mass production encouraged extensive use of chemical fertilisers and pesticides. Introduction of improved seeds swept away the traditional agrobiodiversity. The report of Kerala Biodiversity Board after analysing the data from Peoples Biodiversity Registers gives this data on the loss of 160 rice varieties 12 pepper varieties, 13 banana and numerous vegetables and tubers from Wayanad’s agro-ecosystem (The Hindu, 2011). The biodiversity hub became land of plant deceases, soil and water pollution faced steep decline in productivity of all crops. During 1960, there were 40,000 hectares of rice fields in the region. It has come down to 11,832 hectares in 2007 and that also is scattered (Kumar et.al, 2010). The changes in the agriculture and land use priorities disturbed the livelihood patterns and social organisations of the Adivasi communities which evolved around rice production system (Kurup, 2010).

Kurichya joint families prevented the invasion of capitalistic mode of cultivating cash crops and continue as subsistence producers with rice as principle crop amidst all these changes. The reason for that is observed as their matrilineal property rights and land governance system which ensure sustainable management of land water and biodiversity. The large area of land under collective ownership helps Kurichya to develop a land and resource management system which ensures continuity of ecosystem, water cycle and maximum recycling of organic matter. The collective farming system helps them to be completely self-sufficient in labour. As Kurichya put forward a model for natural resource management and family farming they demand greater attention in this context.

Contributed by Ms. Suma T R (2014)
Annexure III

Kuttanad and Koraput Heritage Agriculture: Two ‘GIAHS’ from India

World’s family farming heritage systems and landscapes are quite a few, and evolved akin to the multitude of social, cultural and ecological systems of the globe. Kuttanad Below Sea-level Farming System (KBSFS) and the Koraput Tribal Agricultural Systems are two prominent examples that foster family farming heritage in India. FAO has recognized both these systems as Globally Important Agricultural Heritage Systems. The recognition of these unique farming traditions instigated a pride amongst the local communities and bestowed further inspiration for conservation and enhancement of such Farming Heritage.

Kuttanad Below Sea-level Farming System (KBSFS)

Spreading over an area of 110,000 hectares of networked lagoons and creeks, Kuttanad is one of the significant rice cultivation centres of Kerala- a densely populated state of India where historically the land for large scale cultivation had been very scarce. Kuttanad Below Sea-level Farming System (KBSFS) is unique, as it is the only system in the country that practices rice cultivation below sea level and is a master piece of manual reclamation adventurously done by individual entrepreneurs with crude and scanty resources and traditional technologies.

With different composition, structuring and use patterns and the local agrarian communities, the KBSFS becomes evidently functional and efficient in terms of conservation biodiversity and ecosystem services- largely regulation of the hydrology of the region and maintenance of livelihood services to people. Agriculture and Inland Fisheries are the major land/water use practices of the system, which is considered as the largest wetland use system in the west coast of Indian peninsula (MSSRF, 2007). Traditionally the efficiency of KBSFS was evidenced by cultivation of one crop of paddy without any external fertilizer inputs, followed with inland and estuarine fish wealth, notably the endemic prawn species, pearl spot and clams.

The natural land formation in the region made the people to aspire for more and more land and started developing the polder system of pumping out water and changing the course and intensity of river flows, lowering lake depth and reclamation of the lands. One of the inventive practices of early days was construction of retaining walls with dry rubble packages, known as pulimuts that served as speed barrier to change the course of flow of water and to protect the river strands. The reclaimed and naturally formed lands were used mainly for one season rice cultivation and popularly known as Pancha Vayals. Contiguous flat patches of Pancha Vayals that range between few ha to 2500 ha in size are known as Padasekharams, which are bordered with coconut gardens on the bunds and crisscrossed water canals offer an amazing sight. Out of the 14 districts of the state, only two are with fairly larger areas of rice cultivation and production- the Palakkad district followed by Kuttanad. These two places are called as the ‘rice bowls’ of Kerala and are very dissimilar in their ecology and land use approaches. Even with the changing environmental or socio-economic conditions, rice will be the only crop that is suitable to the lowland of Kuttanad and Keralites who are often known as the “rice eaters” who consume in an average of 3000,000 tones of rice a year need to give high priority for protecting this system.
Koraput Traditional Agricultural System

