A study on livelihood dependency of forest fringe community, marketing and economics of forest produces in Sundargarh forest division, Odisha

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By

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CERTIFICATE-I

This is to certify that the thesis entitled **"A study on livelihood dependency of forest fringe community & marketing and economics of forest produces in Sundargarh forest division, Odisha"** submitted in partial fulfillment of the requirements for the award of the degree of **MASTER OF SCIENCE IN FORESTRY (FOREST BUSINESS MANAGEMENT)** to the Orissa University of Agriculture and Technology is a faithful record of bonafide and original research work carried out by **Chinmayee Satpathy, Adm. No. 02FBM/15** under my guidance and supervision. No part of this thesis has been submitted for any other degree or diploma.

It is further certified that the assistance and help received by her from various sources during the course of investigation has been duly acknowledged.

(MRS. HIRANMAYEE NAYAK)
CHAIRMAN
ADVISORY COMMITTEE

CERTIFICATE-II

This is to certify that the thesis entitled **"A study on livelihood dependency of forest fringe community & marketing and economics of forest produces in Sundargarh forest division, Odisha"** submitted by **Chinmayee Satpathy, Adm. No. 02FBM/15** to the Orissa University of Agriculture and Technology, Bhubaneswar in partial fulfilment of the requirements for the degree of **Master of Science in Forestry (Forest Business Management)** has been approved/disapproved by the students' advisory committee and the external examiner.

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Bhubaneswar **(Chinmayee Satpathy)**
Date-

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ABBREVIATIONS USED

CIFOR	Centre for International Forestry Research
FAO	Food and Agriculture Organisation
GP	Grama Panchayat
HH	Household
INR	Indian Rupee
MFPs	Minor Forest Products
NGO	Non-Governmental Organization
NTFP	Non-Timber Forest Produce
NTFPs	Non-Timber Forest Products
NWFPs	Non-Wood Forest Products
OTELP	Orissa Tribal Empowerment and Livelihoods Project
OFDC	Orissa Forest Development Cooperation
%	Percentage
SC	Scheduled caste
ST	Scheduled tribe
USDA	United States Department of Agriculture

ABSTRACT

A thesis entitled "A study on livelihood dependency of forest fringe community & marketing and economics of forest produces in Sundargarh forest division, Odisha" was carried out in Sundargarh forest division of Sundargarh district with the objective of study the participation and behaviour of forest fringe community / people in NTFPs extraction and use (collection, processing and marketing) in Sundargarh division and to evaluate marketing and economics of NTFPs in Sundargarh division. The number of respondents for this study was 100 and they were randomly selected. The data were collected through a structured survey questionnaire, analyzed with appropriate statistical methods and were interpreted in accordance with the objectives of the study. Tobit analysis was used to determine the factors influencing the share of NTFP in income. The major findings of the study revealed that NTFP collection is performed by all households irrespective of income contribution. The maximum employment (32%) was generated by the wage sector followed by NTFP collection (25%), agriculture and shifting cultivation (34%) and other sectors (12%). Agriculture generated the highest average annual income per household (INR.6200.00) followed by NTFP (INR.5861.00), wage earning (INR.4067.00), shifting cultivation (INR.1270) and other sector (INR.2885.00) to the total income of the respondents. Interpretation of Correlation of different income sources showed that there are significant and positive correlation between agriculture and shifting cultivation with livestock. NTFPs was found to be significantly and positively correlated with livestock and negatively correlated with other occupation (services/business). Livestock was found to be significantly and negatively correlated with wages. Wages was found to be significantly negatively correlated with other occupation. From the above analysis it was observed that who are engaged in agriculture and shifting cultivation activities are in possession of more number of livestock. Also the landless persons who are collecting NTFPs for their livelihood also were in possession of goats, poultry birds for their subsistence. The persons who were economically poor and did not possess livestock were mainly depended upon wage earning for their livelihood. The villagers who were engaged in service and business were not depending upon wages for their livelihood. Shylajan and Mythili (2007) have reported an inverse relationship between household income from non wood forest products and income from cultivation indicating that households with more agricultural income depend less on NTFP. This is also in concurrence with Tejaswi's (2008) observed that the major determinant factors of NTFP income are time spent for collection and income from wages, farm, services and allied activities. Trade route of NTFPs started from primary collector and ended at consumer through village level trader, intermediate trader, wholesaler, retailer, external agency, outside trader etc. out of observed five channels in siali, same in mahua, two in kendu leaves, same in medicinal plant and numerous in sal, however their efficiency was varying with enterprises. 42 numbers of NTFPs species were found in sample villages and most of them were of medicinal and domestic uses. NTFPs being livelihood of sizable section of society where bondage with forest to be protected to protect ecosystem.

INTRODUCTION

Forestry is a productive sector with significant effects on meeting national socioeconomic and environmental functions as well as the improvement of rural livelihoods. The important roles played by NTFP in the livelihood of rural and urban households cannot be overemphasized as majority of rural households in developing countries, and a large proportion of urban households depend on the products to meet some part of their nutritional, health, house construction, or other needs. A large number of households also generate some of their income from trades in forest products e.g. Sales of Irvingia seeds in Ibadan (Uke, 2010)

Forests contribute 1.7% of GDP of the country. However, this figure does not take into account its numerous non-market and external benefits and the vast amount of fuel wood and fodder and other forest products collected legally or illegally. One estimate shows that total annual removals from the forest is worth about US$ 7.1 billion or Rs.30,000 crores which includes about 270 million tons of fuel wood, 280 million tons of fodder and over 12 million cubic meter of timber and countless non-timber forest products (NTFP). This does not include value of environmental services provided by the forest.

Forest products, which can be classified into timber and non-timber products, are numerous and play an important role in the livelihood of people living in or near forests. People in such areas often collect forest products and use forest land for cultivation. They use forest products both for household consumption and cash income generation (Fisher, 2000).

In subsistence economies, forests can provide many essential products and services for the life of local people such as “food, utensils, clothing, shelter, medicines and objects of spiritual or cultural significance” (Wong, 2000, pp. 3–4). (Wong, J.L.G., 2000).

Many households in rural and forested areas around the world depend heavily on NTFPs for survival. World Bank (2001) estimates that one out of four of the world‘s poor depend directly or indirectly on forests for their livelihood.

Non-timber forest products (NTFPs) are plants or plant parts that have a perceived economic or consumption value sufficient to encourage their collection and removal from the forest. It can also be referred to as all the resources or products that may be extracted from forest ecosystem and are utilized within the household or are marketed or have social, cultural or religious significance (FAO, 1990). These include plants and plant materials used for food, fuel, storage and fodder, medicine, cottage and wrapping materials, biochemical, as well as animals, birds' feather, reptiles and fishes. NTFPs which are harvested from within and on the edges of natural and disturbed forest, may be all or part of a living or dead plant, lichens, fungi, or other forest organisms. It therefore, represents a diversity of potential products sought after by a wide variety of people on a continuum of scales and intensities (FAO, 1990).

Apart from timber and firewood that are conceived as major forest produces, non-timber forest products (NTFP) include all products obtainable from forest. NTFPs indeed play a very significant role in the rural economy in terms of providing employment, income potential and life support sustenance (Negi *et al.*, 2011).

Utilization of NTFPs to create win-win options for forest conservation and improvement of local livelihoods depends upon how they are managed and governed in respect to both access to resources and access to the markets (Laird *et al.*, 2010). Effective governance of NTFPs is important throughout the management, harvesting, trade and use phases of most NTFPs. However, the governance of NTFPs was overlooked and poorly regulated in past years (Laird *et al.*, 2010).

The significance of NTFPs effectively captured the imagination of conservationists around the world when an article by Peter *et al.*, (1989) published in Nature'claimed that more money could be earned from tropical forests by collecting these products than from logging (Choudhury, 2007).

Globally, inter-national trade in NTFPs is estimated at USD 11billion annually (Ndoye and Ruiz Pérez, 1998; Shiva and Verma, 2002; Marshall *et al.*, 2005; Ahenkan and Boon, 2010).

These products provide a green social security to billions of people in the form of low-cost building materials, income, fuel, food supplements and traditional

medicines. In some cases, the revenues earned from NTFPs are the only source of cash income, which increases the dependency of people on commercially interesting NTFPs resources (Andel, 2000; Marshall *et al.,* 2005).

Even the terms forest and product are debatable (FAO, 2001; Ahenkan and Boon, 2010). Literally, NTFPs includes all products that are derived from forests with the exception of timber. In practice, various products and production environments are included or excluded depending on the objectives of the author (Belcher *et al.,* 2005).

Non-timber forest products differ from timber in terms of the greater variety of products and of species, the shorter frequency of harvest cycles and the typically smaller yields per unit area. However, as opposed to timber, rarely are entire plants harvested during NTFP extraction. Additionally, unlike timber that brings profits to state treasuries, economic benefits provided by NTFP accrue largely at the local level (Panayotou and Ashton, 1992).

Non-timber forest products (NTFPs) provide a range of products which, when incorporated into the livelihood strategies of rural people aid in reducing their vulnerability to risks (Neumann and Hirsch, 2000). These products are used for food, energy, shelter, medicines, tools and fibre. They are used to meet basic needs, are sold in local, regional and national markets to generate cash and, serve an important gap filling or safety-net function (Chopra, 1997; Khare *et al*., 2000; Shackleton *et al.*, 2002; Angelsen and Wunder, 2003).

