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Reading on PFM and Case studies

Draft Final Report

**ECOSYSTEM MANAGEMENT AND INCOME
GENERATION OF FOREST DWELLERS: A Study on
“Feasibility of a Non Wood Forest Product Based Micro
Enterprise for Peechi Vazhani Wild Life Sanctuary,
Thrissur, Kerala”**

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1. Background

Striking a balance between the needs of conservation of the forested landscapes on one hand and for ensuring the livelihood of the forest dwellers dependent on these landscapes on the other has become a challenge among the forest managers, policy or decision makers and scientists across the tropical forest ecosystems of the world. Extraction of Non Wood Forest Products in a sustainable fashion is identified as an alternative. But market oriented extraction systems often fail to take into account the processes of the natural systems leading to unsustainable extraction models. Good extractivism paradigm is proposed to have features, which ensure continuous availability of these products, fair market demand, regulation of flow of products, good institution mechanisms and reasonable income for the collectors with products collected of people's choice.

The Western Ghat Forests are renowned for biodiversity richness. The tribals living in and around the forests collect a variety of Non Wood Forest Products (NWFPs) from the forest for their subsistence. They possess traditional knowledge and technology in this activity. The exclusive right for collection of these products from the forest is also vested with these communities. Collection and marketing of these products is entrusted with the Kerala State Scheduled Caste and Scheduled Tribe Development Co-operative Federation Limited through tribal Societies known as Girijan Service Sahakarana Sangham.

Nucleating each Sanctuary with the surrounding dependant settlements into an eco-political unit is a necessity. Empowering this unit with the responsibility to harvest in a sustainable fashion, catalysed by political power, social consciousness and academic inputs should be the goal in a long term perspective. This forest management system would work as a model to serve as guidelines in evolving effective management strategies.

2. Introduction

Conservation of biodiversity in protected areas ensuring the livelihood security of traditional communities has become a challenge in the field of forestry. Past management efforts have resulted in continuous erosion of traditional usufruct rights enjoyed by the communities. This has evoked a feeling of hostility amongst communities with the departments. The resultant conflict and change in the attitude and approach towards the resource base are emerging threats to sustainable forest management. As a result, unsustainable harvesting practices like over harvesting, early harvesting and destructive harvesting continue to flourish. This has led to the degradation of forests, threatening the livelihood of landless poor depending on forests for their subsistence activities. But, the emerging concept of managing forests for Non Wood Forest Products (NWFPs) has revolutionised the whole approach of sustainable forest management. Importance of NWFPs as an effective tool in forest management has been widely recognised and the stress on the need for its conservation has been identified by many workers (Hall and Bawa, 1993).

Till recent past, logging or farming operations were believed to be the major source of income from tropical forests, while studies throughout the world have revealed NWFP as the most potential source of income. Trade in NWFP was found to be more profitable than timber harvesting, managing plantations, cattle ranching any other forestry operation or alternative land use. (Peters *et al*, 1989., Balick and Mendelsohn, 1992., Jahinge *et al*, 1993). The extraction of these resources can provide tangible benefits to the local people simultaneously conserving the biological resources of standing forests, which in turn ensure other invaluable and infinite indirect benefits of the forests.

The emerging paradigm in sustainable forest management is to research into the possibilities for enhancing the potential of NWFPs in conserving biodiversity while ensuring the livelihood of traditional communities. Prevailing methods of unsustainable harvesting like over harvesting, early harvesting and destructive harvesting pose a threat to the

sustainable resource use. Identification of factors influencing unsustainable resource extraction will help in evolving guidelines for developing sustainable forest management strategies. Traditional / indigenous methods or appropriate scientific methods can only be efficiently employed when there is an ecologically sustainable, economically viable and a socially just management practice. Majority of the items harvested from the forest are ingredients in Ayurvedic medicines of great demand in and out of the State. Value addition potential of certain items and off season sales of many others through a micro enterprise will enhance income which will help to tide over the off season, controlling destructive harvesting means of many items.

For development planning, stock taking or inventory of all NWFPs collected, used and marketed for subsistence, is a prerequisite. The socio-economic status of the local people and their perceptions on these resources has to be assessed to evolve locally relevant ecological management strategies. Accounting the resources and valuing them will give an ecological and economic perspective for development options.

Non Wood Forest Products (NWFPs) include all goods of biological origin derived from forests excluding wood in all its form. This include fuelwood, fodder, green manure, litter, grass, etc, edible items like fruits, nuts, root tubers, honey, meat etc, industrial raw material such as bamboo, reeds, canes, gums, resins, charcoal etc and as raw material for ayurvedic medicines and cosmetics.

Unsustainable harvesting of Non Wood Forest Products (NWFPs) has lead to the degradation of forests threatening the livelihood of landless poor depending on forests for subsistence activities. Low income received selling these products persuade collectors to harvest more for subsistence. Unsustainable harvesting practice results in forest degradation leading to poverty, which will in turn again lead to forest degradation. Traditional foraging has many problems. Over harvest, early harvest and destructive harvest are direct threats to the resource base. Competition and negative attitude and approaches also result in unscientific practices. Consequences could be devastating. Degradation of forests, quality of life being adversely affected, depletion of resource base and related environmental impacts are serious threats. Hence it is necessary to revitalise NWFP harvesting, processing and marketing systems on a sustainable basis. Potential of NWFPs in enhancing income and

involving the stakeholders in Participatory Forest Management is receiving great attention and is identified as the need of the time.

Objectives

1. Inventory of forest products (NWFPs) on which the forest dwellers living in the Sanctuary are dependent for subsistence.
2. Identification of the people with forest dependence, based on the income they derive from NWFPs and other sources.
3. To study the value addition potential of selected products based on sustainable extraction.
4. To determine the nature and character of the micro enterprise
5. Preparation of a written document from all stake holders involved, and a micro plan through a consultative process and through resolution of conflicts with in groups.
6. Capacities building with in the ethnic group to establish run and manage the enterprise.
7. Inter institutional linkages among the enterprise, local body and departments concerned. (Forest, Tribal Development, Girijan Service Sahakarana Sangham).

3. Study area

Peechi-Vazhani Wildlife Sanctuary is situated in the forests of Central Kerala between 10° 28' – 10° 40'N latitudes and 78° 18'- 78° 28'longitudes. Total area of the Sanctuary is 125 Km². The Forest formation comprises of moist deciduous and semi evergreen types. Altitude ranges from 100-700 m above msl. Annual rainfall ranges from 2500-3000 mm.

