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Non-Timber Forest Products (NTFPs) for Food and Livelihood Security: An Economic Study of Tribal Economy in Western Ghats of Karnataka, India

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ABSTRACT

The present study attempts to assess the contribution of NTFPs to income and employment by ensuring food and livelihood security for the tribal economy in the Kodagu district located in Western Ghats of Karnataka, India. This study estimates the contribution to income and employment and the costs and returns of NTFPs collections. Furthermore a Tobit model is estimated determining the factors influencing share of NTFP in income. For carrying out this study, simple random sampling was used and data was collected from 91 tribal households.

The result of the study indicates that most employment (55%) was generated by the wage sector followed by NTFPs collection (26%) and other sectors (19%). Also, wage earnings generated the highest average annual income per households (INR.14244) followed by NTFP (INR 5505) and other sectors accounting 10% to the total tribal income. Comparing income and employment from various sectors indicates that: (i) NTFPs collection is performed by all households irrespective of income contribution but (ii) income contribution from wage earning is highest. The higher contribution of wage income to the total income of tribals is due the employment absorption in the coffee sector during different seasons of the year. This fetches a higher wage rate (INR.120/day) compared to the opportunity cost of labour in NTFP (INR.80/day). However, the employment and income levels from coffee and NTFP are uncertain in nature. Thus, income levels from combination of NTFP and other activities generate sustainable income for food and livelihood security.

Results of the Tobit model indicate a positive significant relationship between total hours of collection (b= 0.901) with income share of the NTFPs. A negative relationship with income variables such as farm income (b= -0.001) and wage income (b= -0.003) was found to be statistically significant at the 99 % confidence level. While services and allied activities (b= -0.001) were negative significant at 95 % confidence level. These variables influence the share of NTFPs in income.

The main problems faced by the tribals include government restrictions regarding NTFP collection, limited employment possibilities, inappropriate benefit distribution and misuse of funds and finally a lack of processing activity at the local level. In order to overcome these problems, an efficient distribution of existing benefits through proper institutional mechanisms is needed. In addition, processing activities have to be encouraged through trainings and skill development. This can add in realizing sustainable income and employment throughout the year.

The author

ACRONYMS

ACOTANC	Australasian Council on Tree and Nut Crops
ADB	Asian Development Bank
CARPE	Central African Regional Program for the Environment
CFI	Community Forestry International
CIFOR	Centre for International Forestry Research
CSE	Centre for Science and Environment
DFID	Department for International Development
DSO	District Statistical Office
ETFRN	European Tropical Forest Research Network
FAO	Food and Agriculture Organisation
FDF	Federal Department of Forestry
FPC	Forest Protection Committee
HHs	Households
IAY	Indira Awaas Yojana
INR	Indian Rupee
ITDP	Integrated Tribal Development Programme
LAMPS	Large- scale Adivasis Multi-Purpose Society
MFP	Minor Forest Product
NREGS	National Rural Employment Guarantee Scheme
NTFP	Non-Timber Forest Product
NWFP	Non-Wood Forest Product
OTELP	Orissa Tribal Empowerment and Livelihoods Project
SC	Scheduled caste
ST	Schedule tribe
TFAP	Tropical Forest Actions Programme
TNAU	Tamil Nadu Agricultural University
UNEP	United Nations Environment Programme
USDA	United States Department of Agriculture
ZEF	Centre for Development Research

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Chapter I: Introduction

"The term Non-Timber Forest Products (NTFPs)[1] encompasses all biological materials other than timber, which are extracted from forests for human use" (De Beer and McDermott,[2] 1989).

Non- Timber Forest Products play a vital role in livelihood of people in and around the forests (Quang, 2006). NTFPs comprise medicinal plants, dyes, mushrooms, fruits, resins, bark, roots and tubers, leaves, flowers, seeds, honey and so on (Anonymous, 1995). NTFPs (also called as "minor forest products" in national income accounting system) are sources of food and livelihood security for communities living in and around forests. They are also known as Non-wood, minor, secondary, special or specialty forest products (Shiva, 1993). According to FAO, NTFPs defined as *"all goods for commercial, industrial or subsistence use derived from forest and their biomass"*. Somehow all these definitions vary slightly but basically give same message.

1.1 NTFPs and Tribals

At global level, more than two billion people are dwelling in forest, depending on NTFPs for subsistence, income and livelihood[3] security (Vantomme, 2003). NTFPs are considered to be important for sustaining rural livelihoods, reducing rural poverty, biodiversity conservation, and facilitating rural economic growth (Global NTFP partnership, 2005). An estimated 80 % of the population of the developing world uses NWFP[4] (Non-Wood Forest Products) to meet some of their health and nutritional needs (FAO, 2008). It is an important source of income for the poor in many developing

[1] NTFPs as an alternative to the dismissive epithet 'minor forest products'

[2] This is the first reference to the term 'non-timber forest product' in the English-language literature

[3] A livelihood comprises the capabilities, assets (including both material and social resources) and activities required for a means of living. A livelihood is sustainable when it can cope with and recover from stresses and shocks and maintain or enhance its capabilities and assets both now and in the future, while not undermining the natural resource base (DFID sustainable livelihoods guidance sheets).

[4] The term NWFP excludes all woody materials. It include products used as food and food additives (edible nuts, mushrooms, fruits, herbs, spices and condiments, aromatic plants, game), fibres (used in construction, furniture, clothing or utensils), resins, gums, and plant and animal products used for medicinal, cosmetic or cultural purposes NTFPs (NTFPs), by contrast, generally include fuelwood and small woods; this is the main difference between NWFPs and NTFPs (FAO 2008).

countries. In addition, several opportunities for improved rural development are linked to NTFP (Adepoju, 2007).

In India over 50 million people are dependent on NTFPs for their subsistence and cash income (Hegde *et al.*, 1996). This provides 50 % of household income for 20 to 30 % of rural population particularly for tribal. Potentially around 3000 species of forest products are found to be useful, but only 126 have developed marketability (Maithani 1994). Around 50 % of forest revenues and 70 % of forest based export income of the country comes from NTFPs. Thus it can be depicted that NTFPs form one of the mainstays of income and sustenance for many tribal communities (Rao, 1987; Gauraha, 1992; Chopra, 1993; Mallik, 2000).

Forests are associated with socio-economic and cultural life of tribals in India. These tribal groups inhabit wide ecological and geo-climatic conditions in different concentrations throughout the country. Tribal livelihood systems vary considerably between different regions as also among the various ethnic groups, depending on ecological, historical and cultural factors. These tribal communities largely occupy the forest regions since time immemorial, living in isolation from the mainstream life, maintaining harmony and a symbiotic relation with nature.

The collection of NTFPs by tribals was primarily for meeting their subsistence needs. Over time, these NTFPs acquired commercial value resulting from huge trade transactions and income levels due to rising demand. Trade in NTFPs can act as an incentive for forest conservation by providing a source of income from resources that might otherwise appear to have little financial value (Cottray *et al.*, 2003).

1.2 Importance of NTFPs

NTFPs provide important products for local, national and international markets. These markets are growing rapidly and steadily (Wilkinson & Elivitch, 2000). Non timber resources have great potential for enhancing sustainable rural development and diversified economic growth, cultural endurance, and environmental health. Few NTFPs have low cash values and hence are used for consumption, rather than for sales. Where as rest NTFPs have highly commercial value. NTFPs are significant especially for poor, because they are available at low cost on common property lands. They are used by

people because they have less alternative access to food and income. In a country like India, which has more than half of its population in rural areas and a large tribal population reliant on forest produce for their sustenance, NTFPs play a major role (Sawhney & Engel, 2003). At the same time, NTFPs collection should not hamper the environmental objectives such as conservation of forest and biological diversity.

1.2.1 Environmental, economic and cultural importance of NTFPs

1.2.1.1 Environmental importance: In agro forestry ecosystem, cultivating NTFPs species helps in achieving environmental objectives such as conservation of watersheds, biological diversity and genetic resource. Clark (2001) explained that NTFPs is a possible "magic bullet" to solve deforestation issues and are important, ubiquitous, and culturally integral part of rural and urban lives and must continue to be considered in forest management decisions.

1.2.1.2 Economic importance: In some areas, the financial impact of NTFPs may be greater than that of timber. For example, a study in Zimbabwe revealed that small-scale NTFP- based enterprises employed the 237300 people as compared to only 16000 employed in conventional forestry and forest industries (Anonymous, 1995). According to FAO (1997), it was estimated that the total value of world trade in NTFPs is approximately US $ 1100 million. NTFPs market has grown by nearly 20 % annually over the last several years (Hammet, 1999). For instance, herbal medicine market at a rate of 13.15 percent annually (Anonymous, 1984).

1.2.1.3 Cultural importance: NTFPs are also of great cultural importance. Preservation of NTFPs is fundamental to maintenance and continuation of traditional ways of life. The field of herbal medicine and biomedical research are growing rapidly. Often people who used them traditionally studied the plants, their uses and techniques of harvesting and processing over generations. As these discoveries blossom into lucrative industries an equitable share of benefits is due to the people, communities and countries from which they originate (Prakash, 2003).

1.3 Problem statement

Tribal people living in hilly forest areas depend on non timer forest products for their livelihood. In Karnataka, many tribal families come under the jurisdiction of LAMPs[5](**Large- scale Adivasis Multi-Purpose societies**). As much as 50 % of the income of the *Soliga* Tribe in Chamarajnagar district, for example, comes from the collection of non timber forest products (Karnataka Human development Report, 2005). Inspite of its importance, their commercial value is low. One of the difficulties for small-scale collectors who seek to commercialize NTFPs is that often the markets for these products are relatively complex compared to those for timber and traditional agricultural goods. Prices for NTFPs vary across different locations as well as over time. In addition, buyers also impose different quality control standards. Collectors are frequently rural people who are often poor or landless. All these factors contribute to complexity of NTFP markets leading to the problem of food insecurity by influencing the household income of the people dependent on it.

Poor tribal colonies in the study region mainly depend on NTFPs for their livelihood and earn substantial income from these products. The NTFPs extracted (Appendix III) are lichens (Indian stone moss), honey, beeswax, shikakai (*Acacia consina*), soap nuts or *antavala* (*Sapindus emerginatus*), Indian gooseberry or *nellikai* (*Phyllanthus emblica*) and turmeric or *arishina* (*Curcuma longa*). These resource extractions are done for both commercial and subsistence purpose. The demand for these products is often seasonal in nature and depends on natural growth and regeneration, which makes their productivity unpredictable. Collection and selling of NTFPs is an important source of income and it contributes to food security[6] of the people dependent on this by enhancing their income and in turn increasing their purchasing power, which creates economic access to food. So far very few studies have been done in the study area focussing poor situation of tribal economy. This study tries to fulfil this gap by analyzing the

[5] LAMPs have a co-operative structure, which were established to provide marketing tie-ups and ensure better prices for NTFPs procured by the tribals, have had mixed outcomes. It is chaired by the local forest department official and its member secretary is an official from the co-operative department. At present, there are 21 LAMP Societies in Karnataka with 42,182 tribal families in the jurisdiction. Only 25,504 out of 63,558 members are active - recorded in Karnataka Human development Report 2005.

[6] Food security means having access to sufficient food for a healthy and productive life in the right quantity and at the right time (Odebode Stella O, 2005).

contribution of NTFP towards food and livelihood security. With this background the current research is contemplated with the following objectives.

1.4 General objective of the study

- To study the contribution of NTFPs to income for ensuring food and livelihood security.

1.4.1 Specific objectives of the research

1. To estimate the contribution of NTFPs to tribal income and employment.

2. To study the economics of NTFPs collection by tribals

3. To analyze the main factors affecting tribals' livelihoods and possible coping mechanism.

1.4.2 Hypotheses

1. NTFPs provide relatively better income and employment as compared to other sources of income for tribals.

2. Age, education, family size and access to other employment opportunities influences NTFP collection by the tribals?

1.5 Limitation of the study

The research had some difficulties in getting support by tribals during collection of the data. Tribals usually collect NTFPs in a group rather than independent, hence quantifying the resource collected, consumed and income earned by individuals was difficult, as respondents gave the information for the group. This challenge was overcome by changing the data collection approach. In addition individual efforts were made to collect extra information apart from the questionnaire.

The data were collected with pre-tested questionnaires. The study has some limitations such as-

- Data collected is based on tribals past memory. This can lead to data inaccuracy. Efforts were made by the researcher to crosscheck to make data reliable and accurate.

- Since the study pertains to a particular location, it cannot be generalized and implied to other locations.

1.6 Organization of the dissertation

The dissertation is organised in five main chapters which are further divided into sub chapters. In the first chapter, a general introduction to the research topic is given, which explains the global and national scenario of NTFPs and their importance. That is followed by a problem statement of the study area and the general and specific objectives of research, hypothesis and finally limitation of the study. The second chapter contains the review of literature, which reports the findings of past research studies conducted by various researchers across the national and international levels, with two sub-chapters (i). Contribution of NTFPs to food, income and employment and (ii) Issues in NTFP based livelihoods. Chapter three describes the main features of the study area, sample data and sampling procedure, source from which the relevant data were collected, the software used for analysis and the tools and techniques with which the data were analysed. Chapter four is devoted to the presentation of detailed results and discussion in tabular form into which relevant details have been compressed. Here a brief indication of major findings has been given. Finally, chapter five is delineated to general conclusions and recommendation of the research.

Chapter II: Literature review

This chapter is intended to report the findings and understandings of past research studies conducted by various research specialists as well as their views and opinions about different aspects of study in the light of the objectives set forth. This would facilitate the present research study to use meaningful information and subject them to sound reasoning and strong interpretation. This chapter is presented under following sub-heads:

- Contribution of NTFPs to food, income and employment
- Issues in NTFP based livelihoods

2.1 Contribution of NTFPs to food, income and employment

2.1.1 Global studies

The contributions of NTFPs cannot be over emphasized when considering the roles they play in any nation. Historically, mankind has depended on non-wood resources for meeting basic needs (FAO, 1992). NTFPs play important subsistence and safety-net roles in the rural economy, but only a small subset of forest products possesses potential for significant cash income and employment generation (Wallenberg and Belcher, 2001). Despite the globalization of the World's economy and the rise of industry, NTFPs still remains an important source of income for hundreds of millions for rural livelihoods (Poffenberger, 2006). NTFPs would appear to have potential to diversify the rural economy as the rural economy is heavily reliant on arable crop harvests. The uncertainty of a successful harvest means that there is always an element of instability in the rural economy. Thus diversification would in turn lead to increased stability. For many rural poor this is their sole means of income (Taylor and Parratt, 1995).

A study by Wills and Lipsey (1999) in British Colombia estimated that in 1997 the commercial harvest of wild mushrooms, floral greens and other products employed almost 32000 people on a seasonal or full-time basis, which generated direct business revenues of $ 280 million and overall provincial revenues in excess of $ 680 million. A study conducted by Grimes *et al.* 1994, showed that NTFP would contribute 77 % to the annual net returns, if dry deciduous forests are exploited sustainably. The present value

of the NTFP on an average would be US $ 1182 per hectare, which is, however much less than that of compared to similar estimation made for Equador where it was US $ 2830. The significance of the Amazonian forest is also affirmed by Peters et al., 1989 who estimated that the Net Present Value of sustainable fruit and latex harvested to be as high as US $ 6330 per hectare.