Value is the worth of a product or service to an individual or a likeminded group in a given context, often involving a complex of relationships *(Brown ,1984).* Values are of concern not just in the field of economics for example, they are dealt with by philosophers in their treatment of ethics. Economic values are human oriented and human assigned. Values are specific to a given context and situation. Forest valuation should therefore, always be situation specific and result should be attributed back only to the group studied and to the actual context and situation studied. (FAO, 1995).

In India, the life and economy of the tribal people are intimately connected with the forests. According to the Forest Survey of India's 2003 report, 20.55% of the country's geographical area is covered with forests. Of this, about 12% is dense forest

cover and about 7% is open forest cover. It is estimated that there are over 67 million tribal people in India, with the majority of them living in forested and hilly areas and make a living out of the forest produce collected by them; mainly edible roots and tubers and by hunting small animals.

Many tribal families may collect some of the non-timber forest produce for sale in nearby markets. Forests also support millions of non-forest dwellers who are non-tribal, as well as some pastoral nomadic communities.

These primitive hunting and gathering tribal communities who are numerically very small live mostly in Orissa, Bihar, Jharkhand, Madhya Pradesh, Chhattisgarh, Andhra Pradesh and Karnataka. The survival of these primitive tribal's is dependent on minor forest produce like mahua flowers, sal seeds, sal and Tendu leaves, edible roots, tubers, bamboo and wild fruits etc.

Tribals in Orissa, Madhya Pradesh, Chhattisgarh, Bihar and Jharkhand indicate that over 80 per cent of the forest-dwellers collect 25-50 per cent of their food from the forests.

Of all the states of India, Orissa has the largest number of tribes, as many as 62 in terms of percentage they constitute an impressive 24 percent of the total population of the state. These tribes mainly inhabit the Eastern Ghats hill range, which runs in the north-south direction. More than half of their population is concerned in three districts of Koraput (undivided), Sundergarh and Mayurbhanj.

The economic life of the Primitive Tribal Groups revolves round the forest and the PTGs of Orissa are not out of it. Forest nurtures their life and the biotic and abiotic components of forest ecology fulfil their socio-economic, bio-social, religio-cultural and psycho- social needs. They collect their basic amenities from the forest and their economic life is interwoven with the forest eco-system.

Traditional Knowledge System plays an important role in pattern of utilization of forest resources by a community. However much of this wealth of knowledge is lost today as traditional cultures are being eroded (Hamilton, 1995). Documentation of the traditional knowledge about the relationship of man with biodiversity plays an

important role in rescuing disappearing knowledge and returning to local people, ultimately reinforcing links between communities and environment leading to the support for conservation (Jain, 2000).

Sundergarh, one of the 30 districts of Odisha, located in the northern extremity of Orissa, lies between 21°32' and 22° 32' north latitudes and 83° 32' and 85° 22' east longitudes. Total Geographical area of Sundargarh district is 9, 71,200 Hector. The population of the district is 2,080,664 and of this population, tribal constitute around 51% (Census of India, 2011).

Sundargarh district was constituted on the 1st January, 1948 out of the two ex-States of Gangpur and Bonai, which merged with Odisha on that day. True to its name, this "beautiful" district of Sundargarh with forest cover area is 4232.57 square kilometres which is about 43% of its total area and it is the second largest in accounting for 8.53% of state under forest cover. And numerous colourful tribes dotting its landscape and with abundant mining potential are bounded by Ranchi District of Jharkhand on the North, Raigarh district of Chhattisgarh on the west and North-West, Jharsuguda, Sambalpur and Angul District of Odisha on the South and South-East and Singhbhum District of Jharkhand and Keonjhar District of Odisha on the east. However, no systematic study has been under taken yet in this direction in Sundargarh forest division to assess the potential of availability of various NTFPs and the impacts of these on sustainability of tribal livelihood. Keeping these on mind, an attempt has been made under the present investigations entitled "**A study on livelihood dependency of forest fringe community & marketing and economics of forest produces in Sundargarh forest division, Odisha**"

The specific Objectives of the study are as below:

1. To study the participation and behaviour of forest fringe community/ people in NTFPs extraction and use (collection, processing and marketing) in Sundergarh division.
2. To evaluate marketing and economics of NTFPs in Sundergarh division.

Scope of the study:

India's forest cover is much lower than the required one-third (of the total geographical area) forest cover. The forests are also exposed to human induced deforestation. Being highly diverse in biodiversity and forest types, India's forests also have immense potential for livelihood based activities. The rural population depends predominantly on the natural resources for their livelihood. With the limited forest cover and limited forest resources, there is a huge gap between the demands and the available quantities, which itself are one of the major reasons for the deforestation and forest degradation. Such studies are preliminary measures that will help us understand the production and consumption of forest produces. Information gathered can help better management of the forest resources for poverty alleviation and reduce the gap between the consumption and production or marketing which would ultimately conserve our forest resources and simultaneously improve the quality of life of the forest fringe villagers.

REVIEW OF LITERATURE

NTFPs embody all biological matter of wild plants and animals other than timber extracted from forests and woodlands, e.g. fruits, nuts, vegetables, game, medicinal plants, resins, bark, fibres, palms, grasses as well as small wood products and firewood, amongst others (CIFOR, 2011).

Neuman *et al.* (2000) define NTFPs as: "All the biological materials (other than industrial round wood and derived sawn timber, wood chips, wood based panels and pulp) that may be extracted from natural ecosystems, managed by plantations etc. And be utilized within the household, be marketed or have social cultural or religious significance".

NTFPs are one of the oldest traded commodities in the world having historical importance (Panayotou *et al*., 1992). They are all forest extracts excluding timber. For example, bark, roots, tubers, leaves, fruits, flowers, seeds, resins, honey and firewood (Sunderland *et al.,* 2003; Panayotou *et al*., 1992). They are collected from a wide range of ecosystems such as forests, farm fallow and farmland and used for subsistence livelihoods including food, medicine and bartering.

There is growing evidence that Non-Timber-Forest-Products (NTFPs) contribute significantly to maintain livelihoods in rural Africa, Asia and elsewhere in developing countries (Campbell and Luckert, 2002; Cavendish, 2000; Cocks *et al.*, 2008; Shackleton and Shackleton, 2004; Viet Quang and Nam Anh, 2006).

NTFPs have three main functions in the household economy of rural communities living in or adjacent to the forest. Firstly, they help to fulfil households' subsistence and consumption needs in terms of e.g. energy and nutrition as well as medical and construction purposes. Secondly, they serve as a safety-net in times of crises (e.g. income shortages from other income sources, e.g. crop failure) and thirdly, some NTFPs provide regular cash income (Angelsen and Wunder, 2003; Cavendish, 2002; Chileshe, 2005; Shackleton *et al.,* 2007). The study conducted by Kumar (2015) in Dang's district of Gujarat indicates that most employment (42.51%) was generated by the wage sector followed by NTFPs collection (31.67%) and livestock rearing (15.85%). About 42 species of NTFPs were found to be collected and utilized for

various purposes such as food, medicines, and raw materials for making implements and also as a source of income.

The results of the study conducted by Ajaz-ul-Islam *et al*. (2013) revealed the average size of forest based direct paid employment among sample population was 19.82 man days/ household/ annum and the mean income earned from these activities was `2199.70/ household/ annum in the area. The livelihood generation from forest based secondary employment in the study area was nil as no wood-based or Non-Timber Forest Products (NTFPs) based enterprises were established. The average income and unpaid employment generated through NTFPs based self-employment for the surveyed households in the area were estimated to be `4791.16/ household/ annum and 88.22 man days/ annum.The agriculture contributed major share (36.23%) of total household annual income followed by forest resources (25.05%), labour (9.74%), livestock (8.86%), business/ shop (8.72%), service (6.77%) and others (4.63%).

Varadarajan (1980) reported that 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 Niligiri district.

Intodia (1990) conducted that 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 economic status of tribal's 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 that tribal 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 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.

Chakravarty and Verma (1991) analyzed that NTFP collected and sold in unprocessed form through co-operatives in a tribal sub plan area in Rajasthan fetched lower prices was documented.

Raut *et al.* (1992) studied on employment, income and expenditure pattern of tribal in the Nasik district of Maharashtra found that the collection of minor forest products (MFPs) 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.

Mahapatra (1992) recorded the endeavour by the co-operatives in marketing of NTFPs is an important step in saving the tribal from exploitation by the middleman. In Sundergarh district of Orissa, India he found that 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 tribal to sell minor forest products to the lender at a price fixed by the trader.

Suryawanshi (1992) stated that the tribal 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. Therefore, collection of NTFPs was a major source of income and employment for forest dwellers. For instance, tendu leaf collection was observed to provide about 90 days of employment to about 7.5 million people every year in India (Mistry,1992).

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.

Gauraha (1992) depicted 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.

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 tribal in Nallamalai to collection of forest produce for a living.

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.