The National high way 47 passes through the Sanctuary breaking the corridor between Peechi on the south and Vazhani forest tract on the North. This has resulted in the isolation of Vazhani half of the Sanctuary from the Peechi forests, which is contiguous with the forests

of Southern Kerala. The isolated tracts of Vazhani become more vulnerable to fragmentation than Peechi, resulting in greater degradation.

Moist Deciduous Forests is the most dominant vegetation type comprising 80% of the area, 15 % is covered by Semi Evergreen forests and 5 percent under plantation of teak and softwood species.

4. Methods

For preparing an exhaustive list of forest products, the daily, monthly and annual collection registers, since the inception of the society in 1976, for the past 25 years, were used for collecting information. Quantity of each product collected and revenue generated through selling each item were also recorded.

A reconnaissance survey was conducted in all settlements of the Sanctuary. One of the eight settlements of the Peechi Vazhani Wildlife Sanctuary namely Olakara was selected for an intensive study. Following were the method used:

Structured Questionnaire

Structured questionnaire was prepared to collect the information on the socio-economic profile of the forest dwellers of the settlement. Informations regarding population of each social group, demography, settlement, landholding details, education, livestock, housing structures etc were collected and analysed using this method.

Participant Observation method

The foraging groups were followed to the forest to identify the item collected, and effort involved in collecting the products. Identification of the perennial and seasonal foragers and their livelihood activities were studied with the help of this method.

Semi Structured Interviews

Information gathered through Participant Observation Method has been used to proceed with Semi Structured Interviews to concentrate on topical issues. Information about the foraging groups, its composition, size etc, availability and peak season of items collected, effort involved and foraging efficiency, variation of Seasonality etc were collected using this method.

Preparation of maps

Toposheets (SOI) and Sattelite imageries (IRS 1C) were used to prepare a vegetation map. GPS readings were recorded from the forest sites which was incorporated into MAP INFO (a GIS package) and later verified through ground truthing.

Review of studies carried out in the project site

Menon and Balasubramanyan carried out a detailed study on vegetation in the region (KFRI Research Report 32) titled “Species relation studies in Moist Deciduous forests of Trichur forest division (Kerala)” which is briefed as follows:

The vegetation is of Moist Deciduous and Semi-Evergreen type with 500 ha. of mixed plantations of teak and bombax. In the moist-deciduous forest the canopy remains leafless during the dry season. The chief species of the top canopy are *Albizia odoratissima*, *Bombax cieba*, *Dalbergia latifolia*, *Dillenia pentagyna*, *Grewia tiliaefolia*, *Haldina cordifolia*, *Lagerstroemia microcarpa*, *Pterocarpus marsupium*, *Tectona grandis*, *Terminalia bellerica*, *Terminalia paniculata* and *Xylia xylocarpa*. The lower canopy consists of species like *Bridelia retusa*, *Careya arborea*, *Cassia fistula*, *Erythrina stricta*, *Schliechera oleosa* and *Sterculia urens*. Annual fire during dry season is common in this forest formation. The semi-evergreen forest formation comprises of evergreen species as well as a few deciduous species, which generally occupy in the upper canopy. The canopy is multi-tiered. Herbs and shrubs are less abundant compared to moist deciduous forest. The under-storey is largely comprised of seedlings of tree species. The major species found in the upper canopy are *Cinnamomum verum*, *Hopea* sp., *Lagerstroemia microcarpa*, *Meliusa tomentosa*, *Polyalthia fragrans* and *Vitex altissima*.

Most important species that are found to be associated with many others forming dominant communities are as follows. *Xylia xylocarpa*, *Dillenia pentagyna*, *Tectona grandis*, *Terminalia crenulata* and *Grewia tiliifolia*. The species with percentage positive association values between 40-60 is listed as follows: *Acacia intsia* with a maximum positive association value along with *Bambusa arundinacea*, *Butea superba*, *Careya arborea*, *Dillenia pentagyna*, *Gardenia turgida*, *Garuga pinnata*, *Holarhena antidysentrica*, *Lagerstroemia microcarpa*, *Lannea coramandelica*, *Meyna laxiflora*, *Sterculia urens*, *Tectona grandis*, *Terminalia crenulata*, *Wrightia tinctoria*, *Emblica officinalis*, *Macaranga peltata*, *Piliostigma malabaricum*, *Pterocarpus marsupium* and *Zizypus xylopyrus*.

A study on the rate of forest denudation in Thrissur Forest division (Menon 1986) which is estimated to be 23 percent during 1930 – 60 has doubled to 50 percent during the year 1960 – 84. Construction of Peechi and Vazhani dams during 1950 –60s has resulted in significant loss of forest cover. Flow of immigrants as encroachers and as settlers who were mostly the labour force during the construction phase contributed to loss of forest cover to an extent.

Jayanarayanan in his work titled “Forest degradation in Kerala – causes and consequences Forest in and around Peechi – Vazhani Wild life Sanctuary: A case study” (KRPLLD Project 39) studied the floristics, biotic pressure and its impacts on selected settlements within the region. In the floristic and phyto-sociological studies, which have been touched upon in detail, addresses the regeneration, species composition and similarity indices in different vegetation types of forests in the region. Of the eight adjoining Panchayats around the Sanctuary, Wards of the two Panchayats were selected to study the dependency on forests in the past decades since 1960s. Dependence on fuel wood, green manure and livestock by the non tribals and selected tribal hamlets has been studied.

A Study on the flora of Thrissur forest Division (Sasidharan, N. 1994) account for the biodiversity richness of the region. 1200 species of angiosperms has been reported, belonging to 129 families distributed over 695 genera excluding exotics and cultivated plants. Fifty species are endangered and ten new species has been recorded from this area.

A study conducted by Sankar on “Conservation, management and sustainable utilisation of Non Wood Timber Forest Products in the Southern Western Ghats of Kerala, India” in collaboration with Rajagiri college of Social Sciences (KFRI Research Project 237/97) during the Year 1994 – 95, has thrown light on the forest dwellers and details on forest products they are depending upon for subsistence. Besides, factors influencing the foraging groups, sizes and patterns with varying seasons and other externalities have also been touched upon. The relevant aspects are dealt in detail in this proposal while explaining the study area. This work also has been the source for providing the background information to conceptualize and formulate the present project.

Selection of products for value addition

Of the product categories studied, almost all of them were subjected to varying intensity of impact. The products which can be harvested with relatively lesser impact are selected. Those are the roots of herbs and shrubs from the Moist Deciduous Forests (MDFs) which provide exclusive patches for each settlement to collect. The reasons for selection are given below.