The importance of NTFPs in Hantana forest of Sri Lanka was analysed by Abeygunawardena and Wikramasinghe (1992). They observed that one person entered the forest for five days in a week and collected five bundles of fuel wood. Out of these five bundles, one was kept for his own use and others were sold. They reported that the monetary value of the fuel wood collected from the forest per hectare per year was INR.[7] 1052 while that of grass was about INR. 578. When all NTFPs collected were valued, they found that the monetary value was equivalent to INR. 1961 per hectare per year.

A study in Botswana of the Southern African Plateau (Taylor and. Parratt, 1995) depicts that people most likely to be involved in NTFP use (namely rural communities) have very limited access to technology. As such, it is likely that they will end up selling the NTFP in a relatively 'raw' state to an intermediary who will then end up selling it to a processor. The profit margin increases the further up the chain you go and the harvester would thus realise the least profit margin.

Research by Sunderland *et al.* (1999) reconfirms that NTFPs provide sources of food, medicines, and income to many households in Central Africa. Yet, these studies also confirm that the contribution of NTFPs to local and national economies is typically small relative to agriculture. In four forest villages in South-Western Cameroon, NTFPs contributed 9% to the household economy compared with 43% for agriculture. Similar figures are reported for households in South-Eastern Cameroon (NTFPs 1.2%; agriculture 31%) and South-Western Central African Republic (NTFPs 10%; agriculture 51%). Harvesting of wild NTFPs is most important for poor families that have limited or no access to agricultural markets. Wealthy households or those with access to agricultural markets (i.e. those that can sell cash crops) often consume NTFPs, but seldom harvest them for sale. The study conducted in the South-West and North-West

[7] 1 INR= 0.02311 US $

provinces of Cameroon by Abwe *et al.* (1999) reported that, the total value of NTFP production and marketing exceeded US $19 million in 1999, and contributed 2.8% to the regional economy. In contrast, timber in this area was predominantly logged-over area, which contributed 5% and while agricultural crops contributed 27%.

Pervaz (2002), in his study on NTFP sector in Dhading district of Nepal observed that the NTFP generated maximum employment (60.72 %), followed by agriculture (22.30 %), allied activities (15.83 %) and other sources (1.16 %). With regard to income generation, allied activities were the major contributor to the total household income with 34.74 % followed by NTFP (32.08 %) and agriculture (29.50 %).

2.1.2 Studies in India

Studies in India have revealed that, NTFPs provide substantial inputs to the livelihoods of forest dependent population, many of whom have limited non agricultural income opportunities (Chandrashekaran, 1994; FAO, 1991). About 70 % of the NTFP collection in India takes place in the tribal belt of the country (Mitchell *et al.*, 2003). It would be seen from the literature that the NTFP based small scale enterprises provide up to 50 % of income for 20 to 30 % of the rural labour force. Whereas 55 % of employment in forestry sector is attributed to the sector alone (Joshi, 2003). Therefore collection of NTFPs was a major source of income and employment for forest dwellers. For instance, *tendu leaf*[8] collection was observed to provide about 90 days of employment to about 7.5 million people every year in India (Mistry, 1992).

Nandakumar (1988) showed that the mean annual income of the *Yerava* tribes was INR. 4400 per annum among 62 % of the respondents, while 38 % of them belonged to high income group with INR. 8850 per annum. Similarly a study by Thiagarajan (1989) revealed that 75.5 % of the tribal households had low income while the rest 24.5 % of them had high income. Therefore the economic status of tribals (Intodia, 1990) was much below the satisfactory level as 77.87 % of them were having their annual family income less than INR. 2500, whereas 13.33 % of them were in the income group of INR. 2500 to 3500 and only 9 % of them derived income above INR. 3500. Further, he reported

[8] *Tendu (Kendu)* leaves are valuable leaves used for wrapping Bidis (local cigarettes), popular smoke especially among poor natives

that tribals usually had very low family annual income and spent very low amounts even for the necessities. The low level of family expenditure was mainly due to the fact of low levels of income. Hence, the contribution of NTFPs to the improvement of livelihood of the forest dwellers and equitable distribution of the income among different sections of forest dependent people is questionable and needs to be studied further.

Appasamy (1992) stated that the majority of NTFPs collectors were males in the Palani hills of Tamil Nadu and higher proportion of the NTFPs collected was used for income generation rather than for home consumption. Fifty percent of the firewood was used for home consumption and the rest was sold. A study by Gauraha (1992) depicts that, Forest dwellers in Pendra block in Bilaspur district of Madhya Pradesh obtained 70 % of their household income from settled cultivation and sale of NTFPs. Kant (1997) studied the role of NTFPs in three tribal villages of Gujarat and West Bengal states. The study revealed that NTFPs contributed significantly to the household income in tribal village economies. In the case of Gujarat, the contribution of NTFPs to the total households' income varied from 20.1 % to 34.1 % while in the case of West Bengal, it ranged from 26.5 to 55.5 %. It was also found that majority of the household employment was generated through collection of NTFPs (36.4 %), followed by settled cultivation (15.11 %) and agricultural labour (14.3 %).

Mistry (1992) in his study on the impact of the Forest Act on the household economy of the tribals reported that *tendu leaves* provided enormous employment (90 days of employment to 7.5 million people every year) and income to tribes. The study by Namdeo and Pant (1994) highlighted that *tendu leaves* were estimated to provide employment nearly to 4 million persons annually by way of *Bidi* (Local cigarette) manufacturing. Rao and Singh (1996) studied the contribution of Non-wood forest products in augmenting the income of the tribal families in families of South Bihar and South West Bengal. Ten tribal villages were selected in Bihar, five in Palamau district and five in Singhbhum district and five in Midnapur district of West Bengal. They found that, among the various NWFPs collected in South Bihar, on an average, *Kendu leaves* contributed the most (INR.3169) per family followed by brooms (INR. 2745) whereas in

west Bengal, *Sal leaves* contributed the most (INR. 1675) per family followed by *kendu leaves* (INR. 675).

A study on employment, income and expenditure pattern of tribals in the Nasik district of Maharashtra (Raut *et al*., 1992) found that the collection of minor forest products (MFPs)[9] was found to be the only source of income during the summer season. Wage earning was the prime source of income for landless group, which amounted to the tune of 50 % of the total income. Another study by author Suryavanshi (1992) stated that the tribals got comparatively better employment in the Kharif season due to agricultural activities. Whereas during summer season they were involved in off-farm works such as collection of fuel wood, minor forest products and scarcity works under the employment generation schemes. These studies concluded that wage earning and sale of minor forest products were the major source of income to the landless families.

Rao (1992) examined the employment and income pattern of forest dwellers in the three different ecological and economic settings in Andhra Pradesh. Resource endowment was found to have a definite bearing on the employment pattern. Position of the land and its cultivation had generated more days of employment among *Araku* tribes, whereas its absence drove the tribals in Nallamalai to collection of forest produce for a living. Campbell (1993) opined that according to some rough calculations based on the valuation of NTFPs, an average return of INR. 2720 was realized per hectare annually in India. He observed that forest based enterprises provided up to 50 % of income for 20 to 30 % of labor force in India.

Sekar and Surendran (1993) found that among the tribal households, three members were involved per day in NTFPs collection, whereas only two members served as agricultural labourers. The income realised was INR. 2800 per annum per head from NTFPs' collection. In respect of marketing of the NTFPs, two marketing channels were found to exist. The study by Sekar *et al.* (1996) in the Sathyamangalam Hill LAMP co-operative society, found that around 83 % of the members were tribals who were

[9] Minor Forest Products (MFPs), Non-Timber Forest Products (NTFPs) and Non-Wood Forest Products (NWFPs) terminologies have been used frequently synonymously.

actively involved in minor forest products collection and earning on an average INR. 11180 per annum by spending 8-10 hours in a day for the purpose.

The study by Namdeo and Pant (1994) highlighted that, Sal seeds had potential to provide employment to 4.5 million persons for a period of 40 days and regular employment of 300 days per year for 0.436 million persons in processing of Sal seeds. The annual production of the gum *Karaya*[10] was about 6000 tons and creation of 600000 mandays of work at the rate of 10 kg per person per day. The study by Rao and Singh (1996) estimated that non- wood forest products offer employment to about one million people every year.

Das (1995) studied the role of NTFPs in the economy of forest fringe dwellers of South-West Bengal. He observed that on an average, one NTFP collector working for five to six hours a day could earn INR. 17 to 26 from NTFPs and the collection season was more or less distributed throughout the year. He reported that, of the five Forest Protection Committees (FPCs) studied, the average family income from NTFPs varied from INR. 6046 in Dalangora FPC to INR. 9569 in Khatam. Palit (1995) in his study on the role of NTFP in Joint Forest Management revealed that an average, each household of Raigarh forest protection committee was engaged for 63 days per year in the collection of NTFPs. The income earned from the sale of NTFPs was INR. 2421 per household.

Olawoye (1996) opined that rural households spend income realized from NTFPs to buy food to maintain their families. This provides a supplement to the economic status in the lives of the generality of the rural dwellers. Hence, dependence upon several combined and seasonal activities is an important way to ensure household food security.

A percentage comparison of income composition and employment of the three tribal communities (Jenu kurubas, Soligas and Betta kurubas) in Madumalai Wild life sanctuary in India by Hegde (1997) showed that *Jenu kurubas* derived more employment and income from commercial Non- Wood Forest products than the *Soligas* and *Betta kurubas* communities. The analysis of the correlation indicates that *Jenu Kuruba* community was more dependent of forests than others. It was seen that all other sources

[10] Gum *Karaya* is an extract of Sterculia trees. It is used as a thickener, emulsifier and laxative in foods, and as a denture adhesive

of income, such as forest labour, wage labour and salaried jobs reduced the reliance of the people on the forest.

The study conducted in India (Surayya, 2000) on Contributions of Forests, Microfinance, and NTFPs Marketing and Policy interventions for Reducing Poverty portrayed that mean annual income generate by forest dwellers by NTFPs collection and sale was INR.2337, mean income from collection and sale of firewood and livestock sale is accounted to be INR.2500. Where as income from agricultural source and borrowing and others is uttered to be highest which was about INR.4846 and INR.3388 respectively. The study by Pandit and Thapa (2002) revealed that the NTFPs grown on marginal lands contributed to farm household economies, as 24 % of the annual household income in the upper watershed and 13 % in the lower watershed was realized from the sale of NTFPs based products. They also found that the domestication of the NTFPs reduced local people's dependency on NTFPs as well as other forest resources, as the frequency of visit to forest fodder and fuel-wood resources reduced with the increasing NTFPs domestication.

The role of NTFPs in the economy of communities living in and around forests of South Bihar was highlighted by Vidyarthy and Guptha (2002). Nearly 49 items of the NTFPs found to sustain the people especially landless and marginalized groups during lean season and supplement their income during other seasons. The study showed that NTFPs contributed significantly to the annual income of the households (86%). Besides the economic value of NTFPs, local communities were also enjoying several qualitative benefits from the forest such as medicinal, religious and aesthetic needs. The study conducted by Sawhney and Engel (2003) in Bandhavgarh National Park, India pointed out the majority of the sampled households (97%) collected NTFPs. All the households collecting NTFPs also sold it, though there is a ban on sale of NTFPs. Overall, sale of NTFPs constitutes the most important source (26%) of cash income for the households, and the third most important source of total income (13.8%). On an average each household made US $ 44 from the sale of NTFPs in 2000. From the sale of different source of NTFPs to the total NTFPs income, Amla[11] product (42%) contribute the highest

[11] Amla also known as *Nellikai (Phyllanthus emblica)* valued for its medicinal properties

followed by *Tendu* Patta (41%), *mahua*[12] (12%) and fuelwood (4%) where as Chironji[13] (1%) contributed the least.

2.1.3 The studies pertaining Western Ghats region

Studies on the role of NTFPs in South India indicated that forest dwellers in Western Ghats region depend for up to 50 % for their income and employment on NTFPs (Girish, 1998; Ganapathy, 1998; Hegde *et al* 1996; Suryaprakash, 1999). A study by Ganapathy (1998) on role of NTFPs in the tribal economy of Kollegal taluk of Karnataka covered four forest range of Kollegal taluk *viz.,* Hanur, Kollegal, Malai Mahadeshwara *Hills (*M. M. hills) and Rampuram. He reported most employment (42.96%) was generated by NTFPs for the tribals' households followed by farm employment (22.06%), allied employment (12.72%), wage employment (11.86%) and other source of employment (10.40%). The analysis of the composition of the income of tribal households revealed that NTFP was the main income generator. It contributed for about 34.09 % of the total income of the household, followed by farm income (28.26%), allied income (18.61%), wage income (13.20%) and other sources of income (5.84%).

However the study by Suryawanshi (1992) reported that, almost six months in a year, the forest dwellers in Western Ghats zone of Maharashtra were unemployed. Due to continuous rains in the *kharif* season the forest dwellers got comparatively better employment in off-farm works such as collections of NTFPs, hunting and scarcity works under employment guarantee scheme[14]. The forest work alone more than 30 % of the total employment. Wage earning and sale of forest products were the main sources of income in the landless families. Gathering forest produce during the season in Kerala; the tribal family would make between INR. 2000 and INR. 2500. But during lean season a family made a meagre sum of INR.70 to INR.100 even by risking their lives (Anonymous, 1985). The percentage of family income in different income groups include up to INR. 2000 (14.89 %); INR. 2001 to INR. 4000 (43.41 %), INR. 6001 to INR. 8000 (8.51 %), and INR. 8000 (12.34 %) per annum among *Kota* tribal people of Niligiris

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[12] *Mahua* considered holy by many tribal communities because of its usefulness. The bark is used for medicinal purposes.

[13] Chironji (Charoli) resembles a small bean, it is a type of dry food and used primarily as a garnish

[14] The scheme was to enhance livelihood security in rural areas by providing at least 100 days of guaranteed employment in a financial year to every household whose adult members volunteered to do unskilled manual work.

district. (Varadarajan, 1980). The study by another author (Manjula, 1991) on the same community reported that the average annual income of a family was INR. 7700 per annum. The annual income of the farm family was medium for 54 % of the families, high for 33 %, while low for 14 %, but in general, the income of the tribal farm families was low. When Family expenditure considered, it shows that 90 % of the income earned was spent on necessities while 5 % was on recreation and cash savings account hardly 2.36 %, while borrowing accounted for 8.36 % and investment accounted for less than 30 % of the total income (Lal *et al.*, 1983).

2.2 Issues in NTFP based livelihoods

2.2.1 General, marketing and environmental issues

Life and livelihoods are linked to the biological and physical world in a complex way. Humans are bound by their physical and biological environment in terms of provision of food, water, shelter and other environmentally related services (Centre for Indian Studies, 2003). Livelihood security is dependent on two related factors – one, the access to resources to meet the basic needs of a community and, second the state policies in this regard and the attitude of the civil society are reflected in the state policies (Sudarsen and Sumathi, 2003). There is an intricate relationship between livelihood pursuits of tribal communities and surrounding natural resources like forest, land, water-bodies and other flora and fauna. The critical balance between the two is very essential for sustainable livelihoods of forest dwellers in the world in general. The coping mechanisms developed by them are cultural responses to combat the scarcity and poverty conditions that threaten them periodically (Prasad and Eswarappa, 2005).