Tewari (1993) reported that Non Timber Forest Products (NTFPs) are significant source of subsistence products, employment and household income in areas near forests. A large proportion of employment generated by NTFP accrues to women. Annual employment generation is estimated over 5 million person years with a potential to double it with comparatively less investment. Main items of NTFP include food, fodder and grasses, bamboo, canes, medicinal products, spices, essential oils, insecticides, resins, gums, commercial leaves, natural dyes and tannins, starches, oils and fats, fibre and flosses and animal products like lac, silk and honey etc. The scope of NTFP is so wide and fruitful that if properly managed can generate employment to all forest-dwellers and alleviate poverty.

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 labour force in India.

Sekar *et al.* (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 NTFP collection. In respect of marketing of the NTFPs, two marketing channels were found to exist.

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.

Chopra (1994) in her study on marketing of NTFPs in Raipur district of Madhya Pradesh found that five marketing channels were operating in the trade of NTFPs. They are (i) sale to tribal agent who sold to consumer (ii) sale to the agent of whole seller (iii) direct sale to primary retailer in local market (iv) sale to primary whole seller who sold to the secondary whole sellers (v) sale to the secondary whole sellers. Patel et al (2008) studied the collection of minor forest products in Gujarat. He found the high variability of in the collection of these products that is decrease in the collection of products like tendu leaves, mahua flowers and doli, but the production of gum and other products had increased. He opined that the overall decrease in collection reflected with depletion in forest resources or existence of an inefficient collection system.

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 was about 6000 tons and creation of 600000 mandays of work at the rate of 10 kg per person per day.

Taylor and Parratt (1995) reported that 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.

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.

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 were 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. 6046.00 in Dalangora FPC to INR. 9569.00 in Khatam.

Pradhan (1995) studied the collection of NTFPs in Keonjhar district of Odisha. The study revealed that sal seeds were collected by men, women and children. Sal leaves were predominately collected by women while tassar and weed for building materials were by men. With regards to all other NTFPs collected in the region, the collectors were predominately women and children.

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.

Sekar *et al.* (1996) conducted a survey in the Sathyamangalam Hill LAMP cooperative society, found that around 83 % of the members were tribals who were 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.

Rao and Singh (1996) estimated that non- wood forest products offer employment to about one million people every year.

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 %).

Hegde (1997) did a percentage comparison of income composition and employment of the three tribal communities (Jenukurubas, Soligas and Bettakurubas)

in Madumalai Wild life sanctuary in India and he found that Jenukurubas derived more employment and income from commercial Non- Wood Forest products than the Soligas and Bettakurubas communities.

Ganapathy (1998) studied the role of NTFPs in tribal economy of KollegalTaluk of Karnataka. He reported that NTFPs generated the maximum employment (42.96 %) for tribal households followed by the firm employment (22.06 %), allied employment (12.72%), wage employment (11.86%) and other sources of employment (10.40%). The analysis of the composition of income of the tribal households revealed that NTFPs was the main income generator. It contributed about 34.09% of the total income of the households.

Joshua (1998) found that Economic development is often associated with rising demand for environmental amenities. Forests are a particular focus of environmental concern; in many countries the value of non-timber forest benefits -many of them non-marketed - may be increasing faster than the prices of wood products. One result is that certain forest areas are increasingly valued more for the environmental benefits they provide than for their timber. Hence the "set-side" of timber-rich areas for wildlife conservation, and the increasing attention of public agencies to managing forests for recreational or aesthetic values. He focused on recent advances in the economic evaluation of forestry activities and, in particular, on how techniques for valuing non-timber forest benefits in monetary terms can assist the development of forest policy and management systems. The paper considers the nature of non-market values and the need for valuation, as well as the different techniques used. It briefly considers the long-term dynamics of forest value and outlines the use of valuation results in forest policy and management.

Girish *et al.* (1998) Studied 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.

Sunderland *et al.* (1999) confirmed 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.

Wills and Lipsey (1999) studied 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.

Abwe *et al.* (1999) conducted a survey in the South-West and North-West provinces of Cameroon and 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%.

In open economies where forest dwellers can sell or trade their products, forest products generate considerable employment and income. In India, for example, non-timber forest products generate US$700 million annually in Madhya Pradesh and US$115 million annually in Maharashtra, while commercial wood provides US$72 million in Madhya Pradesh and US$29 million in Maharashtra (Osman *et al*., 2000).

Surayya, (2000) conducted a survey in India on Contributions of Forests, microfinance and NTFPs marketing and policy interventions for reducing poverty and 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. Whereas, income from agricultural source and borrowing and others is uttered to be highest which was about INR. 4846 and INR. 3388, respectively.

Alibaba *et al.* (2000) examined the income and labour relationships in collection of minor forest products and found 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. Furthermore, there was a need for controlled exploitation of minor forest products in order to give scope for rejuvenation of forests.

Wollenberg and Belcher (2001) 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.

Das and Chattopadhyay (2001) found that Non-Timber Forest Products (NTFP) constitute an important source of food for economically backward communities living in the forests of the Nayagram Range of West Midnapore Forest Division, South-West Bengal. Items collected for household consumption include leaves and young shoots, flowers, fruits, tubers, mushrooms etc. The average annual collection was found to be highest for Mahua flowers followed by tubers, leafy vegetables, mushrooms and fruits. The consumption pattern of forest edibles varied widely over the FPCs studied. The present study on nutritional aspect confirms the presence of major nutritive elements in forest edibles in appreciable amount. Therefore, NTFPs have immense prospects to provide solution to the problems of hunger, malnutrition and poverty of the rural poor in the world.

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.

Pervez (2002) conducted a 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 %).

Vidyarthy and Guptha (2002), highlighted the role of NTFPs in the economy of communities living in and around forests of South Bihar by 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.

Sawhney and Engel (2003) studied 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, Amla11 product (42%) contribute the highest followed by Tendu Patta (41%), mahua (12%) and fuelwood (4%) where as Chironji13 (1%) contributed the least.

Joshi (2003) found that the NTFP based small scale enterprises provide up to 50 % of income for 20 to 30 % of the rural labor force and 55 % of employment in forestry sector is attributed to this sector alone.

Kulirani (2003) presented 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.

Sudarsen and Sumathi (2003) reported that Malayali schedule tribe17 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 money lenders, traders and extremists' activities creating unrests among the interior tribals result into disturbances in their livelihood.

Subramanyam (2003) observed that the non-tribal private traders also buy the minor forest produce items from the tribals at low price and false weights and measures in his study.

Scherr *et al.* (2004) studied that many hundreds of millions of people across the developing world trade in a diverse range of non-timber forest products (NTFPs) everyday, which are marketed primarily in local and regional domestic markets. Building materials, fuel wood, charcoal, indigenous foodstuffs, medicines, craft items (from wood, grass, reeds, and vines), farm and household implements, furniture, and other more specialized products such as resins, honey, oils and alcoholic beverages are examples of some of products that may be found for sale in the vast majority of rural markets and in nearby towns and cities. Local markets can provide a guaranteed way of reaching some of the poorest people, and play a crucial role in strengthening livelihoods and improving income opportunities. Consumers of locally marketed forest products may include local people, poor urban residents or outsiders. The production of NTFPs for local markets can be a part time, seasonal, occasional or fulltime, year round activity, with this varying across products, locations and individual households.

Shanker *et al*. (2004) observed that in India over 50 million people are believed to be directly dependent upon NTFPs for their subsistence. However, such human dependence on NTFPs for livelihood gains (win) has most frequently been at a certain ecological cost (lose). If livelihoods are to be maintained, the existing 'win-lose' settings have to be steered to a 'win-win' mode, otherwise, there could be severe erosion of the biological resources and loss of livelihoods ('lose-lose'). They also found that it is possible to predict outcomes and associations that will conform to win-win or win-lose situations. The study demonstrated the causality and the key for long-term livelihood gains lies in reducing the ecological cost. Certain interventions and recommendations that could optimize the balance between livelihood gains and ecological cost are proposed.

Giri *et al*. (2005*)* focused on marketing aspects of selected NTFPs of commercial importance. Emphasis has been given to NTFP items collected by the villagers/NFMPC members in and around the forests under the JFM system. The collector of NTFPs gets a small fraction of surplus generated by produce sold in the market. The middlemen (the agents, traders and wholesalers) receive the maximum benefit from marketing of

surplus NTFPs. There is an urgent need for policy intervention to ensure maximum returns to local people.

Paloti *et al*. (2005) found that the extraction, processing and marketing of NTFPs provide off-farm and off season employment to the rural and tribal people. Communities located in and around the forests deriving their five 'F' requirements viz., food, fodder, fuel, fruit and fibre from the forests. The rural women are largely dependent on local forest products like Muttala leaves, pongamia seeds, fruits, gums, fuelwood, and raw material for basket and brooms for their livelihood. Participation of the rural women was observed high in the processing, storage, preservation and marketing activities than in the NTFP collection.

Prasad and Eswarappa (2005) reported that 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.

Poffenberger (2006) found that 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.

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.

Andel (2006) in his study stated that food products include: wild fruits, vegetables, nuts, edible roots, bush meat, edible insects, honey and food additives like

spices, flavorings, food colorants, fermentation agents. Many non-timber forest products are harvested each year from forests around the world.

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.