1. Annual renewable parts facilitate a better supply of products with vast dominant patches of individual items available for extraction.
2. Vast exclusive patches of MDF for each settlement reduces inter settlement competition in foraging.
3. Foraging diverse products reduces thrust of foraging on individual plant species.
4. Diverting of attention from SEG patches (core zone) which are more susceptible to over harvesting and destructive harvesting.
5. Potential for value addition are more for these items which can bring more returns.
6. Female foragers are benefited; female groups are major foragers of this category of resource a stable income at family level, ensuring security, which will safeguard the interest in forest conservation
7. There is an affinity to collect this resource from the people's point of view in spite of low market prices.
8. Foraging during the season and off season sales can bring extra returns and will help in tiding over the off-season gap with out depending on other resources.
9. Roots of plants remaining unextracted, as 'left outs' sprout after rains. Dominant vast patches of individual items visited by foragers every year are indicators of sustainable harvesting practices and presence of adequate regeneration.
10. Promoting returns through this group of item minimizes destructive harvesting practices, which involve lot of time and effort in cutting down the trees for collection of roots and barks.
11. Ensure supply of non adulterated raw material to the manufacturers thereby helping in enhancing the quality of drugs.

Micro enterprise

The micro enterprise is a forest product based one, to provide value addition for a selected set of products. The products are selected based on ecologically sustainable, socially acceptable and economically viable criteria. The people are forest dwellers of Olakara settlement. The products collected from the adjoining forests within the Sanctuary will be used. Enhancing the skill set of the people in collection and processing of product parts will result as there will be additional participants. This will also create employment opportunities. Value addition through semi processing and storage will be carried out for selected products. Production and supply will be controlled by the forest dwellers and marketing through the Society under the supervision of the Forest Department. Facilitating genuine quality products to the local people and local market through this enterprise is envisaged. Strengthening of institutions involved and mechanisms to ensure continuous supply and flow should be ensured. Monitoring should be carried out on a regular basis for better accountability and transparency of the system.

The inventory of forest products revealed that there are diverse products being collected in varying quantities. After the stock taking was over, the next step was to identify or short list products for value addition process. The products were categorized into product parts. Habit, impact of harvesting, availability in the wild and people's affinity to collect etc., were some of the criteria used for short listing. Herbs and shrubs collected from the MDF were identified as the most potential product. (The criteria for selection are provided elsewhere in the report).

A charitable Society named 'Vanavasi Ayurveda Swayam Sahaya Sangham' was formed comprising of forest dwellers from Olakara settlement. This registered Society under charitable society act applied for a provisional registration for a Small Scale Industry (SSI) for a manufacturing unit. They obtained the registration (SSI/tiny) for extraction of essence from the roots of *Hemidesmus indicus* (Nannari). The essence is of great demand in the local

market. Manufacturing units in Tamil Nadu procure items from the forest and market the essence widely in South India including Kerala. Nannari is substituted/ adulterated by a large sized tuber which is being imported from Maharashtra in large quantities. This product has no required properties. Roots of Nannari are small in size and a syrup is obtained after boiling the roots in water. This is used as sharbath to mix with soda as a drink. The extract or essence can be used and stored for dilution and is used for industrial purpose also. Solvent extraction method is used for extraction. The Society has tried the indigenous method of extraction with alcohol (locally made arrack) as the medium. The extract was successfully made, but in traces and the solution was not clear. Hence the Society decided to proceed with consultation with the Kerala Agricultural University to standardize the protocols for manufacture on an industrial basis. The process of getting this work done took a very long time. Today the protocol is ready but a final testing and validation is awaited for manufacture on an industrial basis. By next month the transfer of technology is anticipated.

The second proposal was mooted by a group of females, a registered Society known as 'Stree shakthi' for cultivation of the most wanted (recognized by them) for cultivation in the peripheries and fringes of the forest areas. They developed a proposal for a 'buy back scheme' from the Ayurvedic drug manufacturers in Thrissur. This project was also attempted under the State Medicinal Plant Board under the commercial scheme. The manufacturers were willing for the buy back arrangement but arranging a loan via bank could not be possible.

The third proposal was by the VASSS to manufacture 'Choornams'. Market survey was conducted in the local market to assess the demand and feasibility of the project. The end product (choornam) of high demand was selected. Short listing was done again to identify the share of products from the wild as major ingredients. This list was checked with the availability of these products in the forests (history of collection from the study site since 1975 through the society). The available plants were listed out to be eighteen. Remaining plants were categorized as those which are available in the open market and those which can be cultivated in the homesteads. A total of 49 plants were found to be of immense demand as required by all manufacturers of which 18 are collected in relatively high quantities from the

forest through the Society. Most of the remaining ones are available in the wild, but are not collected by the society due to absence of market demand.

For the manufacture we decided a multipurpose pulveriser to be used. From the quotations and type of the machine we selected one which would cost Rs 45,000 and accessories worth Rs 25,000 more. Proposals have been forwarded and response is awaited.

A market survey was also conducted in Thrissur Wadakkancherry and neighbouring regions of Olakara to assess the demand for the medicinal plants among the drug manufacturers of the region. For this purpose eighteen manufacturers were visited. Of this eight were big establishments with their retail outlets being distributed all over the State. Ten manufacturers has small scale units who are traditional 'Nattu vaidyans' dealing with 'Paramparya marma chikitsa kendrams' and 'Visha chikitsa kendrams'. Survey revealed interesting results. The big manufacturing units did not show any significant response for purchasing of raw materials from the wild or for the semi- processed products if made a provision. But instead, there was an overwhelming response from the Nattu vaidyans who believed that these products if reached to them, has great benefits to them, as they can bring tremendous improvement in the efficiency of the combined formulations. They have knowledge in identification of plant parts and believe that parts collected from the wild local ones has curative properties significantly higher than the cultivated or imported ones. The availability of adulterants and substitutes in the market is of serious concern to them since they have a direct contact with the patients. For Visha vaidyans it is a matter of rescuing a patient from immediate death. There is no provision for them to buy from the society and those purchased from the open market is prone to adulterations. Nattu vaidyans has also showed interest in purchase of these items, for better prices from the wild if supplied consistently through out the year.

Annual demand of medicinal plants required by the Nattu vaidyans were collected and compiled. The list of plants was prioritized based on the demand as required by maximum respondents.

Microplan

Equity and sustainability issues are directly linked to use patterns. An action programme towards sustainability and equity can result in evolution of alternative use methods. Will these new use methods be adaptable and acceptable for the community? Documentation of the existing system/scenario is a pre requisite to demonstrate the present system and changes to be brought in for better functioning. To ensure that the current users or beneficiaries will not end up as losers after the change is being implemented there is a need of a detailed microplan. Before attempting for a detailed micro plan, essential elements to be included are discussed in detail.