Pathak and Vagholikar, (2006) have provided a detailed set of comments on the Scheduled Tribes and Other Forest Dwellers (Recognition of Forest Rights) Act 2006. A central factor affecting tribal livelihood possibilities is access to and control over natural resources such as land and forests. A major problem is that traditional homelands of tribal communities have been classified by the colonial government and subsequently by the independent Indian government, as forest lands vested with the state. In the absence of clearly defined property rights, millions of tribal families living in or around forest land can be deemed encroachers and thereby illegal occupants, continually living

under the shadow of eviction. It is a matter of historical record that all such areas have witnessed serious conflicts over land rights in the form of agitational activities such as *Dharnas*[15] and *Rasta rokos*[16], often resulting in loss of life. Acharya (2007) has mentioned that, the Wildlife (Protection) Amendment Act 2002 implemented in 2006 bans *adviasis* (aboriginal tribes) from gathering non-timber forest produce (NTFPs) such as honey, wild herbs, mosses, lichens and fruits for commercial purposes from parks and sanctuaries. Till the ban, *Soliga* tribes had usufruct rights to collect NTFPs and sell them to their own cooperative LAMPs (Large-scale Adivasi Multipurpose Society) which in turn would auction them to the highest bidder, generally traders who in turn sell the produce to various industries.

Sharma *et al.* (1992) reported that the tribals living in the high altitude areas of Himachal Pradesh were leading a very tough and hard life. The literacy level was found to be very low (43.77 %). Agriculture was the mainstay with 60 % of the workers being cultivators. Farming, sheep and goat rearing were the main means of livelihood. More than half of the income was contributed by agricultural sector alone, but in some regions sheep and goat played a dominant role.

Prasad (1993) stated that production of NTFPs fluctuated also between years. He observed that the rural communities living in and around such forests depended only on selling forest produce. The situation could be altered only with alternative sources of employment opportunities for cash income. The income and labour relationships in collection of minor forest products examined by Alibaba *et al.* (2000) showed that labour spent on gum and tamarind collection was significant in generating income by tribals in forest areas. Their study concluded that all the tribal households faced problems in searching minor forest products and danger of wild animals. Further more there was a need for controlled exploitation of minor forest products in order to give scope for rejuvenation of forests.

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[15] *Dharnas* means kind of silent protest

[16] *Rasta rokas* means road blocking during demonstrations

Sudarsen and Sumathi (2003) reported that Malayali schedule tribe[17] of Tamil Nadu heavily depends on the forest for their livelihood. With the increasing strictures on access to the forest resources and changes in the policies created by government departments, they are facing acute problems in utilizing the resources. The major problem is to have a secondary source of income or more precisely to generate their minimum needs of food during the crisis period. The impact of external agencies like non-tribal moneylenders, traders and extremist's activities creating unrests among the interior tribals result into disturbances in their livelihood. The non-tribal private traders also buy the minor forest produce items from the tribals at low price and false weights and measures (Subramanyam, 2003). NTFP collected and sold in unprocessed form through co-operatives in a tribal sub plan area in Rajasthan fetched lower prices (Chakravarty and Verma, 1991). Endeavour by the co-operatives in marketing of NTFPs is an important step in saving the tribals from exploitation by the middleman. In Sundergarh district of Orissa, India (Mahapatra, 1992) money lenders of the area advanced loan to villagers only after they handed over the minor forest products (MFPs) collected. Thus became obligatory for the tribals to sell minor forest products to the lender at a price fixed by the trader. An attempt has been made by Kulirani (2003) to present on social, political and economic changes that have happened in Wayanad from a socio- historical point of view and the shrinking livelihood strategies of the Paniyar. Vast majority of tribals still have many unresolved problems especially landlessness in their traditional home land.

The nutritional problems can be derived from inborn errors of metabolism or from cultural and environmental factors. The problem of malnutrition is associated with the scarcity of food resources in many tribal ecological zones including Eastern Ghats (Subramanyam, 2001). In general the incidence of malnutrition among the tribal population and lack of water conservation attitude[18] in the tribal areas is more, resulting in health problems and other water born diseases reducing the working capacity among them. Reddy and Rao (2003) observed that the *kurumbas* and *Irulas* tribes are the first

[17] Malayali (lit.*malai*= hill, *alu*=person) is one of the 36 Scheduled Tribes of Tamil Nadu, India. These tribes are supposed to have belonged originally to the Tamil *Vellala* caste who retreated to the hilly tracts.

[18] Water conservation attitude includes concrete chekdam and tank structures

settlers and occupied and dwelling in the low lands of the Nilgiris are much more subjected to sickle cell anaemia caused due to virulent malaria causing mosquitoes. But it was absent in case of *Toda* and *Kota* tribes (Saha, 1976) as it is evident that these two were dwelling in the upland plateau of Nilgiris.

Mishra (2007) reported that some social support system to cope during drought periods existed in Oraon tribe. At household level, reduction of food consumption and change in the pattern of food consumption are important coping strategies. The majority of people in this area changed their occupation, when agriculture fails due to drought. Also many households either sold or mortgaged their lands and household assets. Some of the people, including young children migrated temporarily to other places for livelihood. OTELP (2007) points out that ecological degradation, erratic rainfall and a high risk of drought in the area have resulted in high food insecurity, increasing out-migration and periodic deaths from starvation. Among the disasters ecological imbalance is now seriously undermining the livelihood patterns and increasing vulnerability. In addition to these, a small land base, low agricultural productivity and low incomes have led to rising indebtedness, trapping tribals into a vicious circle of exploitation. The life of the tribals is increasingly vulnerable due to a persistent lack of assured entitlements to their resource base. Land alienation has deprived them of their land; forest legislation has turned them into encroachers on land they have always used; and they have also been disproportionately affected by displacement due to mining operations, irrigation projects, wildlife sanctuaries, etc.

Chapter III. Research Methodology and Techniques

This chapter discusses the methodology used to test the hypotheses. In particular it will provide a brief explanation of analytical tools and techniques used to understand the complex situation.

3.1 Delineation of the Study area

The Western Ghats also known as "*Sahyadri* Mountains" is a mountain range in the west of peninsular India. It runs north to south along the western edge of the Deccan Plateau, and separates the plateau from a narrow coastal plain along the Arabian Sea. The area is rich in culture and ecology. The biodiversity contained in this mosaic of tropical forest types, from wet evergreen forest to mangrove swamp, is considered worthy of global protection efforts. At least 4050 flowering plants have been identified in the Ghats, of which about 1600 are endemics (Martin, 1999).

The study pertained to Kodagu district of Karnataka state. Kodagu (known as hilly region in southern India), known in English as Coorg. Madikeri (Mercara) is the headquarters of the district. Kodagu is famed for extensive coffee plantations that cover most of the hillsides, most of them under multiple cropping of coffee, orange, black pepper, and cardamom. Coorg honey and coffee are said to be rated amongst the best in the world. The rich heritage of the people of Kodagu, the land, culture and abundant natural beauty beckons every visitor to conserve this tiny district. The region was also called "The Scotland of India" by the British and the Kashmir of the south for its scenic beauty.

3.2 Study site

The district is situated in the Western Ghats between 12^0 42' 00" N latitude and between 75^0 and 73'00" E longitude at an altitude of 1270 meters from the sea level. It has an area of 1595 square miles (410775 hectare in Appendix I), out of which 134615 hectares are forests. It means about 33% of land is covered by forests. Kodagu has an average temperature of 15 °C, ranging from 11 °C to 28 °C, with highest temperatures measured in April and May. It is the most beautiful hill station of Karnataka (Kodagu District Statistics at a glance 2006-07).

Figure 3.1 Map showing Study area

3.3 The population and literacy

The district is home of Kodava people, with a population of 548561 (2001 Census). There are 21046 cultivators, 11479 agricultural labourers, 2521 household industry and other services include 231332 in the district.

Table 3.1 Taluk wise Schedule Tribes' population details in the district

Sl. Nr	Taluks	ST population			Nr. of ST colonies
		Male	Female	Total	
1	Madikeri	3454	3454	6908	14
2	Somawarpet	4615	4586	9201	53
3	Virajpet	15040	14966	30006	87
	Total	**23109**	**23006**	**46115**	**154**

Source: Kodagu District Statistics at a glance 2006-07

The district has 46115 STs[19](Schedule tribes) populations, which constitute to 8.4 % of the total population. These tribes are classified as primitive tribes[20].

[19] The term 'STs' indicates those communities specified by the President of India under Article 342 of the Constitution of India. 'Geographical isolation, distinctive culture, primitivity [sic], shyness and economic backwardness [sic]' are some of

The literacy rate of Kodagu district is 78.17%. There has been a gradual increase in literacy of male and female over a decade. From the table 3.2 we can observe education profile of Schedule tribes which stands the least amongst the population.

Table 3.2 Literacy rate of the district

Sl. Nr.	Literacy Rate	1991	2001
1	Male	75.35	83.80
2	Female	61.22	72.50
3	SC[21]	55.40	60.31
4	ST	29.27	36.25
5	**Total**	**68.35**	**78.17**

Source: Census of India 2001

Kodagu is a land of many communities. Although *Kodavas* are the main ethnic group, Gowdas, Brahmins, Christians and Jains also live in Kodagu. Besides these communities, we can find *Adivasi* known as *"Budakattu Janaru"* (Tribals). Major groups among the tribals in the study area are *Jenukurubas, Bettakurubas, Yeravas* and *Maratha*.

3.4 Sample data and sampling procedure

The district comprises of 154 tribal colonies. The present study has been restricted to Virajpet (87 tribal colonies) and Sommawarpet (53 tribal colonies) taluks where majority of the tribals gather NTFPs products from forest area. A survey was conducted between March and April 2008. Data were collected through interviews questionnaire administered on 91 randomly selected household respondents from the villages in and around the forests of Virajpet and Sommawarpet taluks, which have highest number of STs Colonies.

The study includes both primary and secondary sources of data. The primary data were collected with the aid of structured and comprehensive questionnaire exclusively

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the criteria considered relevant for scheduling as tribes. Although scheduling is intended to be a legal process, arbitrariness and political expediency are often factors in determining the recognition and non-recognition of Adivasis as STs in the absence of a clear definition. The word 'Adivasi' means 'original inhabitants' in Sanskrit, and therefore the term means the indigenous people of India.

[20] The Groups identified by Government of India in order to ensure the development of these communities for the first time in 1975-76 and thereafter in 1993, who are regarded as the poorest of poor amongst the STs and were called Primitive Tribal Groups (PTGs).

[21] The (SC) Scheduled caste people are also know as *Dalits* (Untouchable in Indian caste system), according to traditional Indian society are regarded as low caste.

prepared for the study. The questionnaire was prepared after extensive preliminary survey (September-2007) in the study region that helped to choose the relevant villages for sampling. The questionnaire was subjected to pre-testing during preliminary survey to improve it.

The primary data were collected from sample tribal respondents by personal interviews. The locations of respondent's residence were identified with the help of local guide working for Vivekananda Health Clinic Centre, Gonikoppal, Kodagu. Questionnaire was administered orally in *Kannada,* a native *language.* Each interview took 20 to 30 minutes. The data collected included information on NTFPs collected and their quantities, together with demographic information of the collectors (age, gender, origin, literacy level, land holding, community background, total annual earnings, collection timings and availability). In addition to primary data, secondary data were also collected from Large Scale Adivasi Multi-purpose Societies (LAMPs), District statistical office (DSO) and Integrated Tribal development programme (ITDP) office. Basic statistics about Kodagu were taken from the official sources of the districts.

As majority of the tribals were illiterates, they could not give absolute distance they travel (Kms) and actual time taken (hrs) for extraction of NTFPs. Hence, distance travelled and times taken were carefully approximated.

The total income generated in a season by the tribals during collecting trip was calculated from the quantity of NTFPs collected and the price received by the collectors. Revenue earned from NTFPs was recorded in Indian Rupees (INR). The exchange rate that prevailed during the data collection period was 1 Euro= approx. INR. 62.

3.5 Statistical tools used

3.5.1 Descriptive Statistics

SPSS v. 15.0 was used for statistical analysis. Descriptive statistics (Mean, standard deviation) were used to describe the socio economic profile of the NTFPs collectors such as family size, age, education, employment in different sectors, and household income of the study area.

3.5.2 Tabular analysis of NTFP collection

Both opportunity cost of labour and transportation cost of products that go to market were considered for calculating cost and returns of the NTFPs. Opportunity costs of labour was considered based on average labour mandays involved in extraction of NTFPs. The off seasonal wage rate (INR. 80/day) in coffee plantation at the time of survey was used to calculate opportunity cost of labour time involved for collection of NTFPs. For those products, which are extracted during nights (honey-*Apis florae and Apis dorsata*), the time spent during the night has also been included to calculate cost of labour. Firstly, the tribals shift head loads of NTFPs from forest to home place after long hours of walking through forest. After that they shifted gathered NTFPs to market place (LAMP co-operative society) by local transportation vehicles. Transportation costs were considered and divided equally among NTFPs as they marketed in total. Some tribals marketed their products by walk, since their location is close to market place. This survey recorded no instances of spending on production inputs or on land rents, except the transportation cost.

3.5.3 Tobit model

In addition to descriptive analysis, a censored regression or Tobit model is employed to test the relationship between dependent variable(Y) and explanatory variable (X). Here the dependent variable is the share of household's income from NTFPs. In a Censored sample, some observations on the dependent variable, corresponding to known values of the independent variables, are not observable (Y^*). We do not observe the dependent variable over the entire range. Hence, we utilize the Tobit model (Tobin, 1958). Coefficients in a Tobit model are estimate by maximum likelihood method.

The model supposes that there is a latent (i.e. unobservable) variable Y^* this variable linearly depends on Xi via a parameter (vector) b which determines the relationship between the independent variable (or vector) Xi and the latent variable Y^* (just as in a linear mode). In addition, there is a normally distributed error term u_i to capture random influences on this relationship. The Tobit model is based on the following latent variable model:

$$Y^* = b' X + u_i$$

Where X is a k-vector of regressors, possibly including 1's for the intercept, and the error term u is N (0, S2) distributed, conditionally on X. The latent variable Y^* is only observed ($Y=Y^*$) if $Y^* > 0$.

Thus the model is $Y^*=bx+u$

$Y^*=bx+u$ if $bx+u>0$

$=0$ other wise

In this case one cannot rely on only the observation for which $Y^* > 0$ to estimate the regression equation by ordinary least squares (OLS) because the residuals do not satisfy the condition $E(u) = 0$ if we consider only those residuals such that $u > -bx$.

In the present study, income from NTFPs has percentage share to the total household income. Some observations may have hundred percent contributions to the total household income and some may not have corresponding to the households' income who choose to collect forest products for commercial purpose. Tobit model overcomes bias and inconsistency that arise due to using OLS. Hence Tobit model is used for the present analysis (Shylajan and Mythili, 2007).