Bhattacharya and Patra (2007) reported that the Gond and Korku tribal communities of Betul District of Madhya Pradesh and Melghat District of Maharashtra use thirty major NTFP species, out of which few NTFP are used for self consumption, few for sale and some of them for both the purposes.

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.

Rasul *et al. (2008)* observed that the vast natural resources of India's forests, including non-timber forest products (NTFPs), such as medicinal and aromatic plants, leaves, fruits, seeds, resins, gums, bamboos, and canes, offer employment that provides up to half the income of about 25 per cent of the country's rural labour force. However, poor harvesting practices and over-exploitation in the face of increasing market demand are threatening the sustainability of these resources, and thus the livelihoods of forest-dependent tribal communities and also analysed the role of NTFPs in livelihoods-

improvement initiatives and considers recent initiatives intended to enhance their conservation and sustainable management.

Behera (2009) compiled that Orissa is one of the most backward states of India with 47 per cent of the population living below poverty line. Forests constitute 37 per cent of the state's geographical area and are the major source of income for the poor, particularly tribals. For most of the tribal households, forests provide essential food and nutrition, medicine, fodder, fuel, thatch and construction materials and non-farm income. These products are particularly important in relieving the 'hunger periods' during slack periods of agricultural cycle. Tribal households get 23 per cent of their total income from NTFPs resources from the forest areas.

Xayvongsa *et al.* (2009) reported that about 83% of the total population of Lao PDR lives in rural areas. People living near forest are highly dependent on the forest resources closed to their villages. Especially non-timber forest products (NTFPs) provide a wide range of subsistence needs and are the main source of their cash income. They also make a significant contribution to the country economy. The annual export value of NTFPs is considerably high. 708 edible NTFP species (238 edible plants and 470 animals) have been recorded so far, and about 400 plants have been reported and used as medicinal plants by Lao people. One hundred NTFP species are considered as commercial forest products. The striking trend in NTFP resources is the decline of some commercial species due to increased demand on them for commercialization, and the loss of forest by rapid population growth. For sustainable management of the NTFPs, a number of new management systems are under development and support in progress by the government.

Rout *et al.* (2010) studied the role of tribals in the collection of Non-Timber Forest Products in Mayurbhanj district of Odisha. They observed that the NTFPs collection contributes to the economy benefits significantly in day to day to the tribal community, where the basic needs and livelihood earnings are significantly supported from collection and processing of these items. The NTFPs provide employment opportunities to the local tribals. (Mitchell et al., 2003) about 70 % of the NTFP collection in India takes place in the tribal belt of the country. 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.

Singh and Sadangi (2012) found that the tribals of Koraput and Rayagada District of Odisha collect Fuel wood, wood, tamarind and mahua as forest produce of high importance whereas leaves, mango kernels, tubers and bamboo as important forest products and timber, gum and raisin, bark, honey, grasses and mushroom as less important forest products.

Singh *et al.* (2010) found that the contribution of NTFPs is quite high as it contributes almost 79% (Rs. 80,000) on an average to the annual income of the collector's family. The major NTFP that are being collected includes firewood, prawn, fishes, crab, honey and bee wax. The collection of NTFPs is a daunting task, which involves risk from man-eater tigers. High livelihood vulnerability was also observed with little help from government. If, these biomes are to be conserved it is necessary that Sundarban Development Authority must consider the role of NTFPs in the livelihood and develop the Sustainable Livelihood Framework accordingly so that the biomes as well as people's need could be sustained.

Research by Heubach*et al.* (2011) in northern Benin showed that income from NTFPs accounted for 39% of total household income and had a strong equalizing effect on it. However, the economic relevance of NTFPs differs between households: poorer households are relatively more dependent on NTFPs in order to fulfill basic needs than wealthier households. However, the latter extract more NTFPs in quantitative terms and have significantly higher cash returns than poorer ones.

Sharma and Arunachalam (2011) reported that the forests of Arunachal Pradesh support rich diversity of timber as well as non-timber yielding species. The non-timber forest products (NTFPs) possess imperative part of the traditional life style in Arunachal Pradesh and utilisation of these products has been contributing much to the local livelihood. NTFPs such as wild edible vegetables, fruits, honey, lac, tree seeds, leaves and medicinal plants are mostly collected from natural habitat.

Rout and Panda (2011) reported that Non-timber Forest Products (NTFP) contribute an integral component of the food for the communities dependent on forests.

Their role becomes more significant for less agricultural dependent communities with small land holding residing in remote forests. Fifty-four important NTFP species have been reported to be collected by the villagers in Gandigadha for consumption. However, a few new species like 'Sal' (*Shorea robusta*) leaves, tooth stick and seeds 'Mahula' (*Madhuca indica*) flower and fruit, 'Chara' (*Buchanania lanjan*) fruits, seeds and mushroom are collected and sold to local traders.

Piya *et al.* (2011) during their study confirmed that Chepangs are highly marginalized indigenous nationalities of Nepal, who live nearby the forests that are rich in Non-timber Forest Products (NTFPs) of commercial importance. These NTFPs can be a potential source of income for Chepangs. They also described the role of Chepangs in the marketing channel of those NTFPs and analyses the household socio-economic characteristics that influence the collection and marketing of NTFPs by Chepangs in Shaktikhor VDC of Chitwan district using backward multiple regression method.

Maske *et al.* (2011) in his study in Goregaon cluster of Gondia district of Maharashtra confirmed; Livelihood systems in this districts are complex, primarily dependent on agriculture (including allied activities-livestock, poultry, fishery, etc.) forest, agricultural labour and village artisans. It is more important that the problems of the people of disadvantaged regions like rainfed, hilly and tribal areas be addressed through imparting new skills to the poor and building up durable income generating assets and capacity to adapt to rapidly changing markets. The said district have been so chosen because of poor indices in various areas of development including, amongst others, infrastructure, agriculture, food availability, nutritional health and sanitation and last but not the least economics of the habitants. Study suggested alternate sources of income to the villagers to improve their socio-economic conditions as well as increasing the income level and employment opportunities by effective collection and marketing of non-timber forest product and the same time making villagers come forward for forest protection.

Kar and Jacobson (2012) explored NTFP market constraints from village households' perspective and examine how different socioeconomic factors may influence those constraints and focused on Chittagong Hill Tracts (CHT) of Bangladesh. Results suggested that CHT's NTFP market systems suffer from poor transportation facilities, communication systems, financial capital access, and market

information and linkages. NTFP market knowledge and information among households is deficient and limited. NTFP market knowledge is significantly influenced by various socioeconomic factors such as HH's member's education, sex, HH's income and ethnicity, distance to market and road access.

Shit and Pati (2012) confirmed that Paschim Medinipur district of West Bengal, in India is the most infertile zone with extreme denudation and erosion of the lateritic soil. Lands are mostly rain-fed with very little irrigation. In study area the only crop is a single paddy harvest, thus products from the forest play a significant role in the livelihood of local people, particularly the tribal communities.

According to Sudhakar *et al.* (2013) Non-timber forest products (NTFPs) have attracted considerable global attention due to the significant role played in benefiting people and industries. It is a well-established fact that most tribals and villagers who live in forest regions depend on NTFPs as the source of their livelihood.

Adam *et al.* (2013) found that in recent decades there has been growing interest in the contribution of Non-Timber Forest Products (NTFPs) livelihood strategies to rural development and poverty alleviation. However, the potential of NTFPs to contribute to development remained limited and open to doubt. The study concluded that any assumption regarding the potential of NTFPs to positively affect rural development depends on their role in an accumulative strategy that lifts people out of poverty. Institutional, technical and financial supports are necessary to influence the future direction of the NTFP contribution toward accumulative strategy.

Ghosal (2013) studied the marketing of non-timber forest products (NTFPs) through formal channels is a complicated task in the Global South because of the lack of suitable infrastructure and the influence of intermediaries. Strengthening the formal marketing process, on the one hand, can reduce the exploitation of forest products while improving the socioeconomic status of forest fringe villagers and also examined the present problems of formal marketing system, which can be enhanced in the future in the dry-deciduous forest area of West Bengal, India, where a considerable amount of dispersed Sal (*Shorea robusta*) forest exists.

Hogarth and Belcher (2013) found that bamboo's role in livelihoods and rural development is poorly understood. Detailed quantitative data from 240 households were used to study the contribution of bamboo to household income and rural livelihoods in 12 remote and mountainous villages in southern China. Bamboo was a ubiquitous and highly utilised resource for a wide range of subsistence purposes in all households. The average bamboo income share was 13.3%, ranging from 0 to 50% between villages. High income households had the highest absolute bamboo income, but low income households had the highest dependence on bamboo income.

Mishra and Naidu (2013) observed that the NTFPs have obtained dubious distinction as being both 'safety net' and 'poverty trap'. When people have better employment opportunities, collection of NTFPs become livelihood opportunity of last resort. This was observed in the study area of forest of Chittoor East and Tirupati Wildlife Management Divisions of Andhra Pradesh after implementation of NREGS by the Govt. of India. Thus, the best way to protect forests would be to create better employment opportunities for the forest dependent people nearer to their habitations and reducing dependency on forest resources.