Microplan, its process of development and implementation, its form and character etc is given in detail by Mehta and Vardhan (1996).

The project and its feasibility is being analysed with in the frame work of PFM programme of the State. It has become mandatory to the Government of Kerala to institutionalise forest management into the PFM programme to entitle the State for forest conservation grant from the Ministry of Environment and Forest, Government of India. The Kerala Forest Department started PFM in selected villages along the forest fringes with in the reserves as an experiment sponsored by the World Bank in 1999. Decentralisation and capacity building for good governance at the local level, involving local communities in the protection and management of forests is the goal. The government order (GO. NO. 84/97/E and WLD, dated 13-10-97) issued guidelines for the implementation of PFM in Kerala. The guidelines modified after incorporating the suggestions of the World Bank came out the same year. Under PFM the agreed forest management activities will be planned, implemented maintained and involved by the village institutions known as Vana Samrakshana Samity (VSS) constituted for the purpose with the help of suitable facilitators and the KFD. The process of PFM involves an entry phase, planning phase, implementation phase and monitory phase. The activities are envisaged on a water shed basis.

The watershed for action

The boundary of the Peechi Vazhani Wild life Sanctuary is being delineated based on the catchment area of the two reservoirs, Peechi and Vazhani. The delineated area of the micro watershed and plan of action is 14.17 sq km. These reservoirs are chief source of drinking water to Thrissur town and for irrigation in the environs. A micro watershed draining into the Peechi reservoir through Thalikuluzhi thodu, (a lionshare of water is provided by this micro watershed) is the watershed for action (Fig.11). The portion marked in the map forms the selected micro watershed. To traverse through, from the Olakara settlement to the forest for foraging, one has to cross this stream. The stream flow of Thalikuluzhi thodu for an extended period would be the indicator for the positive effort in the form of soil and water conservation in the upstream.

A landscape analysis of geographical distribution of the settlements in the forest and the distribution of forest types with in the forested landscape reveals that each settlement has a large exclusive patch of MDF and a small patch of SEG/EG which is being shared by all settlements. Here the evergreen and semi evergreen forest patches available for extraction is also being shared by three other settlements (Fig 12). How effective can the exclusive patches of MDF are effectively used by each settlement to avoid competition in the common SEG/EG patches is the success of this microplan and the programme. These common tract of SEG/EG constitute only 15 percent of the total Sanctuary and cater diverse flora and fauna representing the most fragile and sensitive ecosystem.