In particular, the actual dependent variable is:

$$Y = \text{Max}(0, Y^*)$$

The definition of the variables included in the model has given below

$$Y = b_0 + b_1X_1 + b_2X_2 + b_3X_3 + b_4X_4 + b_5X_5 + b_6X_6 + b_7X6_7 + b_8X_8 + b_9X_9 + b_{10}X_{10} + b_{11}X_{11} + dD_1 + gD_2 + U,$$

Where

Y= Percentage share of household income from the sale of NTFPs

X_1= Total annual household income of the family (INR)

X_2= Age of the sample respondents

X_3= Education of the sample respondents

X_4= Distance travelled from home to forest for gathering NTFPs (Kms)

X_5=Total time spent on gathering NTFPs (Hrs)

X_6= Size of the family (Nr.)

X_7= Transportation cost (INR)

X_8= Farm income (INR)

X_9= Livestock income (INR)

X_{10}=Wage income (INR)

X_{11}= Income from services and allied activities (INR)

D_1=Community Dummy 1

0 for Jenu Kuruba and Yeravas

1 for Betta Kuruba

D_2= Community Dummy 2

0 for Jenu Kuruba and Betta Kuruba

1 for Yeravas

The Tobit model was estimated using LIMDEP software package.

3.5.4 Likert Scale

To measure the respondent's opinions on different problems a Likert scale was used for scaling attitudes of the tribal respondents. In this survey respondents were asked to rate each item in terms of agreement or disagreement of the given statements. Here data collected are in the ordinal (ranking) according to priority by the respondents responses. Five is the highest possible score on the charts and one is the lowest. The responses elicited may be coded as 1-Strongly disagree, 2-Somewhat disagree, 3-Undecided, 4-Somewhat agree, 5-Strongly agree. In this survey higher scores indicates more important and vice versa. Modal values were used to describe the response. The result gives different percentages across different attributes. The percentage towards each attribute indicates their opinion shares towards each problem.

Chapter IV: Results and Discussion

This chapter presents the results and discussion of the empirical analysis.

4.1 Tribal communities in the study area

The Kodagu district has a high cultural diversity in terms of composition of tribals. The major tribal communities surveyed are *Jenu Kuruba* (86.8 %), *Betta Kuruba* (7.7 %) and *Yerava* (5.5 %) (Table 4.1). These communities are considered as descendants of nomadic primitive tribal groups dwelling in the interior parts of the forests, depending on NTFPs for their subsistence. The *Jenu Kuruba* tribe was sampled more since this tribe is dominant in the district and contributes 60 % to the total tribal population (Ravi *et al*., 2006). The tribal communities own small pieces of land on which they mainly cultivate coffee, paddy, pepper, ginger etc. Traditionally, *Jenu Kuruba* expertise in honey gathering. They realize incomes from honey, working in coffee estates and agricultural farms. *Betta Kuruba* (hill dwellers) are basically food gatherers specialized in bamboo craft. While *Yeravas* are skilled in fishing and agriculture. Comparing these tribal communities, Jenu *Kurubas* have a relatively better socio-economic status. In this study, communities are not analysed separately since the differences in terms of their livelihood opportunities and outcomes are not that big.

Table 4.1 Major tribal communities surveyed in the study area

Community	Nr. of respondents
Jenu Kuruba	79 (86.8)
Betta Kuruba	7 (7.7)
Yeravas	5 (5.5)
Total	**91** **(100)**

Note: Figures in parenthesis indicate percentage to total

4.2 Socio-economic characteristics of the NTFPs collectors

4.2.1 Family size

The basic information about the households is presented in table 4.2. Average household size was 4.30 with on average 1.2 adult males and 1 female respectively and 2.10 children.

Table 4.2 Socio-economic profile of the NTFP collectors

Socio-economic characteristics	Kodagu district	
	Number	Percentage
Size of the family (average)	4.30	-
a. Adult males	1.20	-
b. Adult females	1.00	-
c. Children	2.10	-
Age of the respondents (years)		
18-40	61	67.03
41-60	27	29.67
61-80	3	03.30
Literacy level of the households		
a. Adult males	43	47.30
b. Adult females	33	36.30
c. Children	72	51.43
Size of the land holding (ha)		
a. Forest land/encroached	0.88	26.37
b. Pisary (Revenue land)	0.60	01.10
Livestock (average)	7.50	26.37
a. Cow	3.30	12.10
b. Poultry	6.90	20.90
c. Goat	5.0	2.20
d. Bullock	1.50	2.20
e. piggery	1	1.10

One characteristic feature of the tribal community is that, they go for early marriage. They live independently forming a nuclear family. This might be the reason why the average family size is quite small. Similar results were observed by Hegde (1994), Girish (1998), Prakash (2003) and Gubbi (2008). This nucleus nature was the major determining factor in the composition of the tribal families. However, formation of nuclear families depends on level of education and employment (Parvathamma, 2004).

4.2.2 Age of respondents

Most respondents were in the age group of 18 to 40 years (67%), followed by 41 to 60 years age group (30%). While the age group of 61 to 80 years contained the least respondents (3%). The tribes in the age of 18 to 60 years (97%) constitute main workforce who employ in collection of NTFPs, agriculture, wage earning and allied activities. On the other hand the tribes above 60 years are rarely involved in such activities.

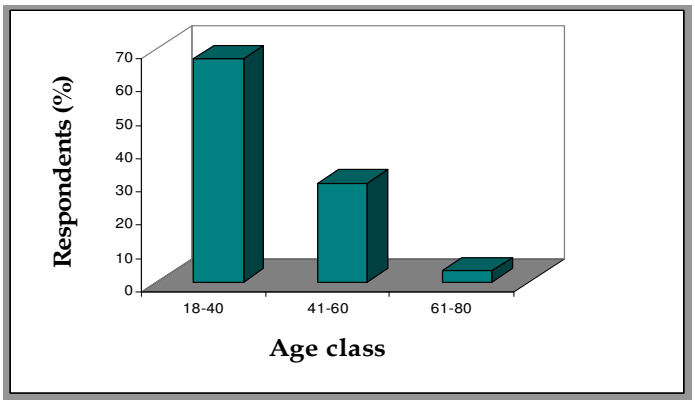

Figure 4.1 Age classes of surveyed respondents

4.2.3 Literacy level

The literacy rate of adult males (47.30 %) was higher than adult females (36.30 %). Literacy was highest for children (51%) because of encouragement from government through free educational programs and support from parents. This confirmed the results of the government survey in 2001. They found phenomenal increase in literary rate with tribals compared with the situation in 1991 (Table 3.2).

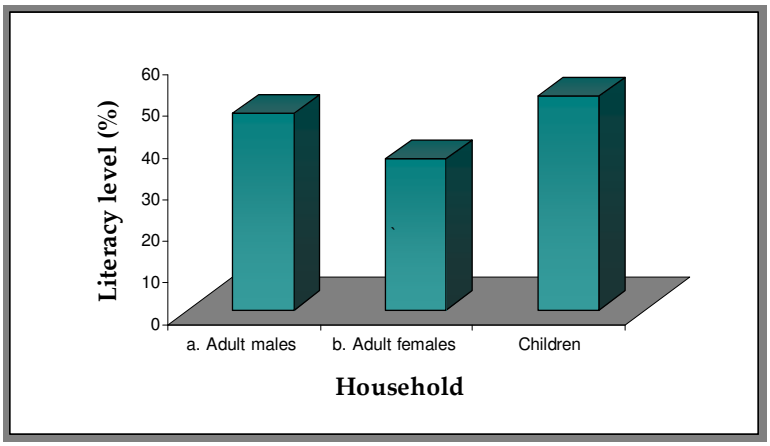

Figure 4.2 Literacy levels of the households

4.2.4 Land holding

Out of the total 91 tribal households, the landless (72.53 %) are dominant in the study area followed by marginal farmers (27.47 %) with holdings of an average 0.88 and 0.60 hectares of forest and revenue lands respectively. Thus, indicating the dependence on encroached forest lands for agriculture and revenue land for carrying out other activities. Infact they own livestock because the rights to these lands are only usufruct.

4.2.5 Livestock

About 26.37 % of the tribal population owns livestock with on average 7.50 animals per household. The reason for high number of livestock is due to the practice of agriculture and availability of free fodder in the forest lands. The poultry reared per household was quite high (6.90), since this is considered as common feature among the tribals. Most of the households own poultry because of easy maintenance and ready cash if they sell to local market. In addition, 12 % of the tribals own an average of 3 cows. In general having animals is a kind of an economic security for forest dwellers.

4.3 Respondents involment in different sectors

The tribals meet food and income needs from collection of NTFPs, wage earning, agriculture, livestock rearing and services and allied activities.

Table 4.3 indicates that, all tribal households are traditionally involved in NTFPs collection. An average number of 1.15 tribals in each household depend on this activity. In addition, tribals also depend on wage earning (76 %) followed by agriculture (27%), livestock rearing (26 %) and services and allied activities (7 %). In conclusion, NTFPs is the important activity in terms of labour contribution.

Table 4.3 Percentage of sample respondents in different sectors

Activities	Number of respondents	Percentage	Average numbers of family members involved
NTFPs	91	100	1.15
Agriculture	25	27.47	1.64
Livestock rearing	24	26.37	1.00
Wage earning	69	75.80	1.55
Services and Allied activities	6	6.59	1.00

4.4 Composition of tribal employment

Comparing employment generation in various sectors, the wage sector generated the highest employment (55%) followed by NTFP (26%), and other sectors. This was similar to the results of Prakash (2003). He reported average employment of 64.42 mandays

from NTFPs collection. The agricultural sector (12.56 %), livestock rearing (3.69 %) and services and allied activities (2.96 %) were other sources of employment available for the collectors in the area.

Table 4.4 Composition of employment in different sectors

Activities	**Employment generated** (days/HH/year)
NTFPs	63.47 (25.70)
Agriculture	31 (12.56)
Livestock rearing	9.12 (3.69)
Wage earning	136 (55.09)
Services and Allied activities	7.30 (2.96)
Total	**246.89 (100)**

Note: Figures in parenthesis indicate percentage to total

The larger employment in NTFPs and wage sector is because of two reasons: (i) most of the tribes were landless (72.53 %) and those who possessed land, hold only small pieces (ii) demand for labour in coffee plantations. Furthermore, forest departments also engage for planting, digging and other maintenance activities. This was supported by the results of Shrinidhi (2006) in Kodagu district. She found that, labour in coffee plantations and NTFPs collection are the major sources of income and employment.

The coffee sector is the largest employment provider throughout the year. Weed control measures, application of manures and fertilizers are executed during May – June (before onset of monsoon). During the rainy season (June to September) a large number of tribals (84.6 %) are involved intensively in lichens collection (Table 4.9). The second weeding and application of fertilizers in coffee is done during October and November. At this time tribals are less employed in gathering NTFPs. Coffee harvesting is done from December till January, which has provided larger employment with attractive wages (INR.120/day) compared to other seasons (INR.80/day) in the plantation economy.

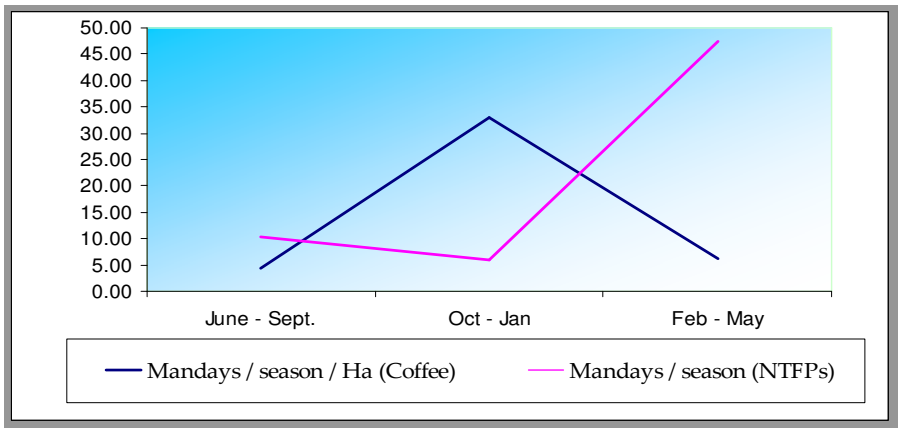

Figure 4.3 Trend in labour demand in coffee and NTFPs

Even children in the family also sometimes engaged in harvesting coffee beans. Again tribals are employed during March and April for pruning and plant protection measures. Hence tribals are employed in both coffee and NTFPs collection. Thus, NTFPs collection and labour in coffee plantations are major sources of income and employment throughout the year. However the employment in NTFPs is lower in particular period due to decreasing availability of NTFPs (Kushalappa 1996; Prakash, 2003).

4.5 Contribution of income from different sources to average household income

The collection of NTFPs by tribal households is a traditional activity for their livelihoods for a long time. Earlier, these NTFPs had only value in use. Of late, due to commercialization, most of these products have additionally acquired exchange value. Due to this, NTFPs collected by forest dwellers are not only meeting their subsistence needs but also for earning cash income. Thus, collection and selling of NTFPs is an important source of income. In this way, NTFPs contribute to food security by increasing their purchasing power, which increases their economic access to food.

Income in the study area is generated by five major activities: NTFPs, wage earning, agriculture, livestock rearing and services and allied activities. Wage earning generated the highest average annual income (INR. 14244) accounting 65% to the total income (INR. 21797).

Table 4.5 Composition of average annual household income derived from different sectors (Household/year)

Activities	Income generated (INR/HH/year)
NTFPs	5505.51 (25.26)
Agriculture	1043.29 (4.79)
Livestock rearing	167.03 (0.77)
Wage earning	14243.96 (65.35)
Services and Allied activities	837.36 (3.83)
Total	**21797.16 (100)**

Note: Figures in parenthesis indicate percentage to total
Note: 1 Euro = approx. INR. 62

The next important income source was NTFP contributing 25% (INR. 5505) to the total income (Table 4.5). The findings are similar to the studies of Acharya (2007) and Prakash (2003). They found that, the average income contribution from NTFPs ranges between INR. 5000 - 6000.

Other sectors, like agriculture (5%) and services and allied activities (4%) are also important income generating activities. Agricultural production in the region tends to be quite low because of the small land holdings (averaging 0.88 ha), lack of irrigation, and poor soil quality. With the small farms and low production, most households grow crops primarily for home consumption. Not surprisingly, therefore, the contribution of agriculture to cash income was small. Livestock (0.77%) contributed the least to the total annual income but led to a higher consumption of livestock products at the household level. The cattle owned by the households were being used solely for carrying out agricultural operations. Therefore NTFPs income and wage earning were important sources in providing income to households as evidenced by higher percentage share towards total household income (Table 4.6).