Hasalkar *et al*. (2014) depicted that the role of women in collection, processing, consumption and trade of NTFPs is very crucial as it contributes directly to the family income. The present research was conducted in Karnataka state of India during the years 2004-06 with the objective to analyse the relationship between socio-economic characters of the families and the type of NTFP activities done by the families. Maximum percentage of families involved in NTFP activities belong to the scheduled caste and tribe families and were having nuclear family system. They lived in kuchha tile roofed houses and did not own any agricultural land. About 22 different types of NTFPs were collected by the inhabitants. Maximum percentage of women collect muttal leaf followed by fuel wood, fodder grass and Jamun fruits. An average of 5 hours per day and 35.51 days per year were spent for NTFP collection activities and a distance of 8.85 kms per day was traveled by women for NTFP activities. Highly significant and positive correlation was observed between the number of female respondents and total number of NTFPs collected and the income from NTFPs. Whereas highly significant and negative relationship between total agricultural land and NTFP collection days, total time spent per day, average distance travelled for NTFP collection and total quality of NTFPs collected was observed.

Malleson *et al*. (2014) compared the significance of NTFPs for income generation in rainforest areas, both within and across these countries to draw out regional patterns in a wider ecological, social and political context discussed the relative importance of non-timber forest products (NTFPs) for rural households in Cameroon, Nigeria and Ghana. The contribution NTFPs make to rural livelihoods depends largely on the availability of forest resources and access to markets, as well as socio-economic variables including wealth, gender and migration status. The findings indicate that remote communities and poorer households rely more on NTFP-based income compared to more accessible communities and wealthier households. NTFPs are relatively unimportant as an income source for households in more accessible rural areas, where farm-related income dominates. These findings support the theory that NTFPs are an important component to rural livelihoods and make significant and timely income contributions to poor households.

Mishra (2014) analysed economic implications of the existing non-timber forest products (NTFPs) market in the tribal belt of Odisha. Based on the primary data, this study explored welfare effect in terms of volume and sale of NTFP items, market behaviour, and role of traders influencing the market chain. The current market system is highly exploitative in nature as major benefits are transferred from producers to the middlemen. It highlighted for effective implementation of NTFP policy, 2000; establishment of weekly markets; disbursement of formal sources of credit; and recruitment of more human resources at the PRI level for improving the trade exploitation.

Pandey (2014) observed that Non-timber forest produce have always been integral part of income and consumption of tribal people. However, their access and usufruct rights to forest resources have been affected by various policies and legislations adopted in pre and post-independence India. As in other parts of the world, there is marked change in forest and NTFP related policies. While earlier, there was a top-down planning for forest management with a clear bias for industrial needs, now there are laudable attempts at devolution of power and conservation of forest wealth while ensuring livelihood concerns of forest dependent communities. After social forestry and JFM, the tenurial rights given to forest dwellers under the FRA 2006 is a step forward in evolution of forest policies in India. The marketing structure for trade in NTFP does not ensure fair returns to the forest dwellers who continue to live in poverty and are unaware of the potential income through value-addition to their produce.

Sharma *et al*. (2015) during his study reported that Non-timber forest products are important component of subsistence and livelihood of tribal communities living in and near forests.

Steele *et al.* (2015) Concluded from his study that NTFP use frequently raises concerns about the sustainability of, or ecological impacts associated with, NTFP harvesting, as well as local contextual factors which may limit or reduce the impacts. These were the extent of local dependence on NTFPs, the degree of marketing and the level of local ecological knowledge. Data were collected via household questionnaires and ecological surveys of woody plants from eight villages throughout South Africa. They found no significant relationships between measures of ecological impact with local ecological knowledge or market proximity and engagement. There was a strong positive relationship between ecological impacts and NTFP dependency as indexed through mean annual direct-use value for NTFPs which indicates that the higher the dependency and demand for NTFPs, the greater is the possibility of high impacts to the local environment.

Sarma (2016) observed role of NTFPs in livelihood of households living in and around forest area of Kamroop district of Assam supplying food, fuel, wild edible vegetables bamboos, thatches, services and materials for households and building and contribute to income. These products hold very important part of the subsistence economy. The total contribution of NTFPs to annual household income varies from 9 percent to about 20 percent depending on agricultural landholding of the household.

Mukul *et al.* (2016) found that People in the developing world derive a significant part of their livelihoods from various forest products, particularly NTFPs and attempted to explore the contribution of NTFPs in sustaining forest-based rural livelihood in and around a protected area (PA) of Bangladesh, and their potential role in enhancing households' resilience capacity. Based on empirical investigation, their study revealed that local communities gather a substantial amount of NTFPs from national park despite the official restrictions. 27% of households (HHs) of the area received at least some cash benefit from the collection, processing and selling of NTFPs, and NTFPs contribute to HHs' primary, supplementary and emergency sources of income. NTFPs also constituted an estimated 19% of HHs' net annual income, and were the primary occupation for about 18% of the HHs.

MATERIALS AND METHODS

STUDY AREA

The present investigation was conducted during 2016-2017 in Ujjalpur and Hemgiri Forest Range of Sundargarh Forest Division, Odisha. The details of materials used, techniques adopted and observations noted during the course of this study are presented in this chapter.

3.1 Geographical location of the study area:

Geography of Sundargarh district, Odisha, covers a vast variety of landscapes including mountainous terrains, inaccessible forests, isolated peaks and river valleys. The district primarily exhibits an undulating table-land having different altitudes, often interrupted by hill ranges and meandering rivers like Brahmani and Ib. The land of the district has a slope from north to south direction.

The district houses forests of northern tropical dry deciduous type where the common varieties found are Sal, Kuruma and Asana with Sal forming the dominant species. Good quality of vegetation is found in eastern part of Rajagangapur and Bonai regions. Rich mineral resources are found in the forests such as lead, limestone, manganese and iron ore. Some important forest products found in the district are kendu leaf, timber and bamboo, which find great utility in export industries. Previously the forests of Sundargarh district were highly inaccessible which often used to make the communication difficult. However, with the practice of shifting cultivation by the tribal population, the forest cover has substantially reduced making them accessible. An area of 3534.92 square kilometres of the district is under the forest cover out of which 612.07 square kilometres area is under protected forest and 2664.64 square kilometres area is under reserved forest. To enhance the revenue generated by the forest products, much emphasis is laid by the state government on afforestation through various programs such as N.R.E.P and D.R.D.A.