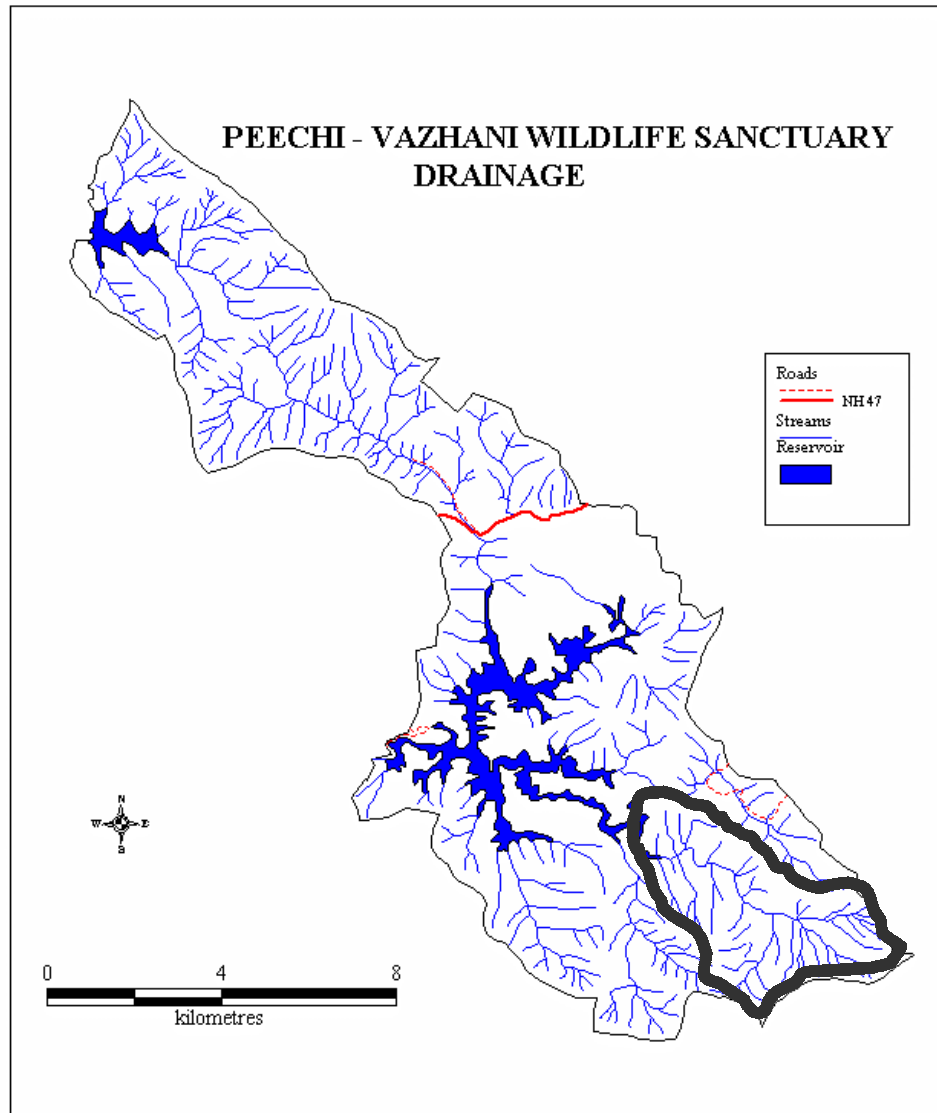


Fig. 11 Watershed of PVWLS with the micro watershed proposed for study

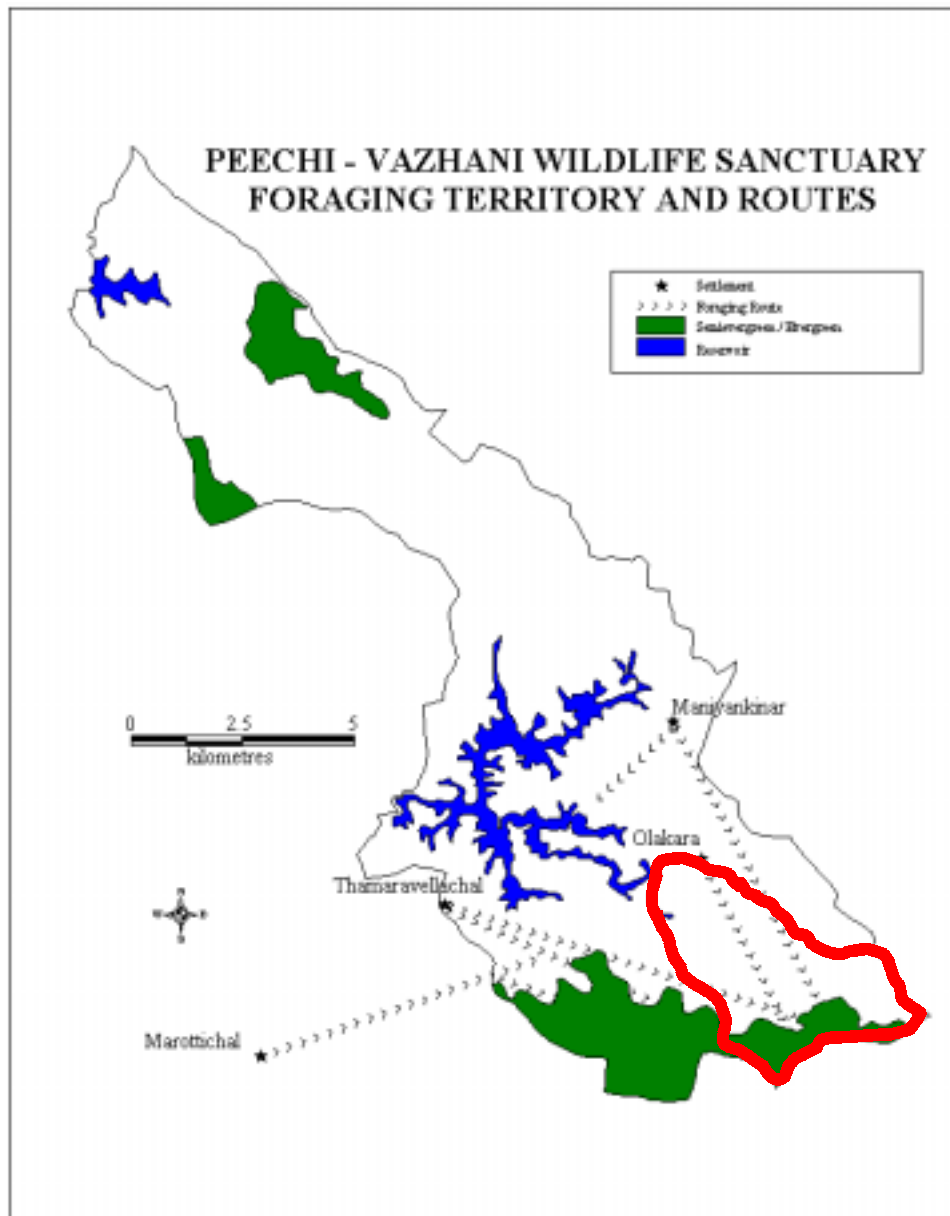


Fig. 12 Habitat and resource utility with in the micro watershed

Foraging groups in search of products in the Moist Deciduous Forests visit certain sites regularly for collection. These sites share certain characteristic features and hereafter are referred to as foraging sites. These sites are highly disturbed, with exposed rocks and poor canopy cover. Grass cover along with weedy growths of *Chromolaena odorata* is

predominant. Regeneration of tree species is found to be poor. Annual forest fires are common. Dense cover of herbs and shrubs of high market value are available in these sites. These sites are different from a healthy forest floor of MDF where regenerating tree seedlings are abundant with better canopy cover. These inferences call for a need of zonation with in the MDF with restricted activity being defined in each prescribed zones.

The committees constituted for monitoring, formulation and implementation of microplan are the following

The Forest Product Management Committee (FPMC)

This committee will be in charge for ensuring continuous supply and production of products in use. Representatives of Forest Department, Society and the forest dwellers are the members of this committee.

Duties and responsibilities of forest dwellers based on their interest and skill set

All the perennial foraging house holds will be the members with a representative of a male and a female member from each household. Of the seasonal foragers, Nattu Malayans (possess knowledge in collection and skill in processing) will be the core members in foraging and Kongu Malayans will be in charge of the production in the prescribed zones. The activities include collection of seeds, raising seedlings, propagation and planting. There are two types of activities. One is cultivation of selected plants as raw materials for the enterprise. Second, replacement of casualties due to the extraction practices of the past. This activity should not be mistaken with the enrichment planting. The non ST community will run the enterprise and market the finished and semi processed products catering the local market needs. Society will be in charge of collection of raw and semi processed products and marketing through the existing channels.

Institutional Support

The Forest Department and the Society can play an important role by providing support in terms of people and money. They will assist the FPMC through utilization and equitable distribution of resources and conducting timely election of the committee members.

A part of the development fund of the Forest Department and a portion of profit earned by the Society can be allocated for the implementation of the programme. The fund allocated for local level planning by the State Government for the development of NWFPs, tribal welfare fund, fund for local enterprises for ST under tenth plan etc can be set apart for this purpose. The Principal Investigator of this project is willing to work as a facilitator with an NGO back up, which can assist the committee in effective functioning, monitoring and resolving the conflict between different interest groups.

Capacity building with in the ethnic group

During this period, there were hectic activities going on (desperate efforts) to initiate a micro enterprise in this settlement. Investigator was a spectator often a facilitator's role without any catalyzing effect. Numerous ideas came into being, regarding the possibilities of semi processing and finished products tailoring to the needs of the local market. Existence of another tribal settlement of this kind, in the whole State, is next to impossible in terms of initiative ness, continuous interest and efforts being pumped in towards achieving this goal.

Activities and progress towards achieving the goal is listed.

A Society was registered named as '**Vanavasi ayurveda swayam sahaya sangam**' under the leadership of Shree Gangadharan, a very active and dynamic member with innovative ideas and positive thinking. Society was formed on 20.1.2001.

Obtained a provisional registration for a SSI for extraction of essence of *Hemidesmus indicus* for sales in the local market.

Attempts for standardization of protocols through KAU for extraction of the essence of *Hemidesmus indicus* to be used for industrial purpose.

Tried with indigenous methods but less quantity extracted and quality were constraints.

The procedure finalized after repeated and consistent efforts.