The Koraput district of Odisha, India is well known for its rich cultural and biological diversity. Tribal communities inhabiting this region belong to Proto Australoid ethnic stock and speak Austro Asiatic language. Sixty two tribal communities in varying concentrations live in the district and constitute 49.6 per cent of the total population. Of the total population, 83 per cent live in rural areas and 84 per cent of the population lives below poverty line. Main livelihood option is agriculture and 32.45 per cent of the populations are cultivators. Marginal and small farmers are dominant in the district with a holding of 0.1 to 4 ha. They are tradition bound and have rich traditional knowledge on existing agricultural crops and practices and forest species. Most importantly their knowledge systems are constantly evolving in response to the ever changing climate and surrounding environment.

Koraput district forms a major part of Jeypore tract of Odisha which has been established as one of the center of origin and diversity of Asian cultivated rice (*Oryza sativa* L.). Enormous landraces and traditional varieties of rice with impressive morphological, agronomic and physiological characters are cultivated in different ecologies situated at elevations varying from 150 to 1000 meters from MSL. Tribal farm families have been cultivating these landraces since thousands of years which allowed them to evolve naturally to adapt to changing biotic and abiotic stresses.

Rainfed agriculture is predominant amongst them, and cultivation is carried out in three seasons viz. autumn, winter and summer extending from May/ June to February/March. Rice is cultivated in fragmented lands located in different agro-ecological zones *viz*. upland, medium land (irrigated and rain fed), low land and *jhola* land (deep lowland). Within each agro-ecology, numerous rice landraces/ traditional varieties are grown depending on family preferences and local trading. Traditional rice varieties are well adapted to the agro ecological conditions and give them stable yield with low inputs under unfavourable climatic conditions. For cultivation they emphasized on duration of the varieties, family food needs and the requirement for socio cultural and magico religious functions. Some specific landraces are tolerant to disease and pest, drought and flood. They claim landraces are tasty, nutritious and provide them energy to undertake strenuous work, suitable for value added products like popped, puffed and pressed rice. Long straws are used for thatching and several are used as fodder. Tribes have emotional attachments with their landraces as those are the only legacy, they have received from their forefathers, and they respect it by continuing its cultivation.

Tribal farm families use various selection criteria before going for cultivation of a particular landrace. They look for landraces that are tall but resistant to lodging, disease and pest, having black or purple leaf sheath, long and heavy panicles, bold and medium slender grains with good threshing and milling quality. Long and broad leaves are given priority as it suppressing weeds. Black or purple leaf sheath helps in identifying weeds at an early vegetative stage. Grains with pigmentation are often selected as that helps in rouging the field and physical cleaning of the grains while selecting the seed. Coarse grains are preferred for daily consumption as they swell on cooking and give thick gruel that could be consumed as a meal during lean period. Landraces, which are suitable for value added products are highly preferred by communities. Aromatic landraces have good palatability and fetch a good market price compared to normal landraces. Ancestors of present day tribal and rural farm families have been developing, conserving and cultivating rice genetic resources from time immemorial using traditional knowledge and innovating practices. As a
result a range of diverse landraces still exist with varied morphological and agronomic characters and are tolerant to biotic and abiotic stress conditions. Traditional knowledge occupies a prime position in tribal agriculture. Traditional practices help to conserve the resources like traditional crops and varieties, soil and water in an integrated manner. Conservation and cultivation of rice on farm maintains genetic diversity and provides an opportunity to evolve naturally with changing climatic conditions. Tribal traditional farming systems are highly sustainable; they have been practiced for thousands of years without harming the ecology of the regions.

Text on Koraput contributed by Dr Smita Mishra (Mishra et.al 2010; Mishra et.al, 2013)