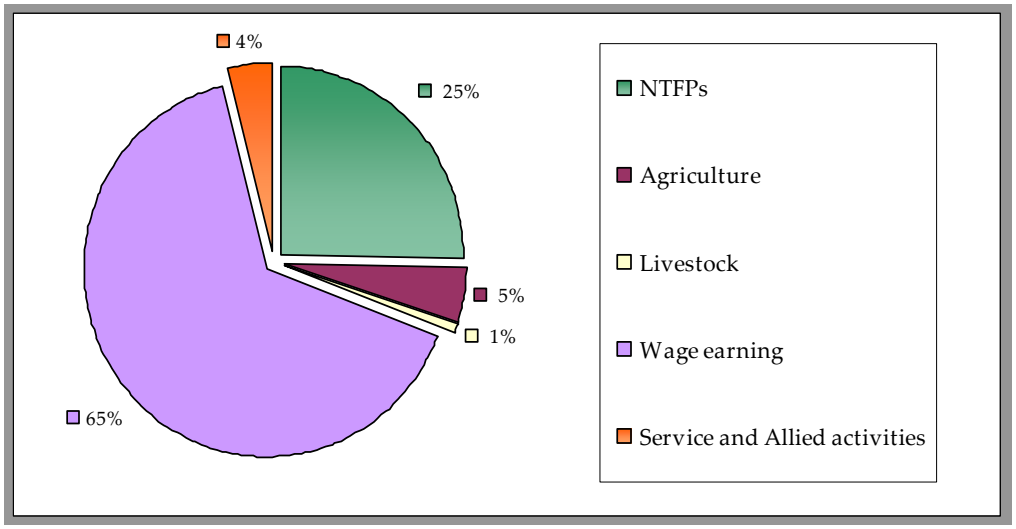

Figure 4.4 Average income shares of households from different activities

It can be depicted from figure 4.4 that income contribution from NTFPs is an important source of livelihood for households in the study area. Moreover, for tribals not having agriculture land it becomes the primary activity during certain periods of the year. Thus households depend on NTFP not only for their livelihood but also to earn cash income.

Apart from NTFP collection, most tribals were also engaged as wage labourers in coffee plantations. As could be seen above, this activity actually generates the highest income share, which fetched them larger wage income.

Agriculture as income generating activity provides relatively more income (averaging INR.1043) than services and allied activities. The majority of the cultivators grow paddy, coffee and pepper on small pieces of land. Paddy is for home consumption while coffee and pepper is for sales. Income generating potential of agriculture is thus rather meager if compared with wage earnings and NTFPs.

Animal husbandry is a minor source of income. Milk production from cows and goats is low and are normally used for household consumption. However, the sale of goats and poultry fetches some money every year.

Since the collectors were also involved in other minor activities such as petty business, cooking in government schools and elephant rearing, they earn some income, which also contributes to their livelihood.

4.6 Distribution of income from different sectors

The contribution of income from various sectors is presented in table 4.6. All the sample households in the study area depend on NTFPs collection for their subsistence. However, tribals cannot depend on a single source for their income and employment. Since NTFPs collection provides employment for few days in a year. For instance, according to the current study, it provides an average employment of only 63 mandays per year (Table 4.8). Therefore they depend on multiple sectors for their income and employment.

Currently tribals are receiving income from NTFPs collection, agriculture, livestock, wage earnings and services and allied activities. Among these sectors, the average income from NTFP per year is around INR. 5506, the income from agriculture (INR. 1043) will increase the total average income level to INR. 6549, which adds around 16 % to the total income. Further, average income from livestock is negligible (INR. 167) and adds around 2.5 % to the total income. Wage earnings, which form one of the major incomes, contributed 67 % (INR. 14244) to the total income (INR. 20960). Additionally, the income from services and allied activities contributes 4 % to the total income and raises the average total income level to INR. 21797. Thus the approach of sector-wise income distribution indicates the importance of each sector to the total income of tribal households. Comparing income levels from various sectors indicates: (i) NTFPs collection followed by all households irrespective of income contribution and (ii) income contribution from wage earning forms the highest income followed by other sectors. The higher contribution of wage income to the total income of tribals is due the employment absorption in the coffee sector during different seasons of the year (Figure 4.3). Thus, tribals are realizing more income if they depend on the coffee sector, NTFP and other activities. The income levels are directly proportional to the number of activities followed by them in general and the share of the NTFPs income in particular declines as income from other activities increases.

For the lowest income groups, contribution of NTFPs accounts for more than 70 % of the total income, indicating a greater economic role of NTFPs among low-income category (Table 4.6 & Figure 4.5). Therefore, income contribution from NTFP is an important source of livelihood activity.

Table 4.6 Sector-wise income distribution (Household income/year)

Type	NTFP income (INR)	Agriculture income (INR)	Livestock rearing income (INR)	Wage earning (INR)	Services and allied activities (INR)	Average total income (INR)
A	5505.51 (100)					5505.51 (100)
B	5505.51 (84.07)	1043.30 (15.93)				6548.81 (100)
C	5505.51 (81.98)	1043.30 (15.53)	167.03 (2.49)			6715.84 (100)
D	5505.51 (26.27)	1043.30 (4.98)	167.03 (0.80)	14243.96 (67.95)		20959.80 (100)
E	5505.51 (25.26)	1043.30 (4.79)	167.03 (0.77)	14243.96 (65.35)	837.36 (3.83)	21797.16 (100)

Note: Figures in parenthesis indicate percentage to total
Note: 1 Euro = approx. INR 62

A: NTFPs

B: NTFPs + Agriculture

C: NTFPs+ Agriculture+ Livestock rearing

D: NTFPs +Agriculture+ Livestock rearing +Wage earning

E: NTFPs + Agriculture+ Livestock rearing + Wage earning +Services and allied activities

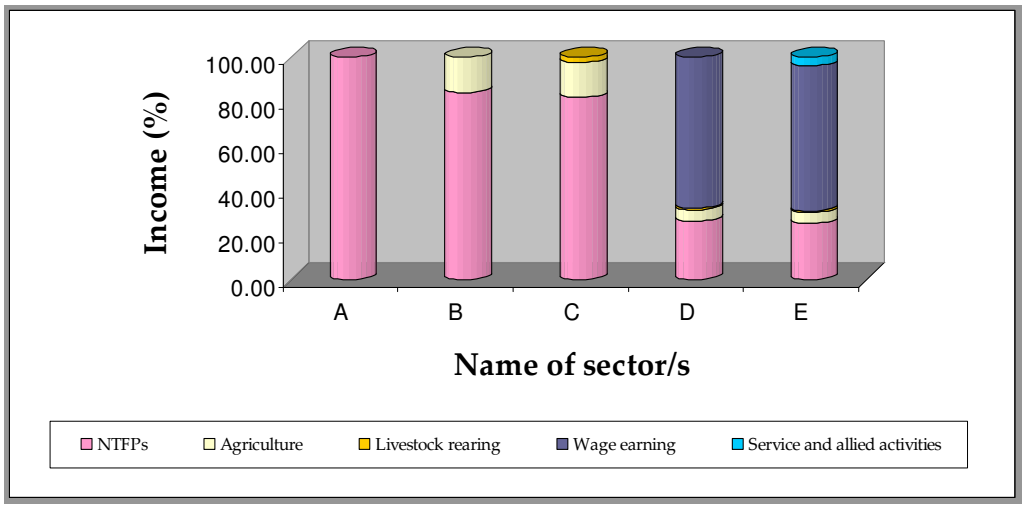

Figure 4.5 Sector wise income distribution

4.7 Scenario of NTFPs in the study area

Table 4.7 depicts details on various NTFPs available, the period of availability, the harvesting parts, methods of collection and end use of the products. The major NTFPs are lichens, honey, beeswax, shikakai and soap nuts. While gooseberry and turmeric were available in minor quantities.

NTFPs are collected all year round. However, most of them are seasonal in nature. The late winter and summer season (February to May) is considered as the peak season for NTFPs collection. Out of the seven species, four species were collected in this season. The other important season was monsoon season (June –September) dominated by collection of lichens. While gooseberries were collected during the winter season (December to February) (Table 4.7). Thus maximum NTFPs collection was done during summer and monsoon seasons.

Each collector makes on average 2 to 3 visits to the forest in a week. However, this frequency may vary according to season and type of NTFP collected in the respective season. Collection of NTFPs in the study area is only by men. Though women are interested in that job, they were not involved in collecting because of fear of elephants and drudgery in collection process.

Table 4.7 Details of NTFPs in the study area

Local Name	English name	Botanical Name	Period of availability	Parts collected	Method of collection	End use
Marada hoo	Lichens (Indian stone moss)	-	June-September	-	Hand removal from tree bark	Spice for food, Medicine
Jenu a.*Kolu Jenu* b.*Hejjenu* c. *Hutta Jenu*	Honey Little Bee Rock Bee Indian Bee	 *Apis florea* *Apis dorsata* *Apis cerana*	April-May	-	Bee hive and Smoker	Groceries, medicine
Jenu mena	Beeswax	-	-	-	Collected from honey comb	Candles and water proof materials
Seege	Shikakai	*Acacia concinna*	February- May	Fruit (pods)	Shaking and plucking	Bathing powder, soaps and shampoo and in medicine
Antavala	Soap nuts	*Sopindus emerginatus*	March-April	Fruit	Shaking and plucking	Shampoos and soaps
Nellikai	Indian gooseberry	*Phyllanthus emblica*	December-February	Fruit	Shaking and plucking	Pickles, medicine
Arishina	Turmeric	*Curcuma longa*	March-april	Roots	Hand	Colour and flavor for food stuffs and medicine

4.7.1 Lichens (Marada Hoo)

Collection of lichens is one of the most important activities. Lichens were collected during the monsoon season. They usually grow on barks of trees and collecting them is considered as a drudgery and risky work due to chances of skidding while climbing trees. The average collection was 61 kg per season. They are marketed to the nearest co-operative society (LAMPs) at an average price of INR. 64.10 per kg (Table 4.10).

4.7.2 Honey (Jenu)

Natural honey is available in the study area and people collect it during summer (April-May). There will be more than 5 to 6 colonies of honey bees in a tree. Each harvest in a tree may takes about one and half hour. Honey collection is done by adult male, as it requires skill to handle the bees. Gathering honey in the forest mainly depends on its availability. The availability of honey varies and depends on how they search for that product. It is a very laborious job and sometimes they need to stay the whole night for collection. One person can easily collect about 35 kg per season, which can fetch average price of INR. 52 per kg in the co-operative society (Table 4.10). The same honey collected by the tribals may fetch higher prices (INR. of 60 to 100) when it was sold locally.

4.7.3 Beeswax (Jenu Mena)

Wax is prepared locally by tribals. They prepare wax in the wooden frame with an average quantity of 5.5 kg per season and sell it to the co-operative society at an average price of INR. 75 to 80 per kg (Table 4.10).

4.7.4 Shikakai (Seege)

Shikakai collection is one of the growing activities in the study area. This is available during summer (February- May) characterised by alternate bearing. Its collection requires 4 to 5 hours/day. A person can collect about 134 kg per season, sold at co-operative society at an average price of INR.8 per kg (Table 4.10). Shikakai fetches a price up to INR.15 during lean season but tribals cannot wait because of lack of storage facility. Collecting shikakai was the most drudgery work, since it is a vine plant which spread up to 4 to 5 trees and is covered with the spines. The seed of shikakai is processed into shikakai powder which is used for bathing.

4.7.5 Soap nuts (Antavala)

Soap nuts were also collected during summer (March to April). However its availability is declining in last few years because of irregular rains. Presently, people in the study area were collecting 242 kg per season. The prices range from INR. 4 to INR. 5 per kg (Table 4.10). Also the soap nuts were sold to co-operative society. They are widely used in shampoos, soaps and by goldsmith.

4.7.6 Indian gooseberry (Nellikai) and Turmeric (Arishina)

In addition to the above major products, households were also involved in collection of gooseberry and turmeric, but these products are available in negligible quantities. Hence, it cannot be purchased by the LAMP society. The products serve medicinal purposes and are sold either to local retailers or kept for home consumption.

4.8 Composition of NTFP employment pattern

Shikakai was the major employment source contributing 52 % (33 days/HH) to the total NTFPs employment (Table 4.8). The collection of shikakai was a labour intensive activity and time consuming process. Lichens were the next important employment generating activity which provides 16 % (10 days/HH) to the total NTFPs employment. The collection of soap nuts, gooseberry, honey with beeswax, and turmeric contributing 9.74%, 9.28%, 8.96% and 4.17% respectively to the total NTFPs employment. The collection of soap nuts, gooseberry and turmeric generated less than 10 days of employment for the tribal households, as their collections procedures was much simpler than collection of shikakai and lichens. But, the case is different in harvesting honey. Even though honey collection is laborious job, the quantity extracted and days going out for harvesting was less compared to other NTFPs. Thus, based on the employment generating capacity, shikakai and lichens could be considered as the major employment share in the study area. Altogether, the collection of all the available NTFPs generated 63 days of employment per household.

Table 4.8 Contribution of NTFPs in employment generation

NTFPs	Season	Employment generated (days/HH/year)
Lichens (Indian stone moss)	June-September	10.27 (16.18)
Honey with Beeswax	April-May	5.69 (8.96)
Shikakai	February- May	32.80 (51.67)
Soap nuts (Antavala)	March-April	6.18 (9.74)
Indian gooseberry (Nellikai)	December-February	5.89 (9.28)
Turmeric (Arishina)	March-April	2.65 (4.17)
Total		**63.48 (100)**

Figures in parenthesis indicate percentage to total

4.9 Income composition of NTFP collectors

NTFPs contribute to livelihoods for the large proportion of poor living in forests of most tropical countries (Arnold and Perez 2001). The NTFPs incomes vary across tribal households. They collect seven NTFPs, however only few of these contribute significantly to the total household income. In the study area, lichens, honey and shikakai accounts for more than 70 % of annual NTFPs income (figure 4.6). It was found that, lichens (43 %) contributed the most to the NTFPs cash income followed by honey (19 %), shikakai (12 %), soap nuts (10 %), Indian gooseberry (6 %), beeswax and turmeric with 5 % each. The heavy rains during Kharif season[22] in the study area supports growth of lichens. Though the quantity of lichens, honey and shikakai collected per household was less than other NTFPs, the cash income generated was higher because of: (i) the high unit price and (ii) the export demand.

Looking at the figures in table 4.8 and 4.9, it indicates season-wise income contribution from NTFPs. Shikakai, soap nuts, honey and turmeric are harvested during spring[23] and summer season which coincide highest cash income. This cash income may provide a

[22] Cropping season starts with the on-set of South-West monsoon and runs along with it till October

[23] Spring marks the transition from winter to summer (begins on march 21st and lasts until June 21st)

cushion during autumn[24] when NTFPs incomes appear quite low. Similar kind of results of highest contribution to cash income during spring and summer by NTFPs were also noticed in the study by Albers *et al.* (2005).