Market survey for purchasing a multipurpose pulverisor as a part of semi processing many products which will cater to the local demand. Ready with the quotation of the instrument for purchase. Funds awaited.

Survey among the manufacturers to identify the demand of plants collected from the wild.

Preparation of project proposals and letters to various authorities and ministers.

Irrespective of all these efforts, the micro enterprise has not been initiated till date. We are optimistic and efforts will continue till we initiate this venture. Departments which have been approached were interested in the project and we anticipate interventions in near future.

6. The forest dwellers

The population of the forest dwellers of the Sanctuary is 938 belonging 244 households with four persons per household (Table 5). There are more number of females; 473 and 465 females and males respectively. A lion share of the population (71 percent) is in the Peechi half of the Sanctuary. The settlement of Thamaravellachal (Plate 3) has the highest number of households, more than all the households of the Vazhani half put together and has 29 percent of the total population within the Sanctuary. There are 3.5 persons per household with males outnumbering the females, 141 and 127 males and females respectively. Maniyankinar is the second largest in terms of population and Olakara of Peechi half and Thirumani of Vazhani half rank third with 133 people each. Details are provided in table 5. In the Vazhani half, except Thirumani, others are small in terms of population. Vazhani is the smallest, constituting nine households and 36 people with females double the number of males. Location of the settlements is provided in fig. 10

Table 5 Population details of forest dwellers from each settlement

Hamlets	Households	Population	Percentage	Persons/	Males	Females
Peechi half						
Thamaravellachal	76	268	28.6	3.5	141	127
Olakara	38	133	14.2	3.5	63	70
Maniyankinar	37	144	15.4	3.9	68	76
Marottichal	27	120	12.8	4.4	63	57
Total	178	665	71	3.7	335	330
Vazhani half						
Thirumani	29	133	14.2	4.6	67	66
Kolapara	17	57	6.1	3.4	32	25
Mattinmugal	11	47	5.0	4.3	19	28
Vazhani	9	36	3.8	4	12	24
Total	66	273	29	4.1	130	143
Grand Total	244	938	100	3.8	465	473

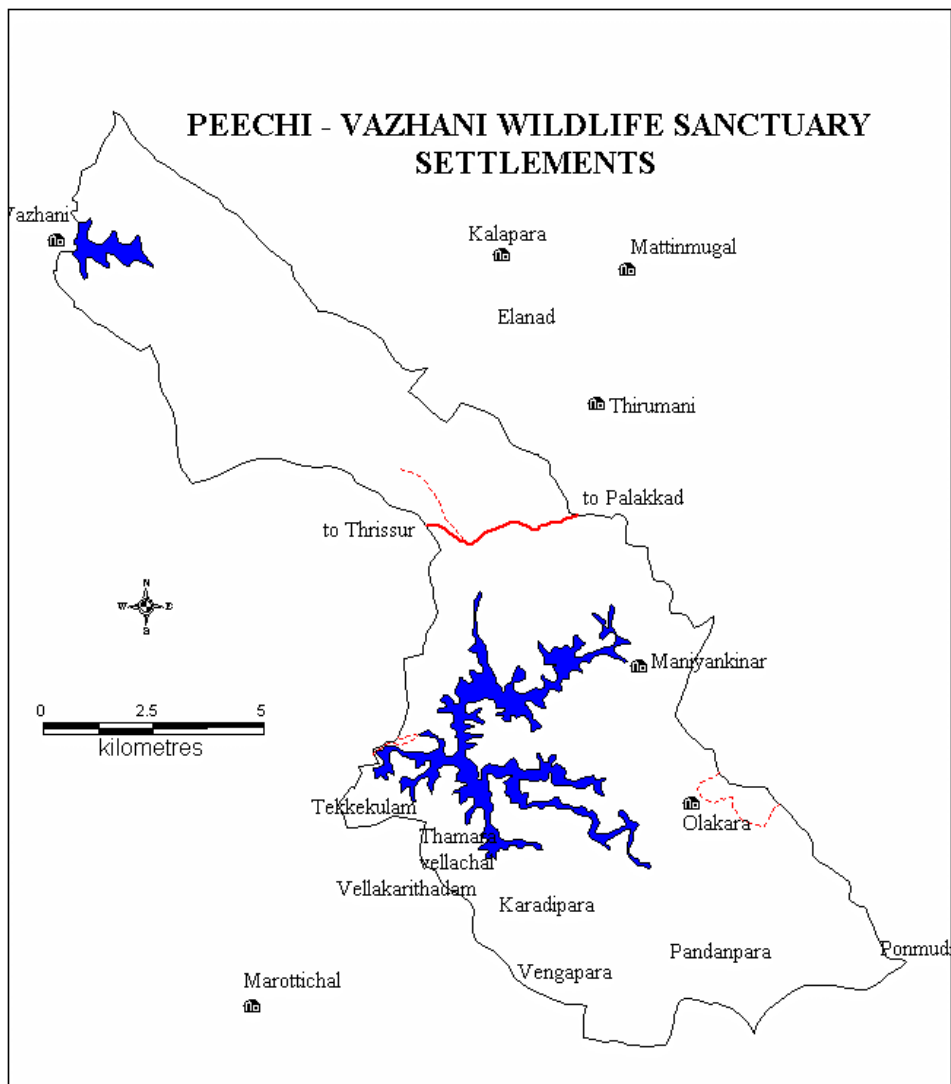


Fig. 10 Settlements of Peechi-Vazhani Wildlife Sanctuary



Plate 3 A household of Thamaravellachal settlement



Plate 4 A Household of Olakara settlement

Settlements in the Vazhani half had only ST population comprising Malayan community. SCs are present only in the Peechi half. Thamaravellachal settlement is heterogeneous with Malayan representing the Scheduled Tribes and three groups of Scheduled Castes namely Parayan (or otherwise known as Sambhava,) Kavaras and Pulayans. There is one household each in Maniyankinar and Marottichal. Malayans constitute of two groups namely 'Nattu malayan' and 'Kongu malayan'. 'Kongu malayan' is those who came from Tamil Nadu. There are also households belonging to Ezhava, a backward community, living with in the tribal settlements.

Socioeconomic profile

Nuclear family is the prevalent kind of family. Majority of the residents are in the age group of 18-45 years (46%), followed by the age group of 0-18 years (35%) with 135 individuals from the age group of 0-6 years. 56.2 percent of the population is married and the proportion of divorcees or separated ones were found to be very low, less than 0.5 percent of the total population. Individuals from the older generation have not done their schooling, but most of them manage to read and write. Among those who have done schooling, majority has undergone lower primary education (20%). 15 percent of the individuals did their upper primary, 8 percent the high school education and 5% completed SSLC. Only few pursued their college education, eight individuals from Thamaravellachal, one each from Maniyankinar, Vazhani and Marotichal.