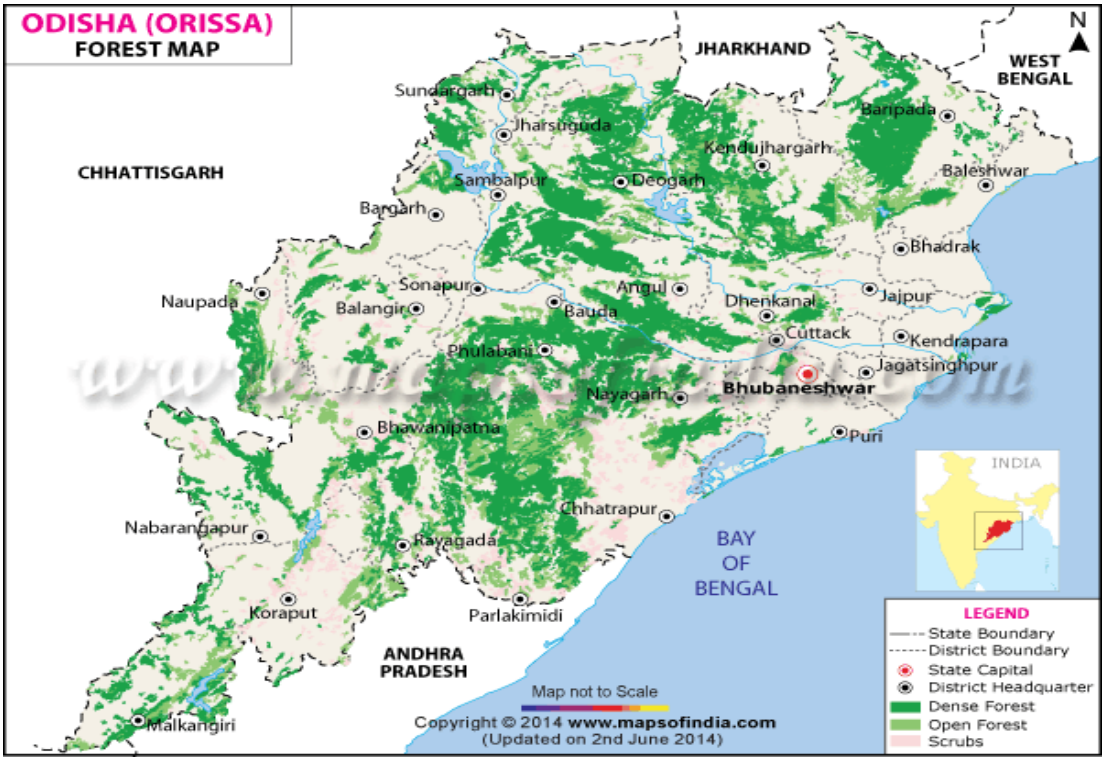

Fig 3.1: Forest map of Odisha

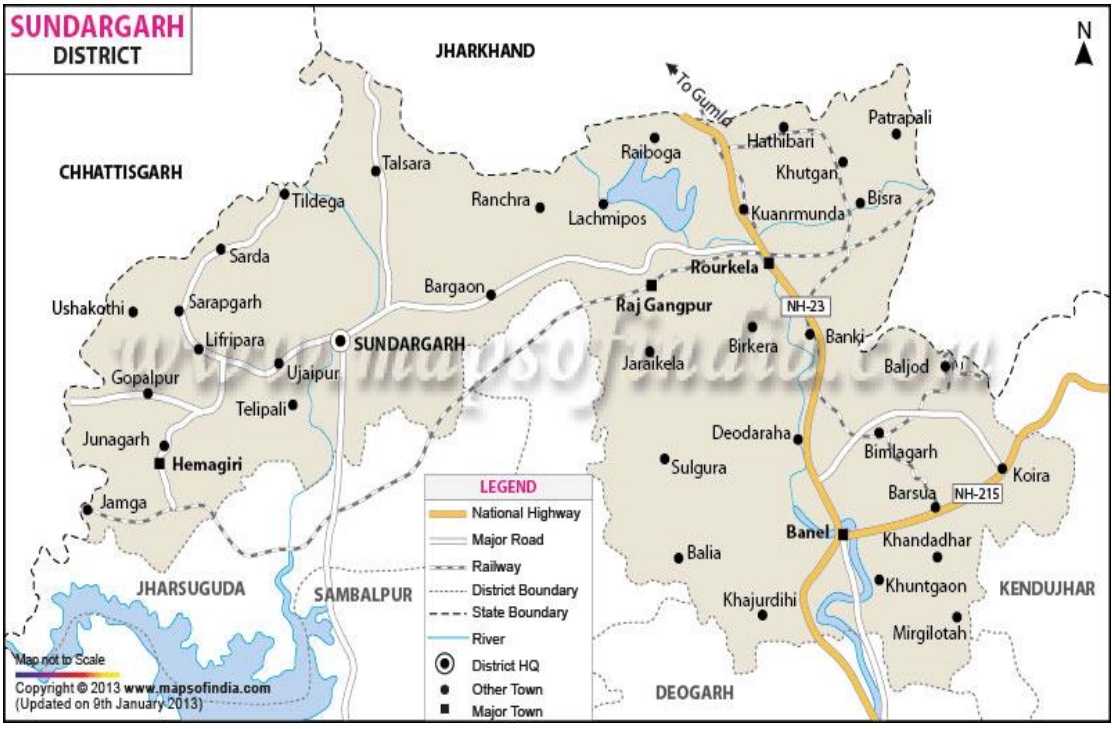

Fig 3.2: Map of study area

3.2 Tools for Data Collection

Tools for data collection have been decided very meticulously keeping in mind the low literacy level of the people being covered in the study area. Efforts were given to find suitable tools to facilitate the data collection without much hindrance to the respondents to understand the questions and to draw most appropriate answers. The methodologies for data collections finalised as below:

a. Direct observation

b. Interviewing respondents

c. Records kept by the respondents

d. Records kept by Govt. agencies and different NGOs etc.

3.3 Interview Schedule

Collection of primary data from 24th October, 2016 to 20th July, 2017 in phase wise was mainly through questionnaires and Focus Group Discussions used for interviewing households of forest dependent communities and small traders involved in forest produces. Focus was given mainly on availability of forest produces, source and distribution, seasonal pattern, proportion of household income and employment generation by forest produces.

The primary data was collected through interviews based on the questionnaire administrated in local language to the respondents (Appendix I). Each interview took 10-20 minutes.

3.4 Location details of study area:

Table 3.1. Location details of study area

Range	Village	Gram Panchayat	Block
Ujalpur	Kanakjora	Tasaladihi	Tangarpali
	Kendudihi	Tildega	Balisankara
	Goiljor	Meghdega	Tangarpali
Hemgir	Tangardihi	Kanika	Hemgir
	Kalobahal	Laikera	Hemgir
	Beldihi	Kulunga	lathikata

Household Survey

A structured questionnaire was prepared for the household survey. The questionnaire was developed based on reconnaissance survey, consultation with different experts and reference to literature.

Total 6 villages, three from each range were selected for the study of utilization, dependency and marketing of forest products of the forest fringe villages. All the households have been randomly selected from the village. Sample size is approximately 30% of total number of households in each village. Criteria for selection of villages were based on presence of nearby forests, availability and dependence on forest produces.

3.5 Data analysis and interpretation:

Both qualitative and quantitative methods have been used for analysis and interpretation. The data were synthesized and inputted in Excel software. Descriptive and inference analysis were applied to quantify perception of respondents for household interviewing.

3.5.1 Net returns from NTFPs

The opportunity cost may be calculated and deducted from the gross returns to find out the net returns (Svarrer & Olsen, 2008). Opportunity cost is the economic cost of an action or decision in terms of what is given up to carry out that action (USDA, 2012). In the present study, the opportunity cost is measured using the local labour wage of the tribal and the cost of time spent for NTFP collection.

3.5.2 Marketing Channel design:

A marketing channel may be defined in different ways the chain of intermediaries through whom the various commodities pass from producers to consumers constitutes their marketing channels. The course taken in the transfer of the title of a commodity constitutes its channel of distribution. It is the route taken by a product in its passage from its first owner i.e. producer to the last owner, the ultimate consumer.

3.5.3 Marketing cost under various channels (Channel Costing)

The movement of products from the producers to the ultimate consumers involves costs, taxes, and cesses which are called marketing costs. These costs vary with the channels through which a particular commodity passes through. e.g: - Cost of packing, transport, weighment, loading, unloading, losses and spoilages.

3.5.4 Marketing efficiency

It is the ratio of market output (satisfaction) to marketing input (cost of resources).

Empirical assessment of marketing efficiency is given below

A reduction in the cost for the same level of satisfaction or an increase in the satisfaction at a given cost results in the improvement in efficiency.

$$E = \frac{O}{I} \times 100$$

E = level of efficiency

O = value added to the marketing system.

I = Real cost of marketing.

An increase in ratio represents improved efficiency and vice versa.

3.5.5 Price spread under marketing channel

The difference between the price paid by the consumer and price received by the farmer. It involves various costs incurred by various intermediaries and their margins.

3.6 STATISTICAL TOOLS USED

The data was analyzed using the SPSS 16. Descriptive statistics (Mean, percentage, standard deviation) were used to describe the socio economic profile of the NTFP collectors' such as family size, age, education, employment in different sectors

and household income in the study area. The income generated in different sectors and the employment generated from different NTFP was analyzed on Microsoft excel. Apart from the descriptive analysis, Tobit model was also used to analyze the relationship between the household characteristics, which are independent variables and percentage of cash income generated from the NTFP.

Tobit model is employed to test the relationship between dependent variable(Y) and explanatory variable (X) and was proposed by James Tobin (1958). The model is also called as censored regression model. Here the dependent variable is the share of household's income from NTFP. 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. Coefficients in a Tobit model are estimated 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 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:

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

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 NTFP 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 produce for commercial purpose. Tobit model overcomes bias and inconsistency that arise due to using OLS. Hence Tobit model is used for the present study (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

$Y = b_0 + b_1X_1 + b_2X_2 + b_3X_3 + b_4X_4 + b5X_5 + b_6X_6 + b_7X_7 + b_8X_8 + b_9X_9 + b_{10}X_{10} + b_{11}X_{11} + dD_1 + gD_2 + U,$

Where

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

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 NTFP (Kms)

X_5=Total time spent on gathering NTFP (Hrs)

X_6= Size of the family (Nr.)

X_7= Shifting cultivation income (INR)

X_8= Farm income (INR)

X_9= Livestock income (INR)

X_{10}=Wage income (INR)

X_{11}= Income from services and allied activities

The Tobit model was estimated using LIMDEP software package.

A scoring was used for scaling the problems faced by the respondents. The data was ranked according to the priority of the respondents. In the survey higher scores indicated that they strongly agreed that the particular factor was the most important and significant and vice versa. The percentage differences across the attributes were used to analyze the constraints faced by villagers.

Fig. 3.3: Interaction of researcher with the Respondents

RESULTS AND DISCUSSION

The study on "Livelihood dependency of forest fringe community, marketing and economics of forest produces in Sundargarh forest division, Odisha" was conducted in Sundargarh district of Odisha. A total of 100 families from 6 villages belonging to 6 gram panchayats of 4 blocks of the division.

Table 4. 1: Number of Respondents in different villages under study area:

Sl No.	Name of village	Number of respondent
1	Goiljor	24
2	Kendudihi	17
3	Kanak jor	16
4	Kalobahal	18
5	Tangardihi	12
6	Beldihi	13

4.1 Degree of dependency of forest fringe communities on NTFPs

4.1.1 Socio-economic characteristics of the respondents

4.1.1.1. Family Size:

The basic information about the households is presented in Table 4.2. Average household size was 5.37 with an average 1.50 adult males, 1.72 adult females and 2.15 children. From the study it was observed that the tribal people preferred early marriages, they lived in nuclear families mostly.