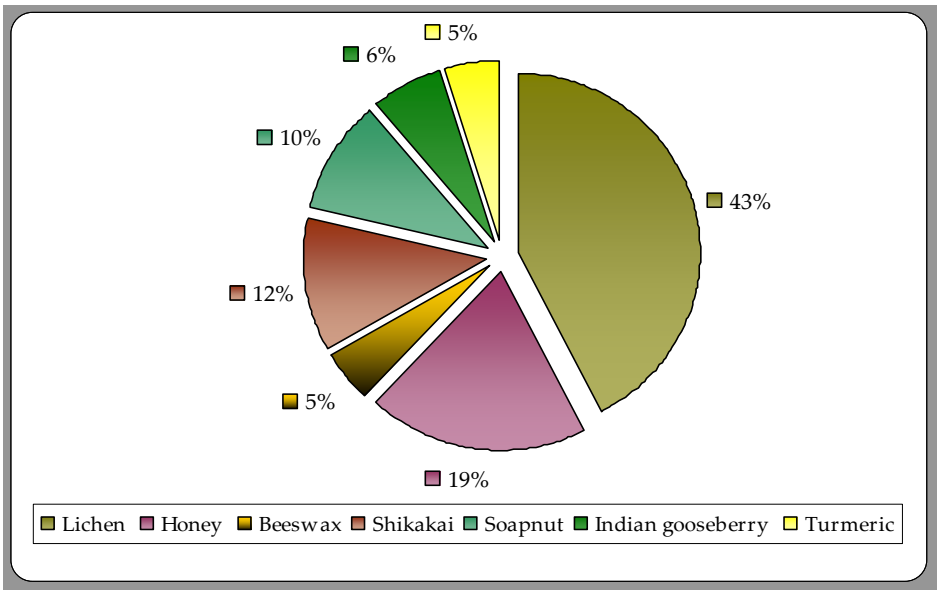

Figure 4.6 Percentage income contributions from sale of different sources of NTFPs

[24] Autumn marks transition from summer usually in September (when the arrival of night becomes noticeably earlier)

Table 4.9 Contribution of different NTFPs to cash income

NTFP	Nr. of HH involved/year	Quantity collected (Kg/HH/year)		Home consumption (Kg/HH/year)		Quantity sold (Kg/HH/year)		Income generated * (INR/HH/year)	
		Mean	S.D	Mean	S.D	Mean	S.D	Mean	S.D
Lichens (Indian stone moss)	77 (84.6)	61.34	28.84	-	-	61.34	28.84	3931.81 (42.59)	1846.65
Honey	84 (92.3)	35.19	20.06	1.29	0.665	34.16	19.93	1789.30 (19.38)	895.01
Beeswax	43 (47.3)	5.50	3.58	-	-	5.50	3.58	424.66 (4.60)	284.47
Shikakai	46 (50.50)	133.70	101.64	-	-	133.70	101.64	1105.70 (11.98)	901.83
Soap nuts	18 (19.8)	242.22	223.79	-	-	242.22	223.79	954.35 (10.34)	899.19
Nellikai (Indian gooseberry)	9 (9.9)	142.57	88.013	2.00	0.000	140.57	88.013	581.96 (6.30)	363.382
Arishina (Turmeric)	5 (5.5)	79.40	46.38	-	-	79.40	46.38	444.64 (4.82)	295.21
Total (INR)								**9232.50 (100)**	

Note: * Figures in parenthesis indicate percentage to total
Note: 1 Euro = approx. INR.62

4.10 Economics of NTFPs collection

Economics of NTFPs include costs and returns involved in NTFPs collection and marketing. The opportunity cost of labour is estimated considering average labour mandays involved in NTFPs collection. Opportunity cost is an important economic concept that measures the economic cost of an action or decision in terms of what is given up to carry out that action (USDA, 2007). For example, the opportunity cost of labour for the tribal is often measured using wage rate in coffee plantations (INR.80/day). The cost of time spent for NTFPs collection is imputed from the opportunity wage rate prevailing in the study area. The gross income per household derived from the sale of products, was calculated by considering difference between total quantity collected and sold. The costs and returns of different NTFPs obtained during collection season is shown in table 4.10.

The total opportunity cost of labour was amounting INR. 5078, of which shikakai was highest (INR. 2624), followed by lichens (INR. 822), soap nut (INR. 494), Indian gooseberry (INR. 471) and so on. This was mainly due to a higher number of days spent for collection. Table 4.10 shows household income from NTFPs collection. The gross income per household was INR. 9233. Similar results were observed in the study conducted by Shylajan and Mythili (2007). They showed a gross income per household of INR.9542 in the case of the *Kattunaikkan* tribal community.

Net returns from NTFPs are calculated using a simple concept as the difference between gross returns and costs excluding the opportunity costs of labour and transportation costs. Therefore, a total net return from NTFPs was INR. 3648. Out of this, the most important product in the category on the basis of net returns generated was lichens which contributed the highest net return (INR. 3038) due to highest unit price and export demand. On the other hand, the net return from shikakai was negative (Table 4.10).

To explain this, the researcher would like to introduce a new idea concerning the tribals' subsistence living within their systems considering opportunity cost of labour. If labour is valued at an average off seasonal wage rate (INR. 80/day – which is considered as the opportunity cost), then opportunity cost of labour, will be more than NTFPs income.

Nonetheless tribals choose to remain as NTFP gatherers despite of low relative net returns from NTFPs, which implies that the actual opportunity cost of labour might be well below the NTFP income. Considering the opportunity cost of labour, NTFPs income is below that of wage returns. But in reality they are gaining because, except transportation cost, nothing was paid by them. However during NTFPs season, coffee plantations in the study area will not provide employment as much as NTFPs gathering. According to the secretary of the LAMPs, *an individual tribal can make up to INR 150 per day by collecting and selling the NTFP to the LAMPS, which is more profitable compared to working in the coffee plantations*. Even though the NTFPs are seasonal, people are able to collect one or another NTFP throughout the season (Table 4.7 and 4.8). Thus, actual opportunity cost for tribals provides minimum amount than that of NTFPs work. Hence NTFPs incomes are more important despite low income from wage earnings.

In conclusion, NTFPs also contribute to the household income of tribals to a considerable extent. But associated drudgery with its collection is enormous. There is less income sources which can uplift tribals from the existing situation. The uncertainty about their annual income still remains questionable.

Table 4.10 Economics of NTFPs collectors (HH/year)

Particulars	Quantity sold (Kg)	Price/kg (INR/kg)	Gross returns (INR)	Transportation cost (INR)	labour mandays	Opportunity cost of labour* (INR)	Net returns(INR)	Net return/kg	Net return/rupee of cost
Lichens	61.34	64.10	3931.89	72.41	10.27	821.60	3037.88	49.53	47.39
Honey	34.16	52.38	1789.30	72.41	5.69	455.20	1261.69	36.93	24.09
a. Beeswax	5.50	77.21	424.66	72.41	0.00	0.00	352.24	64.04	4.56
Shikakai	133.70	8.27	1105.70	72.41	32.80	2624.00	-1590.72	-11.90	-192.35
Soap nuts	242.22	3.94	954.35	72.41	6.17	493.60	388.33	1.60	98.56
Indian gooseberry	140.57	4.14	581.96	72.41	5.89	471.20	38.35	0.27	9.26
Turmeric	79.40	5.60	444.64	72.41	2.65	212.00	160.23	2.02	28.61
Total			**9232.50**	**506.90**	**63.47**	**5077.60**	**3648.00**		

Note: *Off seasonal wage rates were considered (INR 80 /Day)

Note: 1 Euro = approx. INR 62

4.11 NTFP trade in the study area

The state forest department has to grant a lease to LAMP society for collecting 50 % of NTFP from forests. However, National parks and Wild life sanctuaries are excluded in the lease with several terms and conditions. The 50 % restriction in collection of NTFPs in certain areas connoted it for ecological, conservational and tribal livelihoods for future needs. Before collection season starts, for each product the LAMPs announces the collector's price, which is paid by the LAMPs to the tribals. In turn LAMP society issues the identity card (collector's pass) to the tribal who wish to collect NTFPs which he has to carry when he goes to forest for collecting products. Here the forest department is enforcing the tribals to carry the pass.

The LAMP society was the sole agency handling the NTFPs' trade. Society will appoint an agent among tribals in each tribal settlement who works on a commission basis. The agents procure the produce from the collectors on the behalf of LAMPs for which they get commission per kg of produce they handle. For marketing of the produce the LAMP calls for tenders/public auction to local brokers/dealers to dispose the produce to traders under the presidency ship of "*Mahamandala*" a co-operative marketing federation. According to the secretary of local LAMP society the *'Mahamandala should find better markets for NTFPs using auctions'*. However, this study revealed that the LAMP sell the NTFPs that are collected directly to the traders. A study by Shrinidhi (2006) reported that, the inefficiency of the *"Mahamandala*" in finding a market for the NTFPs and lack of storage facilities at the local LAMPs are some of the reasons for the local LAMPs to sell the NTFPs by themselves to traders. These traders are export license holders and can sell export products either domestically or internationally. The traders themselves may process the NTFPs or sell to the processing industries, which ultimately pass on the products to consumers. Karnataka has two license holders for exporting the NTFP in Hubli and Mangalore districts. They can sell the product with high profit margin. The details of NTFP marketing is presented in the figure 4.7. In the study area, collecting NTFPs at LAMP society is the first channel and the only legal one.

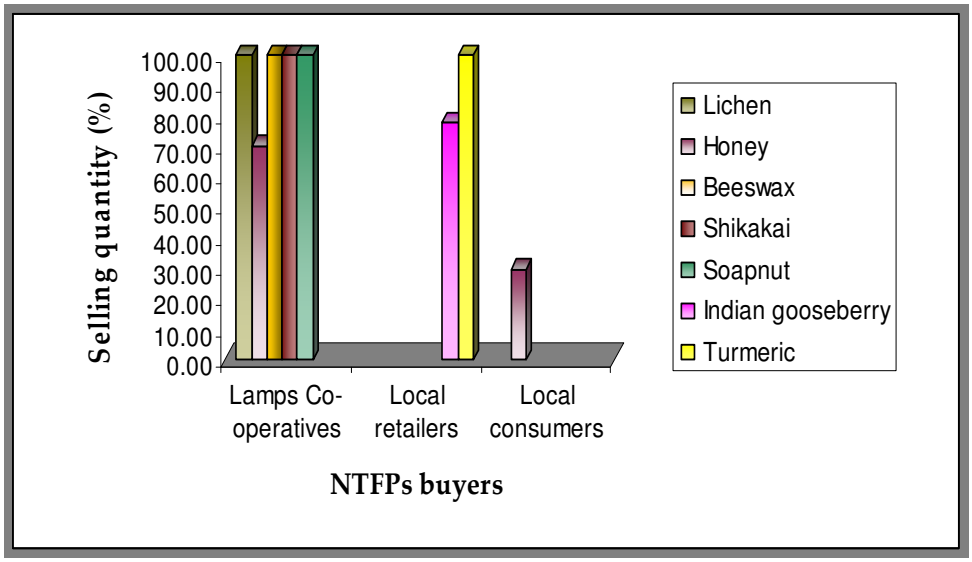

Figure 4.7 Marketing pattern of the NTFPs

There are three LAMPs societies in the district, is one for each taluk. LAMP society trade exclusively for five notified NTFPs (lichens, honey, beeswax, shikakai and soap nuts). Whereas marketing of other two products (Indian gooseberry and turmeric) were traded through local retailers as availability of these products is less. Some quantities of honey was occasionally sold to local consumers where they get slightly higher prices than LAMPs. Out of the seven products in the study area, only lichens are exported internationally to Arab countries in the name of "Indian stone moss". Lichens are used as spice ingredients for both vegetarian and non-vegetarian food in the Arab countries. The remaining products are traded domestically to the mega-cities of neighbouring states like Maharashtra and Tamil Nadu.

The marketing of Indian gooseberry and turmeric through the local retailers channel can be termed as unorganised channel. Tribals preferred these people to meet the immediate monetary needs of households. Unlike in the marketing channel through LAMPs there is no organized way of procurement, and distribution of these products in the open market. In these channels, a number of sub-agents procure the NTFPs from the collectors and sell it to private traders who in turn, sell it to the wholesaler, manufacturing units or final consumers. While procuring NTFPs from the collectors, LAMPs agents who operate at the tribal village level were also found to mislead the collectors at the time of weighting of the produce.

Tribes in the study area sold most of their collected produce to LAMPs collection centres, because society is operative irrespective of fluctuation in demand of any NTFP in the market. This acts as a shock absorber for the local communities in case of market fluctuations. In the LAMP society record of product wise total collection is maintained. Depending upon the availability of facilities and infrastructure the collected products are sorted and processed at different levels.

4.11.1 Calculation of price spread

An analysis of price spread has been carried out to understand the share of final price going to the primary gatherers. Price spread is the difference between the price paid by the ultimate consumer and price received by the gatherers in case of NTFP (Shylajan and Mythili, 2007). Here final consumers' price was considered sales price of the LAMPs co-operative society, because it was difficult to assess ultimate consumer price by researcher.

Table 4.11 Estimation of price spread of major NTFPs

Name of the NTFPs	Selling price by collectors to LAMPs (INR/Kg)*	Sales price of LAMPs (INR/kg)*	Price difference between collectors and the lamps (INR/kg) (Price spread)	Percentage appreciation
Lichens	68	105	37	54.41
Honey	45	63	18	40
Beeswax	75	85	10	13.33
Shikakai	10	11	1	10
Soap nuts	4	5	1	25

* Data recorded in LAMPs society (2006-2007)

Table 4.11 highlight the price spread, which is estimated for some of the NTFPs collected by the local tribal people in the study area and marketed through the co-operative society (LAMPs). A perusal of table indicates that the price differences (in INR) between the collectors and LAMP co-operative societies for the NTFPs such as lichens, honey, beeswax, shikakai and soap nuts were 37, 18, 10, and 1 and 1 respectively.

It could be noted that, the LAMPs gets sufficiently high margins which is even over 50 % in case of lichens followed by honey (40 %), soap nuts (25 %), beeswax (13 %) and

shikakai (10 %). LAMPs has the monopoly over marketing of NTFPs and gatherers were not allowed to market their products according to their wish even though some products have alternative market in the nearby town. Hence, price spread is generally high between the collectors and LAMPs.

4.12 Results of Tobit estimation

The estimation of the Tobit model aims to identify the relation between household characteristics (independent variables) and percentage share of cash income generated by selling of NTFPs (dependent variable). The result in table 4.12 shows that there are four independent variables that significantly contributed to the dependent variable. Out of these, total hours of collection was found to be positive contributor to the dependent variable, whereas regression coefficient of farm income, wage income and income from services and allied activities were negative contributors to the dependent variable. Dummy variable "Community" is introduced to know whether the community in the study area influences the intensity of extraction of NTFPs. The coefficient of the dummy variable for community was statistically insignificant. Thus share of NTFPs income is similar in the different communities.

The estimated results of the Tobit model in the table confirm that, total hours of collection with coefficient of 0.901 was found to be significant at the 5 % level of significance (95 % confidence level) indicating that the positive relationship between the total hours of collection and dependent variable, the share of the income generated by NTFPs extraction. This was mainly due to fact that respondents spend more time in the forest for extracting NTFPs. Thus time spent/hours of collection is positively contributing towards NTFPs income.

Moreover the estimated coefficient of other income variables such as farm income (-0.001), wage income (-0.003) and services and allied activities (- 0.001) were found to be statistically negatively significant at 99 % confidence level in case of farm and wage income and 95 % confidence level in case of services and allied activities. This relationship clearly indicates that, if households have access to avocations of receiving income from other activities for their livelihood, they would depend less on NTFPs as

an economic activity. Hence, interpretation obtained from this table is consistent with the tabular explanation of table 4.6.

4.12 Tobit estimation of share of cash income from NTFPs

Independent variables	Coefficients (b)	t-value	Significance (p-value)
Constant	57.440*	6.040	0.000
Dummy_1	2.016	0.322	0.747
Dummy_2	2.267	0.321	0.748
Respondents Age	0.190	1.348	0.178
Education	-0.263	- 0.591	0.555
Distance travelled	0.177	0.566	0.571
Total hours of collection	0.901**	1.964	0.050
Family size	- 0.842	-0.834	0.405
Transportation cost	0.001	0.293	0.770
Farm income	- 0.001*	-2.902	0.004
Livestock income	0.001	0.728	0.467
Wage income	- 0.003*	-9.671	0.000
Income from services and allied activities	-0.001**	-2.514	0.012
Nr. of observations		91	
Log likelihood function		-367.820	
LM test [df] for Tobit		20.678 (13)	
ANOVA based fit measure		0.527	
DECOMP based fit measure		0.599	

Note: * indicate significant at 1% and ** indicate significant at 5%

The relationship between family size with the coefficient of -0.842 and share of household income of NTFPs was negative but non-significant.