Majority of the households has more than one earning member in the family. Observations on household income indicate that 11 percent of the households have three or more earning members, 51 percent have two and 38 percent with one earning member. Occupation is either extraction or as wage labourers. Exceptions are a few like those employed as forest watcher, weaver, barber, tailor, fishermen, goat rearing and work in the post office, which accounts to only less than two percent of the total households.

Regarding the size of the landholdings, 60 % possess land of size below 50 cents. 15 percent possess 15 – 100 cents. In Thamaravellachal land holding size classes varied from less than 50 cents to more than 350 cents. Land of size 100 – 350 cents and above was found only in Thamaravellachal with exceptions like four and one households in Maniyankinar and Vazhani respectively.

Rearing livestock was practised by 43 percent of the households, most of them preferred to rear only goats. Low buying prices, easy maintenance, facility for grazing and easy option to sell when in need of lump sum money are reasons. Eleven percent is cattle owners, seven percent reared hens, and one percent maintained goat and cattle and two percent of them kept both goats and poultry.

Regarding the housing structure, 43 percent reside in tiled houses. 35 percent in thatched ones, 11 percent in terraced houses, only found in Olakara (11), Maniyankinar (2) and Thirumani (15). 10 percent live in huts.

Drinking water sources were mainly from neighbors well, public well, own well, own tap and public taps. Sixteen percent of the households had their own wells, of which majority represented from Thamaravellachal. Olakara, Thirumani and Marottichal had water sources nearby their houses whereas in Maniyankinar, 70 percent go quite far to the water source.

Few households (14%) have electricity connections with more concentration in Marottichal, Thirumani, six households each in Kalapara and Vazhani and one in Thamaravellachal. Rest of the households resort to kerosene lamps.

Toilet facilities used were of pits, open air and flush toilets. Nearly 64 percent of the households used open air, 24 percent used pits and 11 percent used flush toilets.

The forest dwellers of Olakara Settlement

Of the eight settlements, Olakara has been selected for an intensive study. There are 133 individuals from 38 households. This constitutes 14 percent of the total population of the Sanctuary. There are 3.5 persons per household. Females are more in number with 63 and 70 males and females respectively.

Malayans are the predominant community. Of this, there are two groups namely 'Kongu Malayan' and 'Nattu Malayan'. Kongu Malayan constitutes 58 percent of the total households. Nattu Malayan constitutes 34 percent and the remaining households are of Ezhava community with in the settlement.

Nuclear family is predominant. Active group involved in foraging are in the age groups of 25-45 which constitute 35 percent, of which, 19% belong to the 25-35 group and 16 percent in the 35-45 groups. The age group of 0-18 constitutes 40 percent. Most of them are married (53%) and 46% unmarried with one widower and divorcee in the settlement.

Majority of them can manage to read and write. 20% completed lower primary, 12% upper primary, 5% high school and 9% completed SSLC. Three girls pursued further completing PDC and graduation. Of them two are postgraduates, one completed BEd and is employed, and the second completed M.Phil and doing her PhD (from the Ezhava household of the settlement). Parents are keen to educate their children despite absence of infrastructure and facilities.

Majority of the households have land below 50 cents. Only 3 households possess more than 50 cents but with in the one acre range.

Most of them (58%) had tiled house (Plate 5) followed by terraced 29%. Two houses are thatched and two temporary huts.

21% of them possess their own well. 26% resort to public well. The rest of them depend on their neighbour's well (households holding their own well) as drinking water source. There are no electricity connections in this settlement and Kerosene is the only source of lighting. Fuel wood for cooking is collected from the forest.

Major occupation is collection of forest products. There are 6 perennial foraging household groups, of which 4 belong to Nattu Malaysians and 2 belongs to the Kongu Malaysians. Perennial foraging households are households deriving their income through collection of forest products exclusively, or deriving a lion share of the income. Seasonal foraging households involve in collection only during seasons, collecting promising products in terms of income generation. They involve as wage labourers of the Department or engage in the neighbouring homesteads to earn their income. The remaining 12 Nattu Malaysian households and 20 Kongu Malaysian households are seasonal foragers involving mostly in the collection of *Acacia concinna*, honey and selected medicinal plants.

7. Discussion

The 'menu' provided by the market for the forest dwellers is big, supported by diverse products from a wide category of plant parts. Even though there is a wide array of products being marketed, the lion share of revenue (86%) is derived from seven products. These products have been collected consistently almost every year for the past 25 years with good response from the market. All the seven products are found in the MDF but the frequency of distribution vary. *Acacia concinna* the most important in terms of revenue generation share both habitats of MDF and SEG. It is found in the healthy patches of the MDF with good canopy cover and in the SEG patches. *Acacia intia* share both MDF and SEG but found mostly found distributed in the MDF. Honey combs are found distributed in all the habitats with frequency of sightings significantly high in SEG. *Pseudarthria*, *Desmodium* and *Sida* are exclusively found in the MDF. *Piper longum* is abundant in the MDF, both in the dense and degraded sites and also found distributed in the SEG. The remaining products are equally important and sometimes very critical in tiding over the off season or for emergency needs.

Each forest type owes importance, in terms of the diverse products each exclusively produces. Conservation of these forest types or habitats deserves great attention and holds great importance in ensuring a continuous flow of products and providing livelihood opportunities for the dependent people. The MDFs are significant in terms of number of products. The number of products collected exclusively from the MDFs is more than the products collected from any forest type. Plants yielding products which are found in both the MDF and SEG provide maximum revenue. These products share both habitats, while when distributed in the MDF, occupy a relatively healthier patch or in the relatively non-degraded sites with in the MDF. They are absent in the degraded sites. The degraded sites with in the MDF have trees distributed sparsely, poor canopy cover, and eroded soil cover with rocky exposures. In these areas, regeneration of tree species is very poor. These areas are often the active foraging sites for a variety of products of the herbs and shrubs category responsible for a larger biomass flow. The products extracted from the SEG deserve equal importance as they have higher market value. This sensitive and fragile habitat type contributes to only 15 percent of the total forest area available for foraging. Thus each habitat type is important in

terms of providing products satisfying the needs of an array of stake holder groups. In this context, conservation of these forest types deserves great attention.