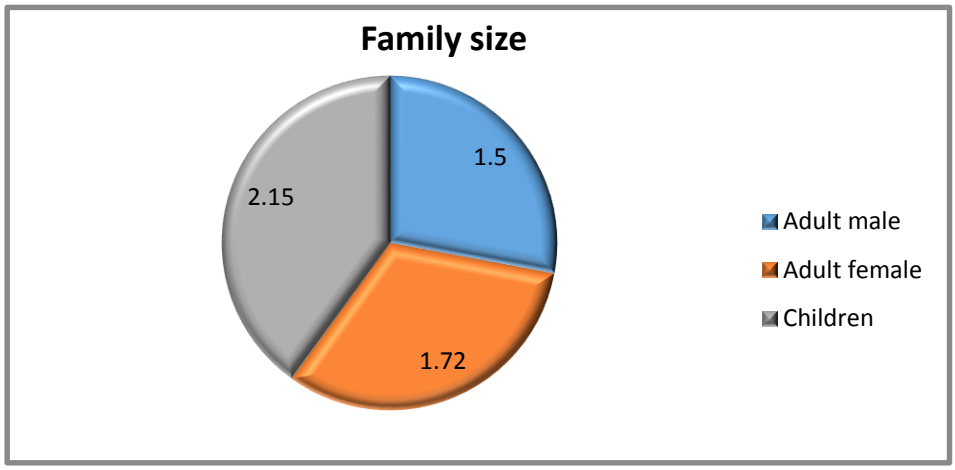

Figure 4.1: Family size of the surveyed Respondents

4.1.1.2. Age of the respondents:

Most respondents were in the age group of 51 to 60 years (36%) followed by 41 to 50 years' age group (29%) & the age group of 18 to 30 years were the least respondents (19%). Fig 2 depicts the age classes of the respondents.

One of the major problems encountered during the observation of age, was the inability of the respondents to mention their exact age, especially the age of the older generation. The age was therefore carefully noted by considering certain factors like their physic, their health and appearance. The lower response of age group between 18 to 30 yrs was due to their absence on account of engagement in different livelihood activities outside the village.

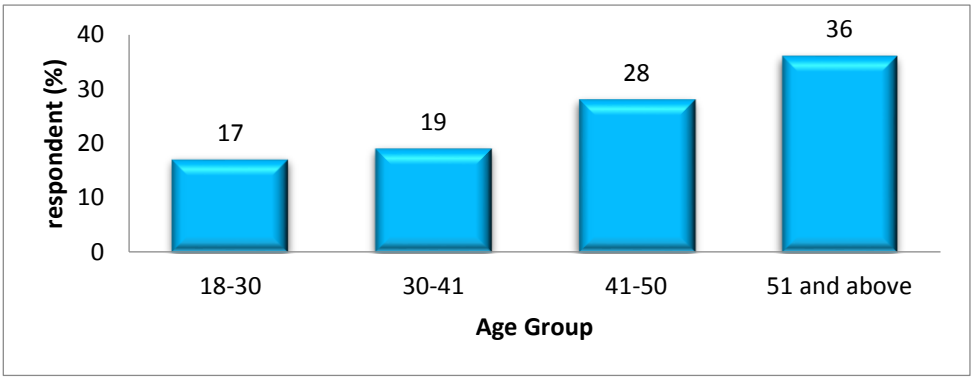

Figure 4.2: Age class of surveyed respondents

4.1.1.3. Literacy Level:

The literacy levels of the respondents were evident in fig 4.3. The literacy rate of adult females (35.52%) was much higher than adult males (18.79%). Literacy was higher for children (41.35%) because of free educational programmes of government. Free mid-day meals also contribute to the large turnout of the children at the primary and secondary level of education.

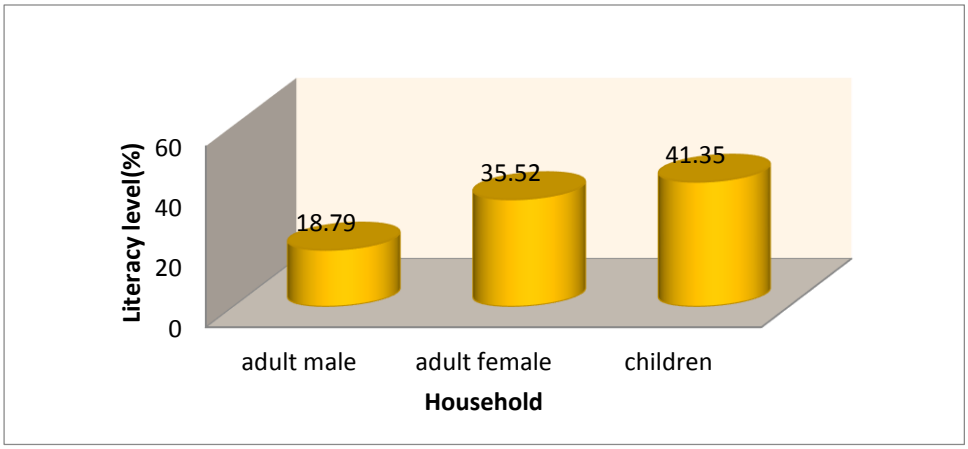

Figure 4.3: Literacy level of Respondents

Table 4.2: Socio economic profile:

Sl. No	Socio-economic characteristics	Number	Percent
1	**Size of the family (Average**	5.37	
	Adult male	1.50	
	Adult female	1.72	
	Children	2.15	
2	**Age of the respondents**		
	18-30	17	17.0
	31-40	19	19.0
	41-50	28	28.0
	51 and above	36	36.0
3	**Literacy level of the households**		
	adult male	18	18
	Adult female	34	34
	Children	41	41
4	**Size of the land holding**		
	Less than 1 acre	43	43.0
	1-2 acre	36	36.0
	More than 2 acres	21	21.0
5	**Livestock (average)**	3.70	
	Cow	1.04	
	Goat	1.72	
	Poultry	2.57	
	Buffalo	1.33	

4.1.1.4. Land Holding:

Out of the 100 households surveyed 21% were landless or having less than 1 acre of land. 43% of the total respondent had land holdings between 1 to 2 acres and rest 36% of the respondents had more than 2 acres of land.

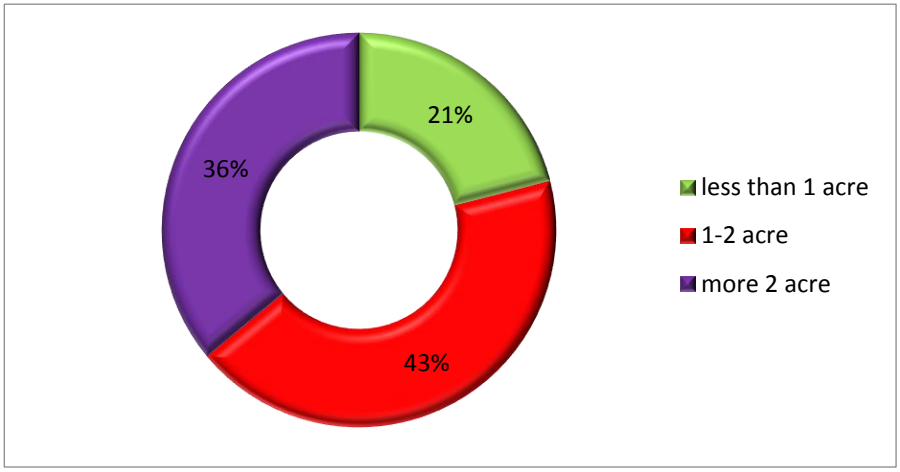

Figure 4.4: Size of the land holding of the respondents

4.1.1.5. Livestock:

From the survey it was found that 50% of the population owned livestock with an average 3.70 animals per household. They reared livestock for farming and consumption purposes. Poultry with an average of 2.57 numbers per household helped them in selling meat and egg. They also consume and sell milk and milk product from their cows in the nearby markets. Having animals was an economic security for the respondents as was observed in many other studies (Kumar, 2015).

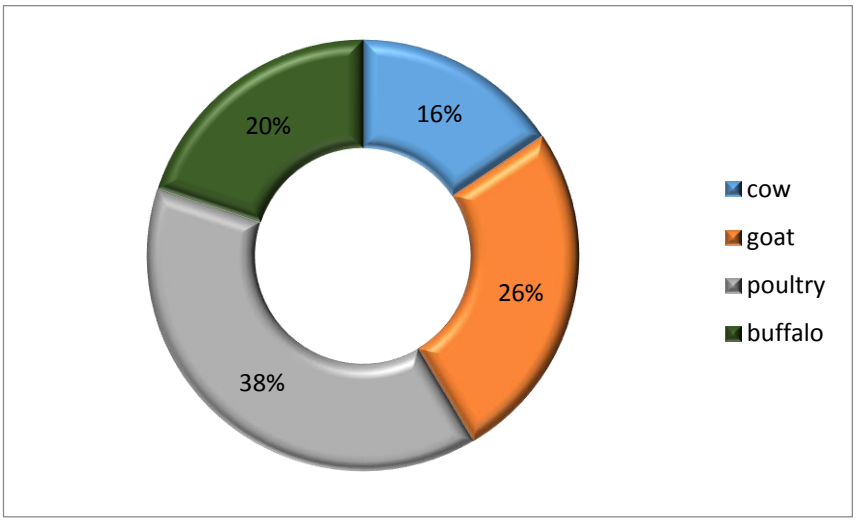

Figure 4.5: Livestock percentage

4.1.2. Involvement of respondents in different income generating sectors:

In the study areas the respondents met their food and income needs from various livelihood activities like collection of NTFP, shifting cultivation, wage earning, agriculture, livestock rearing and services and allied activities.