The estimated coefficient of education (-0.263) was found statistically non-significant factor influencing NTFPs collection by tribal households. This is because of the fact that, majority of the literate households (upto primary schooling) had no alternate source of employment or income. Similarly, the estimated coefficients for other variables such as distance travelled (0.177), age of the respondents (0.190), transportation cost (0.001) and livestock income (0.001) were found statistically non-significant. Thus it indicated that these variables will not have much effect on share of income by NTFPs.

Finally, it can be concluded that determinants of share of household's income from NTFPs are time spent for collection and income from other activities include farm income, wage income and income from services and allied activities.

4.13 Problems and coping mechanisms

This part of the study attempts to report the factors affecting tribal livelihood and few coping mechanisms among tribals living in the Kodagu district of Karnataka. All the sample respondents of the district were interviewed with regard to the problems encountered. As explained in the methodology, various constraints were ranked (figure 4.8) following the priority given by the respondents.

With regard to implementation of Act (Wildlife Amendment Act 2002), 42.9 % of the respondents had the opinion that, they were unable to "decide" as they do not have knowledge about this Act, because majority of them were illiterate. On the other hand almost 40.7 % of the respondents strongly agreed this was a problem. This clearly says that people have problem with the implementation of the act. This is due the fact that implementation of Wildlife (protection) Amendment Act 2002 now bans extraction of NTFPs in National parks and Wildlife sanctuaries. Till the ban; local tribes had usufruct rights to collect NTFPs such as honey, lichens, shikakai, soap nuts, turmeric, gooseberry and other medicinal products and sell them to LAMPs.

Tribals were "undecided" (54.9 %) about their commuting in the forest for long distances daily in search of NTFPs. Even they can't say that commuting is a problem, because of the fact that NTFPs collection is a routine practice for their livelihood and they were ready to walk for long distance in the forest. They also opined that, in the forest the problem is not with commuting but with the risk of attacks by elephants and wildlife animals and the legal restrictions associated with the forest, when they enter protected forest. So they have to spend money to commute by hired vehicles.

Regarding accessibility to food, tribals responded that *"we live here, because of NTFPs and wage earning in the coffee plantation, income from this will help us to buy food".* Also tribals were growing food in small pieces of land they have, there is no problem to meet basic food demand. Therefore 41.8 % of the respondents indicated that they were food secure (answered somewhat disagree on the statement of having insufficient food to eat), even

though they rely on NTFPs sales for income supplement. Children going to schools run by the state government, have lunch in the school under the mid-day meals program. The parents have expressed their appreciation with this program as children are noticeably healthier and attend the schools more regularly. That is the reasons why the literacy rate of the children in the study area is more than 50 % (figure 4.2). While, 33 % percent of the tribals were defiantly said food insecure (answered somewhat agree on statement of not having enough food), because crops grown in the forest land were damaged by elephant raids. Therefore, they have problems in accessing foods in the vicinity. Tribal people have no incentive to invest on agricultural land as they do not possess title deeds for the land they have been cultivating for a long time in the forest. Their possession of land is now considered illegal or encroached land. As a consequence of this, tribes at the household level adapted by changing their food habits as a mechanism to cope up with available resources.

Threats by forest officers were noticeable when researcher had interaction with respondents. About 47.3 % of the tribals agreed that, the high risk of being caught or punished by the forest officers, when they go to National parks and Wildlife sanctuaries for gathering NTFPs was a problem. Tribals are asking for extending the areas for NTFP collection as alternative mechanism for their subsistence. They were caught and penalized if they did not carry collector's pass with them during collection trip. However the local tribal leader indicated that, a recurrent action of these kinds of troubles by the local forest officials has jeopardized their customary way of life. This makes life difficult, as NTFPs collection is one of the sources of their livelihood. On the other hand tribes also expressed that, forest officers don't trouble unnecessarily unless they have reasons or mistakes committed during extraction of the NTFPs. Somehow changes are needed in the existing institutional rules keeping the problems in view for achieving food and livelihood security.

The employment scheme in the district implemented by central government for economic uplifting of Scheduled tribes was found to be impressive. Therefore, 54.9 % of forest dwellers agreed with the fact that they were getting employment under the

benefited schemes of National Rural Employment Guarantee Scheme (NREGS)[25]. The scheme provides alternative employment opportunities such as planting, road construction, drainages etc. to earn wage income and reducing the drudgery. Respondents indicated that income from this scheme is sometimes utilized as a coping strategy to meet household expenses. But drawback is delay in implementation of the schemes and all members are not benefited. This is due to lack of concerns of officials about the schemes and together with tribal's ignorance could be the other reason.

The results presented in figure 4.8 revealed that the most severe constraints faced by the respondents in collection of forest produce were restrictions under the forest laws. This is given top priority (strongly agree) by 52.7 % of respondents. Presumably, this is due the fact that, the forest department has put restriction that, the tribals should not make any steps on the barks of the tree for climbing while collecting lichens in the forest. One more restriction is limit in the distance travelled (not beyond 3km – 5kms), is in effect now for gathering products. If they crossed the limit, there is a chance of being penalized. Moreover, a majority of the tribal respondents who ranked "strongly agree" were in proximity or comes under the Nagarahole National park, which is considered as the restricted zone for NTFP collection.

The economic position of tribal population has not even stepped up. Among the tribals, only a handful of forest dwellers are getting the benefits (strongly disagree) and rest majority of them (32%) are unaware about governmental policies (strongly agree). The government has been not able to provide supporting measures, which are permissible under the provisions of policies such as poverty alleviation program and Recognition of Forest Rights (Scheduled Tribes and Traditional Forest dwellers) Act, 2006. Hence some more policies need to be planned addressing problems and concerns of tribals. From the tribals point of view, *the benefits from the government covering district ST families living mainly in the forest land are not reaching actual beneficiaries due to misappropriation of funds at officials' level concerned with both district and gram panchayat*[26].

[25] The government scheme promises 100 days of employment a year to one member of every rural unemployed family.

[26] Decentralized local administration system or local government

Table 4.12 Respondent's opinion on problems by priority (Percentage)

Respondents opinion	Implementation of Act	Commuting	Accessibility to food	Threatens by forest officer	Employment Scheme	Restriction	Unfavourable policy	Other basic facilities
1	16.5	7.7	19.8	15.4	18.7	24.2	27.5	3.3
2	0.0	7.7	**41.8**	17.6	16.5	3.3	1.1	**48.4**
3	**42.9**	**54.9**	1.1	0.0	0.0	6.6	25.3	0.0
4	0.0	16.5	33.0	**47.3**	**54.9**	13.2	14.3	34.1
5	40.7	13.2	4.4	19.8	9.9	**52.7**	**31.9**	14.3

Note: 1- Strongly disagree

2-Somewhat disagree

3-Undecided

4-Somewhat agree

5-Strongly agree

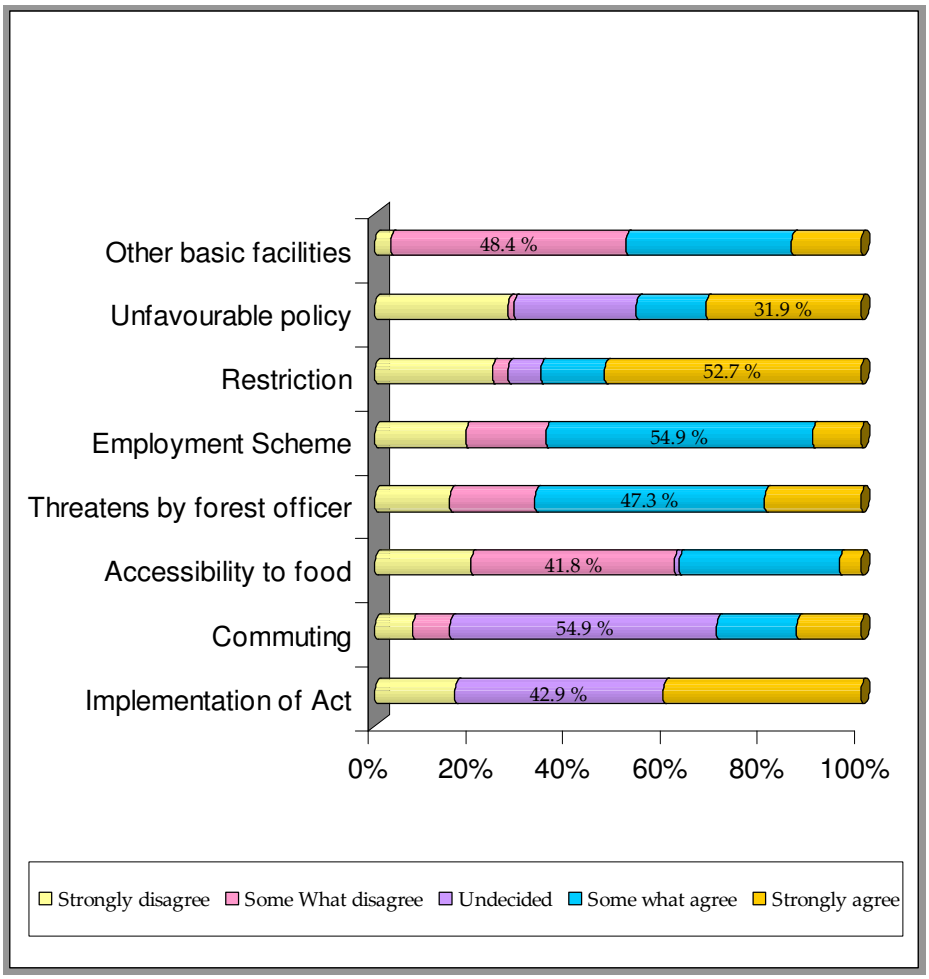

Figure 4.8 Likert Scale Survey results – The opinion of local forest dwellers

The figures indicated that, basic facilities like food, shelter, water and education are not much of a problem (some what disagree) for many forest dwellers as reflected by 48.4 % of the respondents. On the contrary, 34 % of the tribals who were dwelling in the forest land however did not have access to basic facilities (some what agree). Electrification and credit facilities were uttered to be an important problem. The result implies that, credit facilities have been provided to Pisary land (revenue land) of the forest area, but not for those who have encroached. This is because tribals who own land will have more access to credit facilities, as they will be able to fulfil the collateral security demanded before the loans are granted. Thus, this situation has deprived many tribals from the access to credit resources. With this consequence, they were forced to approach local to the money lenders for small loans to buy food. If they become defaulter, postponing payback or re-loaning are the present coping strategies of the local tribals.

With reference to electrification, they don't have it; instead they use kerosene as an alternative source for lighting inside home. However this is not effective as they have to buy kerosene with their low income. Buying and using kerosene is a luxury for them. Inspite of providing electrical lights in the settlements, the forest department has provided solar lights long before, which are not functional anymore. Tribals were complained that the facilities which are provided under the provision of government can extend only to forest located within the revenue boundaries of a village but not to those who encroached it illegally. Regarding their shelter, tribals reside in *Kachcha*[27] houses (Appendix III) they could not have proper housing, since their settlement is in the proximity of the National park. Therefore it would be better if the concerned near forest department would relocate them and to have *pacca*[28] houses under certain government programme.

The study also revealed that, for the majority of the forest dwellers (91.20 %), it is impossible to leave their customary way of extraction of NTFPs, because they need to survive with NTFP during the seasons (from June- September and February - May). The local tribes in the kodagu district are even ready to spring on with the business of collecting NTFPs like they did it for centuries. They want their future generation to continue extraction of NTFPs at least for their subsistence. The researcher also found that, even most of the collectors wish to continue the extraction of the NTFPs as a source of livelihood, if an alternative livelihood option provided from agriculture by the government or forestry, because extraction of NTFPs are a traditional practice. Children in the study area learn themselves on method of NTFPs collection. This clearly says that interest of the younger generations towards NTFPs. Respondents in the study area highlighted that, interests of the households' children regarding collection of NTFPs is used as supplementary income in the family. Thus, children from the households are used as coping mechanisms for survival through NTFPs activities. However, the results of the study are contrary with the study by Gubbi and MacMillan (2008). Their results from the study in Periyar Tiger Reserve established that 82 % of the collectors do not

[27] The houses which built by Bamboo sticks and mud

[28] The houses which built by bricks and cement

wish to continue collection of NTFPs, if an alternative livelihood from agriculture was provided and none wanted their children to continue with NTFP collection.

Hardly few in the study area (8.80 %) were ready to give-up their traditional practice of extraction of NTFPs. They were saying that, collection of such products involves physical drudgery and that collectors risk danger from animals especially elephants and other wildlife. Furthermore, only few of the respondents, stated that, they don't want their children to continue with the NTFPs collection as they found it has a drudgery and risky. They like their children to get educated and find good jobs.

When the researcher asked about accessibility of NTFPs in the opinion survey, some communities said that *"abundance of NTFPs is declining now.....not due to extraction, but due to logging and fire has resulted in a lack of forest products to even meet subsistence needs. Due to fire in the forest area the availability of the lichens are reducing these days, since it is growing on the bark of the trees. We have real wisdom, culture, protecting and conservation of the forest area. Mere collection of NTFPs are not over exploited by us, as we know the value of these products and future benefits, we collect the NTFPs in such a way by keeping in mind about conservational strategies of the species and its tangible benefits. But the real exploiters are outsiders who tempt us to overexploit the NTFPs for making it commercializing by exporting the products."*

4.14 Testing of hypotheses

Based on the objectives, following hypotheses were set for present study

- NTFPs provide relatively better income and employment as compared to other sources of income for tribals.
- Age, education, family size and access to other employment opportunities influences NTFP collection by the tribals

The first hypothesis regarding the contribution of NTFPs to the household income and employment are accepted, as NTFPs has a major role in generating employment and contributing income which accounts 26 % to the total employment and for about 25 % of the total income of the households. Therefore, local tribes are realizing relatively better income and employment as compared to other sources of the income derived from agriculture, livestock rearing and services and allied activities. However, the major source of income and employment is wage employment responsible for more that 50% of the total days of employment and income of the households.

Regarding the second hypothesis, the percentage share of income derived from NTFPs gathered by tribal households was found to be influenced by the total hours of collection, income from agriculture, wage income and income from services and allied activities is accepted. However some factors (age, education, distance travelled, family size and transportation cost and livestock income) were found to be non-influencing factors on share of NTFPs income to the total household income.

Chapter V: General conclusions and Recommendations

The production of timber in India is mainly on public forest lands with relatively well defined markets. Forests produce multitude of NTFPs *inter alia* medicinal plants, dyes, mushrooms, fruits, resins, bark, roots and tubers, leaves, flowers, seeds, honey, lichens and so on. NTFPs are sources of food and livelihood security for rural communities living in and around some of the forests. Despite of its importance, availability and prices of NTFPs are varying from place to place and their commercial value is low. In addition, markets for these products are relatively complex compared to those for timber, imposition of different quality control by buyers. Tribal people are often poor or landless. All of these factors contribute to the complexity of NTFP markets influencing the income of the households and leading to the problem of food insecurity.