The forest dwellers, products, season and market demand has together evolved in space and time to constitute a livelihood pattern for the forest dwellers of this region. The people involved in extraction of products are dependent on forest to a great extent for their day to day activities. Ninety per cent of the population of the Olakara settlement belong to the social group 'Malayan', vested with the exclusive right for collection of products and possess traditional knowledge and skill in extraction. There are perennial foraging households involved in extraction of forest products as a year round activity deriving income all round the year or as in some cases extraction as the only source of income through out the year. For this group extraction is a way of life and not maximisation of income. There is a considerable decrease in the number of households in this category. As household strategy is to maximise income, income as wages are being resorted to. They work as labourers, foraging only during seasons for the key products which will fetch them more money. They are the seasonal foragers. This has resulted in intense competition in foraging for few items severely affecting the resource base through unsustainable harvesting means. These observations highlight the usefulness of a micro enterprise to provide value addition for selected products to provide ecological, social and economic benefits.

Marketing of forest products has better opportunities in the State, to be developed under effective institutions. The first and foremost factor is the diverse products that the forests of the State provide. In the medicinal drug formulation, mainly in Ayurveda, multiple products are used in trace quantities and the availability of an array of products is vital for the industry. Hence supply from the forest is being met by the diverse products that the variety of habitats produces and every time a drug being manufactured, diverse products are being assembled. Ayurveda is a growing industry due to its increasing popularity and since large manufacturing units are with in the State there is a high local demand.

Species richness is correlated with low density. Spatial distribution of products of interest in a species rich forest increases the effort involved in collection. Hence collection of diverse products with low market prices for individual items will distract people whose

primary focus is to maximize income. Non availability due to over extraction can worsen the situation further. Perennial foragers harvest products which involve moderate to high effort during extraction.

Most of the products are available only during certain seasons. Seasonality of individual products regulates the flow and availability only during a certain period of the year for the end users. Another factor which regulates the flow is the phenomenon called 'alternate bearing'. Most of the fruit yielding trees exhibit this phenomenon where by there is a fluctuation in production every year with a peak production followed by low production in the consequent years. Availability and demand for products which fall under different seasons to provide a continuous extraction cycle is important in providing consistent revenue through out the year. This is of serious concern as most of the products provide low returns.

Thrissur Thalappilly Girijan Society in charge of collection of products from the tribals was found to be satisfactory in marketing the products. But every time a hike in performance was observed there used to be a change in the person in charge which will result in the decline. Since its inception in 1976, there was a steep hike in collection till 1979 with decline in collection after 1979. There was an improvement in 1991, when the apex body (Federation) started functioning in Thiruvananthapuram. The efficiency of the person in charge in marketing is identified as the sole responsible factor affecting the collection and sales and not the availability in the wild or inefficiency of the foragers or lack of interest of the foragers in foraging. Since 1998, an efficient and enterprising man took charge which again was reflected in the collection. In the year 2000, the tribals from Thamaravellachal settlement as members took over the charge throwing the man in charge. The members from this settlement in the year 1995 voiced against the redundancy of the system, asked for the closure of collection depot in their settlement and started direct marketing of products to traders in town. They proved to be more efficient than the Society doing an excellent job marketing 75 products earning Rs 2,70,463 in just one year shared by 20 households (Sankar, 1997). Gaining confidence they took over the management but misappropriation of funds by the person in charge lead to the closure of the Society in 2001. The system remained closed for one year and opened with the intervention of Federation in 2002.

8. Conclusions

NWFPs play a major role in supporting the livelihood of the forest dwellers in the Sanctuary.

Each forest type is unique and plays a vital role in terms of providing livelihood support.

The flow of products through the Society and fluctuations in flow is not due to non availability of products, or people not collecting it but lack of initiative ness of the institutions involved.

Coincidence of the phenological events (flowering, fruiting, seed setting) and period of extraction has a negative impact on seed route regeneration especially of herbs and shrubs. Their abundance in the forest floor over years is facilitated by vegetative propagation from plant parts which may be affecting the genetic diversity.

Of the extracted species, 22 are red listed and six species are endemic. Nine species belong to the vulnerable category of which five trees and four species of herbs and shrubs are present.

Maximum number of products is collected from MDF. Highest revenue is accrued from products which share both habitats, MDF and SEG. Market prices are high for products collected from SEG.

Among the resource categories, roots of herbs and shrubs are potential products for providing ecological sustainability and social benefits.

Of the forest types, products harvested from MDF can decrease inter settlement competition and can provide more social benefits as there are exclusive foraging zones for each settlement.

Extraction scenario with diverse products can reduce the 'no income months' and can provide economic opportunities through out the year and generate more revenue. Individual thrust on key species will also be reduced.

Seasonality analysis indicates that there are threats of over harvesting which is unsustainable.

VSS of PFM have limitations in supporting a microplan for a forest product based micro enterprise. As areas for VSS are assigned in the fringes, peripheries or evicted areas of encroachments and forest products are in the periphery as well as in the buffer and core zones.

9. Recommendations

Forested landscape with forest dependant settlements foraging for livelihood should be the functional unit for future actions.

This functional unit should be represented by all mosaics of vegetation types that would cater diverse products to provide income round the year and support dependant perennial foragers for whom extraction is a way of life.

Societies of the State, especially the one in the study site (Thrissur Thallapilly Girijan Sangham) have played an effective role in marketing the products through preventing exploitation by the private traders and middlemen in the business to a great extent. But there is lot of potential left in this area through strengthening institutions. There is a long way to go and the goal can be achieved only through the functioning of a decentralised and an autonomous body.

The duties and responsibility of the Society should also include monitoring and ensuring the flow and sustainable harvest of a foraging site from each settlement of minimum extent. There is a need of extra manpower and the person in charge should also involve in the decision making bodies while fixing prices, allotment of prices and selecting products.

VSS of PFM have limitations in supporting a microplan for a forest product based micro enterprise. As areas of VSS are assigned in the fringes, peripheries or evicted areas of encroachments and forest products are in the periphery as well as in the buffer and core zones. For, at the settlement level, a forest product based venture, in the PFM context with in a protected area, a microplan should envisage the following: Areas assigned for preservation (core zone, SEG/EG types, with out any assigned activity), conservation (with in the SEG/EG and MDF with extraction limited to bare minimum) production (with in the

degraded MDF, not in terms of enrichment plantation of NWFPs but casualty replacements alone) and extraction (which is referred to as foraging sites). This should be envisaged at a landscape level within a watershed.

Capacity of the people and institutions is the most determining factor for the effective management of any natural resource. Elimination of the existing Society for the formation of VSS has resulted in collapse of the system affecting the livelihood and the resource base elsewhere in the State (PFM experience) Strengthening of the existing institutions through modifications and amendments should be taken up on a priority basis.

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