With this background, the main thrust of the present study is to assess the contribution of NTFPs to income and employment for ensuring food and livelihood security of tribal economy, cost and returns of NTFPs collection and identifying the factors affecting tribals' livelihoods and their coping mechanisms in the Kodagu district located in Western Ghats of Karnataka. India.

The conclusions of this study are presented in three sections:

The first section of the study presents the income and employment pattern of the tribal households from different sectors. The study indicated that, the wage sector was the major employment generating activity constituting 55 % (136 days) of the total days of employment. NTFPs collection was found to be the second major employment generating activity contributing 26 % (63 days/HH/year) for the collectors. Therefore wage employment and gathering NTFPs were the prominent source of employment among the collectors.

It can be observed that wage earning generated maximum annual income of INR.14244 per households constituting 65 % of the total income of the households. The next important contributor was sales of NTFPs, which depict an interesting picture in terms of income. The study revealed that sale of NTFPs provides an important source of cash income for poor forest dwellers. The most important point is that NTFPs represents

nitty-gritty component of their livehood strategies accounting 25 % (INR. 5506) of their total annual household income.

However, one can understand crucial role of the NTFPs in light of tribal economy in case of sector wise income distribution. The results of study revealed that, percentage share (>70 %) of NTFPs played greater economic role among low income households (Table 4.6), which forms an important source of livelihood. It also becomes a primary activity during certain period of the year for those not having agriculture land. Thus households were found to depend on NTFP not only for their livelihood but also to earn cash income, which in turn make them to increase their purchasing power to buy food.

The extraction pattern of the NTFPs showed that there was a significant difference in the rate of extraction of NTFPs and also number of days spent in collection of each of these produce. A total of 7 NTFPs were extracted from the forest (Table 4.7). Out of these, a few NTFPs make a sizable proportion of household income. Lichens (Indian stone moss) was the most important NTFP in terms of income which contributed 43 % for the collectors followed by honey with beeswax (24%), shikakai (12%), soap nuts (10%), gooseberry (6%) and turmeric (5%). NTFPs like lichens, honey with beeswax, shikakai and soap nuts accounts for more than 85 % to the total NTFPs income (Table 4.9). Most of the products in the study area were gathered during the summer season due to their availability in that period. Only lichens and gooseberry were extracted during *Kharif* (rainy season) and winter seasons respectively.

The second section portrays the results of the cost and returns of NTFPs collection, trade of NTFPs and factors influencing share of NTFPs income. The study shows that, total opportunity cost of labour was highest in case of shikakai, followed by lichens, soap nuts, and gooseberry and so on. This is mainly due to more time spent for NTFPs collection. Gross income per households from NTFPs was INR. 9233, whereas net returns is INR. 3648. Of the total net returns, lichens contributed the highest due to highest unit price and export demand followed by honey with beeswax and soap nuts. The economics of NTFPs collection proved that, opportunity cost of labour is well above the NTFPs income. But in reality, taking into account real labor opportunities it is well below the NTFPs income. That is gatherers are gaining during NTFPs season compared

to working in coffee plantation with the off seasonal wage rate. However the study revealed that, during the period of NTFPs collection most of the tribals realized substantial income despite the pervasive low incomes in the wage earning from off seasonal works in coffee plantations. Thus, incomes from NTFPs contribute to the tribal's total annual households' income for considerable extent.

The trade of NTFPs clearly indicated that most of the tribes preferred to sell the produce to LAMPs collection centre. The LAMPs retained sufficient margin in the NTFPs trade. The tribal were found to receive low price for the NTFPs to an extent of 10 to 50 % of the consumer price. The LAMPs agents who operate at the tribal village level were also found to deceive the collectors at the time of weightments of the produce.

A Tobit model was used for determining by which factors the percentage share of cash income generated by selling NTFPs is influenced. The total hours of collection, farm income, wage income and income from services and allied activities were found to be significantly influencing the share of NTFPs income to the total household income. As anticipated, income from NTFPs having positive relationship with time spent for collection. While income from agriculture, wage earnings and services and allied activities exerted negative influence on the share of the NTFPs income. However, the dummy variable for community was not significant. Hence, for all communities the income shares from NTFP is similar.

Finally the third section will conclude with explaining problems faced by tribals in NTFPs collection followed by suitable recommendations. The major constraints faced by the respondents were restrictions to enter certain parts of the forest. In addition to this, they were also facing restrictions and risk of punishments associated with forest protection laws. The Wildlife Amendment Act 2002, limits the rights of forest dweller to collect NTFPs from National Parks and Wildlife sanctuaries with the view of protection and conservation of wildlife and biodiversity. Some of the tribals stated that while commuting in the forest they had serious problems of physical attacks by wild animals, which can be lethal or cause severe lifetime injuries. Though NTFPs collection fetches income to the people, it is also associated with high risk to their life. Some of the tribals inhabited in the isolated and remote hamlet areas do not have access to other basic

facilities. The assistance through the supporting policy measures of the government are not efficiently functioning to overcome poverty and assurance for their livelihood.

In general, NTFP is an important source of employment and income in poor remote places of the study area. It is striking that NTFP contributed significantly to household income with off-farm activities. The NTFP contributes a lower proportion of total household income (about 25 %) than wage earning (> 50 %) but it is a source of cash income during the season of extraction, which increases economic access to food.

Therefore, NTFPs play a prominent role in both life and economy of the three surveyed tribal communities dwelling in and around forests of Kodagu district. The main conclusion from the study approximates that the NTFPs were collected for both subsistence and commercial use. NTFPs add to peoples' livehood security especially for forest dependent people (Posey 1999, Cocks *et al* 2003). NTFPs were found to be the second major employment and income generator. Thus NTFP collection is important and moreover it becomes one of the primary activities during certain periods in the year. But this is also associated with high risk to life of collectors and also economic exploitation of the poorly educated people by the traders. The study also proved that wage earnings were the major source of employment and income for tribals in the study area, as it was evidenced by higher percentage share towards total household income. This is also a stable and relatively risk free source of income for the people. However, NTFPs supplement households' income and ensure food security indirectly by increasing their purchasing power over foodstuff which creates an economic access to food. Olawoye (1996) opined that rural households spend income realized from Non-timber forest products to buy food to maintain their families. This provides a supplement to the economic status in the lives of the rural dwellers. Hence, dependence upon several combined and seasonal activities ensures household food security.

Recommendations/Suggestions

1. In the study area NTFPs collection provides substantial employment and income opportunities to the poor forest dwellers. However resource decline is also reported due to commercial extraction, logging and fire hazards. This destabilizes the NTFPs based income. There is a strong need for scientific management and strict monitoring of forest resources. Besides, local people should also be educated about the ill effects of man-made fire in the forest and fire protection should be proactively followed by the forest department involving local people.

2. LAMPs have the monopoly over the NTFPs trade. The LAMPs agents reportedly followed misappropriate weighting of the products and LAMPs retained higher margins through sales as indicated through price spread analysis. Therefore concerned authorities of LAMPs should ensure fair practices in the trade of NTFPs and explore the possibilities of increasing price benefit to the collectors.

3. Crop raid by elephants over agricultural farm is a major problem which is restricting agricultural activities of the tribals. Government should ensure proper compensation for the loss and take up effective preventive measure against crop raids.

4. Scientific studies have to be carried out to assess the short and long run impact of NTFPs extractions on forest and ecosystem. Based on this, tribals have to be educated on sustainable ways of harvesting NTFPs.

5. The forest laws prevent extraction of NTFPs in the National Parks and Wildlife sanctuaries. In such cases, tribal people should be given suitable alternative sources of livelihood outside the protected forests and also government should explore the possibility for voluntary relocations outside the forest.

6. The concerned government authorities should ensure that the benefits of the development policies and programs targeted exclusively at the forest dwellers should effectively reach the needy people. Besides health, education and infrastructures facilities should be ensured to people with in the available provisions.

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APPENDICES

Appendix I. General profile of the Kodagu District

Sl.Nr	Particulars	
1	Geographical area in sq km	4102 sq. km (410775 ha)
2	**Forest area in hectares**	134615 (ha)
3	Nr. of revenue blocks	03
4	Nr. of educational blocks	03
5	Nr. of gram panchayats	97
6	Nr. of corporation town	01
7	Nr. of Madikeri urban development authority	01
8	Nr. of town panchayats	05
9	Nr. of assembly seats	03
10	Nr. of villages	303
11	Nr. of habitations	303
12	Percapita income	INR.3535 per annum

Source: Kodagu district at a glance

Appendix II. NTFPs production in Karnataka (In Metric Tones)

NTFPs	Production (2000-2001)	Production (2001-2002)
Tamaind	7321.0	2856.0
Shikakai	764.0	676.0
Terminalia	229.0	440.0
Fruits	591.0	197.0
Soap nuts	651.0	433.0
Gooseberry	649.00	469.00
Honey	123.00	57.00
Others	4634.00	9593.00

Source: Ministry of Statistics and Programme Implementation, Govt. of India.

Appendix III.

Lichens (*Marada hoo)*

Honey (*Jenu*)

Beeswax (*Jenu mena*)

Shikakai (*Seege)*

Soap nuts (*Antavala*)

Gooseberry (*Nellikai*)

LAMP co-operative societies in the study area

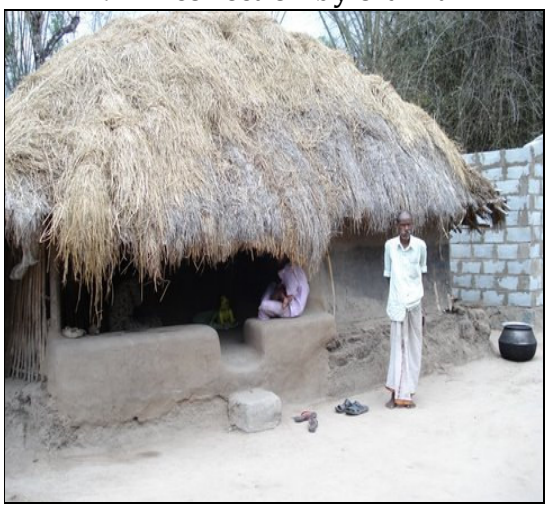
Researcher interactions with local tribes

Beehives in the tree

Tasting of honey

NTFP collection by old man

Tribe injured by elephant attack



The view of *Kachcha* (built by sticks and mud) houses

Drinking water facility in tribal village

Primary school

Appendix IV. Interview questionnaire

I. General Information:

Name of the respondent:
Age:
Village:

II. Family information:

Sl.no.	Relationships	sex	Age	Education	Employment from various sources in man days per annum				
					NTFPs	Farm	Services	Allied activities	Others
1 2 3 4 5									

Note (Relationships): 1= House hold head, 2=spouse, 3= children, 4=sisters, 5= brothers, 6= others
Note (Education): 1=Masters, 2= Degree, 3= Pre-university, 4= Secondary school, 5= Middle school, 6= Primary school, 7=Illiterate/others

III. Details of landholdings (Area)

Type of ownership	Wet (area in ha)	Dry(area in ha)	Subsidiary(area in ha)
Owned			
Leased in			
Leased out			
Grand total			

Total operation holding: owned land + leased land –leased out land (area in ha):……
Lease value:…….
Types of soil: 1,…….. 2,……. 3,……. (4)…….

IV. Time spent for crop production

Operations	Family owned (time spent- hrs/day)				Hired (time spent- hrs/day)			
	Male	Female	children	bullock	Male	Female	children	bullock
Total time spent (hrs)								
June-sep (avg)								
Oct-jan. (avg)								
Feb-may(avg)								
Total (average)								

V. Returns

Name of the products	Main products				By products			
	Qty produced (Qtl)	Home consumption	Qty sold (Qtl)	Price /unit (INR)	Qty produced (Qtl)	Home consumption	Qty sold (Qtl)	Price/ unit (INR)

Total income (main products):……
Total income (by products):……

VI. Live stock production

Particulars	Number	production Quantity (lts/kg)	Home consumption	Sale	Price/ unit (INR)	Total income (INR)
Cow						
Buffalo						
Bullock						
Goat						
Sheep						
Goat						
Piggery						
Poultry						

VII. Information on product gathered (NTFP'S–plants/animal products)

Particulars	1	2	3	4	5	6
Name of the NTFPs						
Plant parts (edible /non edible)						
Animal products (edible/non edible)						
Period of availability						
Peak season						
Lean season						
Nr. of hours of collection/day a. Male b. female						
Qty. collected /season (kg or qtl) **a.Male** June-Sept.- Oct- jan.-						

Feb-may- **b.female** June-Sept.- Oct- jan.- Feb-may-						
Distance traveled/trip a. Male b. female						
Method of collection a. Male b. female						
Cost of collection a. Male b. female						
Qty processed a. Male b. female						
Cost of processing a. Male b. female						
Home consumption a. Qty b. Uses						
NTFPs sales(Qty in kgs) a. Male b. female						
To whom they will sell						
Cost of transportation (INR/trip)						
Marketing channel						
Price received (INR/qtl)						
Total income from sales						
Consumer price of NTFPs						
End use of this product						
Remarks						

Note (Marketing channels): 1= producers- consumers
2= producers- cooperative society (retailers) - consumers
3=producers- cooperative society (wholesaler)-retailers (private traders) - consumers
4=producers – commission agent-local wholesaler- wholesaler of the city-retailer-consumers

VIII. Respondents opinion

Problems according to priority by respondents	Priority basis (ranking)					Coping mechanisms by respondents
	1	2	3	4	5	
Implementation of act						
Commuting						
Accessibility to food						
Threatens by forest officers						
Employment scheme						
Jurisdiction						
Restriction						
Unfavorable policy by govt.						
Other basic facilities (food, shelter, water, credit, education……..)						

Note: 1= strongly disagree, 2= some what disagree, 3= undecided, 4= some what agree
5= strongly agree (higher the scale higher will be the importance)

IX. Institutional factors

Particulars	Remark		Details
	Yes	No	
Name of the institution & service: (FD,CFP,PPU,NGOs)			
Arrangements for collecting NTFPs?(Formal/informal)			
Collection of NTFPs by respondents type (S,Co,I,Ce,R)			
Problems that you encounter while collecting the NTFPs?			
Do you follow any typical custom during (C,P,M)			
Restriction on NTFPs (C,P,M)			
Any jurisdiction for collection, processing and marketing of NTFPs			
Restriction on hunting, fishing & felling of trees			
Reliant more on industrially produced goods rather then locally produced goods (NTFPs)			
Do you feel that processing			

can be done at your home		
What products need drudgery and who bears this?		
Is there any extinction of NTFPs used in the past or present time?		
Is there any attack of wild animals on crops and/or human? If yes, give details.		
Is there any policy or rules on NTFPs at this moment in the area by government?		

Note: 1. FD-Forest dept., CFP- Community Forest programme, PPU-private processing unit, NGOs
2. S- Subsistence, Co-Commercial, I- Incidental, Ce- Ceremonial, R-Recreational
3. C- collection, P- processing, M- marketing

1. Do you really want your future generation to continue collecting NTFPs

2. Do you wish to continue collecting NTFPs if an alternative livelihood option is provided in agriculture?