The table below (Table.4.3) indicates that all the respondents were involved in NTFP collection. An average number of 2.10 people in each household were involved in this activity and was the second dominant income generating activity after agriculture in the studied area. Most of the respondents (89%) practiced agriculture in their own land and leased land. In addition, the respondents were also involved in shifting cultivation (42%), livestock rearing (85%), daily wages (79%) and services and allied activities (5.00%). Besides NTFP collection and farming the villagers depended up on livestock rearing and daily wages for their livelihood substantially. The villagers were mostly involved in forestry operations for their daily wages.

Hence collection of NTFP and agriculture are the important activities in terms of labour contribution. Studies on heavy dependency on agricultural labour (79.05%) were also observed earlier (Singh *et al.* 2010). Similar results on forest dependency were observed where the NTFP collection is one of the dominant activities of the forest dwellers (Mahapatra *et al*. 2005).

Table.4.3: Percentage of sample respondents in different sectors

Activities	Number of Respondents (out of the people surveyed, the number involved in various activities)	Percentage	Average numbers of family members involved
NTFP collection	100	100.00	2.10
Agriculture	89	89.00	1.70
Shifting cultivation	42	42.00	1.30
Livestock rearing	85	85.00	1.41
Wage earning	79	79.00	1.26
Others (Services and Allied Activities)	5	5.00	1.00

4.1.3. Composition of employment:

On comparing employment generation in various sectors, the daily wage sector generated the highest employment opportunities for the respondents, with respect to the number of man days per household per year (32.681%) followed by NTFP collection (25.057%) (Table 4.4). This was similar to the findings of Kumar (2015). He reported an average employment of 115.56 man days/HH/year from wage sector and 77.81 man days/HH/year from NTFP. In the present study the agricultural sector contributed to 14.372 %, livestock rearing 4.852% and services and allied activities 3.049% of the total number of man days/HH/year. Studies indicated that NTFP collection and daily wages are two major employment opportunities for the forest fringe villages. According to the studies of Ravi *et al.*2006, NTFP contributed 50.58% (137.82 man days/HH/year) which was more than those generated by wages that was 91.79 man days/HH/year (33%).

Table 4.4. Composition of employment in different sectors

Activities	Employment generated (days/HH/year)	Percentage (%)
NTFP collection	62.38	25.06
Agriculture	49.76	19.99
Shifting cultivation	35.78	14.37
Livestock rearing	12.08	4.85
Daily wages	81.36	32.68
Others (Services and Allied activities)	7.59	3.05
Total	248.95	100.00

4.1.4. Contribution of income from different sources to average household income:

Income in the study area was generated from six major activities: NTFP, agriculture, shifting cultivation, earnings from daily wages, livestock rearing and services and allied activities as shown in Table 6. Agriculture generated the highest average annual income (INR.6200) accounting 29.93%to the total income (INR.20710) of the studied villages (Table 6). They grow different types of crops in different seasons for both home consumption and commercial purposes.

The next important source of income was NTFP contributing 28.3 % (INR.5861) to total income (Table 4.5). The income generated from NTFP in the present study was much lower than the annual income reported (INR.75032) by Singh et al., 2010 from Mangrove forest areas of Sundarban but are similar to the studies of Prakash *et al*. (2006) where an annual income of INR.5392.56 has been reported. Shifting cultivation contributed 6% (INR 1260) to the total income.

Daily wages were also an important income source for the studied areas which constituted about 19.63% of total income. Both males and females of the studied area were involved as daily labourers.

Livestock contributed the least (2.064%) to the total annual income but led to a higher consumption of livestock products, especially milk and milk products, meat and egg at the house hold level. They also use their cattle for carrying out agricultural operations. However, sell of goat and poultry on occasions contributed to the household income of some villagers.

Therefore, agriculture and NTFP collection were important sources of income to households as is evident from their higher share percentage towards total household income (Table 4.5).

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

Activities	Income generated (INR/HH/year)	Percentage (%)
NTFP collection	5861.00	28.30
Agriculture	6200.00	29.93
Shifting Cultivation	1270.00	6.13
Livestock rearing	427.50	2.06
Daily wages	4067.00	19.65
Others	2885.00	13.93
Total	Rs. 20710.50	100.000

4.1.6 Employment Generated from the NTFPs in the study area:

Collection of mahula gave the major employment sources among the different NTFPs sold; contributing to 34.43% (21 days/HH/year) of the total employment generated by NTFPs (Table 4.6). This was because mahua was collected by every family of the study area in its season. Chara seeds collection was the next important employment generating activity which provided 23.66% (15 days/HH/year) to the total employment generated by the NTFPs. The next main source of employment generation was collection of kendu fruits and leaves and sal leaves and seeds which are 14.13% (8.82 days/HH/year) and 13.72% (8.56days/ HH/ year) respectively. Hill broom contributed 5 to 6% of the employment generation. Other products like aonla, harida, bahada contributed least to the employment generation i.e. 8 % as they were collected in very small quantity and were seasonal and less people were involved.

Thus, based on the employment generating capacity, mahula and chara could be considered as the major income generating activity in terms of employment generated by NTFPs in the study area. Altogether, the collection of all the available NTFP generated 62 days of employment per household. This is the same as the number of man days generated observed by Prakash *et al.* (2006) for NTFPs collection among some tribal groups in south India.

Table 4.6: Seasonal contribution of NTFPs and employment generate

NTFPs	Season	Employment generation(days/HH/year)
Mahula Flowers	February- April	21.48(34.43)
Chara seeds	March-April	14.76(23.66)
Kendu leaves	February- April	8.82(14.13)
Sal leaves	All season	8.56(13.72)
Senna seeds	October- February	2.74(4.39)
Harida	October – January	1.25(2.03)
Bahada	October- January	1.36(2.18)
Aonla	October- February	1.23(1.97)
Hillbroom	February – May	2.18(3.49)
Total	-	62.38 (100)

Note: Figures in the parenthesis indicate percentage to total.

4.2 MAJOR NTFPs COLLECTED IN THE STUDY AREA:

Table 4.7 showed on various forest produces collected, the period of availability of the products, the economic parts and utilisation. NTFP like mahula, chara, sal leaves and seeds and kendu leaves formed the major chunk of the collection where as other products like harida, bahada, aonla, hillbrooms, bel, kochila were collected in very small amount mostly for home and medicinal consumption.

Out of all the NTFPs collected by the respondents in the studied area, 4 NTFPs like chara seeds, kendu leaves, sal leaves, senna seeds were collected abundantly in their seasons. Fuel wood and sal leaves were collected by the respondents throughout the year. Other NTFPs like harida, bahada, aonla were collected during the period of October to January.

Mahula or Mahua was collected during the period of February to April by the villagers. All the family members including children were involved in the collection of mahua flower and fruits. They collected the flowers by shaking and plucking. Both men and women go in groups early in the morning for collection of flowers and return by noon. The average annual collection of mahua flowers is 119.46 kg (Table 4.8). The average selling price of mahua flowers was 19.98 Rs/kg (Table 4.9)

Collection of chara was one of the most important among the NTFPs. Almost every household of the surveyed area were involved in collection of chara and mahua. The average annual collection of chara was 15.66 kg (Table 4.8) with an average selling price of 199.46 Rs/kg (Table 4.9) which contributed 35% to the total income.

Collection of sal and kendu leaves were another important source of income and employment generation. The average annual collection of sal leaves and kendu leaves was 64.58kg and 48.97 kg (Table 4.8) respectively. The contribution of these two NTFPs was 24% with the average selling price of 15.55 Rs/kg and 16.94 Rs/kg (Table 4.9) respectively.

The panicles of hillbrooms collected were around 11.41 kg (Table 4.8) per season per household and were sold at an average of 28.55 Rs/kg (Table 4.9). Amount of harida, bahada and aonla collection was 12.60 kg, 4.63 kg and 4.76 kg (Table 4.8) respectively per season and were sold at an average price of 11.00 Rs/kg, 11.04 Rs/kg and 47.01Rs/kg (Table 4.9) respectively in the local market.

Many other NTFPs were collected in very small amount which were used soully for home consumption and traditional use by the respondents. They used those NTFPs as medicines and ornaments.

Table 4.7. Common NTFPs observed in the study area, their taxonomical positions, plant parts locally used and potential uses

Sl. No.	Name of the species	Local Name	Habit	Family	Parts used	Different uses
1	*Aegle marmelos*	Bela	Tree	Rutaceae	Fruit	Edible, medicinal
					Leaf	Worship of Lord Shiva
2	*Andrographis paniculata*	Bhuin Neem	Herb	Acanthaceae	Whole plant	Medicinal
3	*Anogeissus latifolia*	Dhaura	Tree	Combretaceae	Gum	Medicinal
4	*Aristida setacea*	Badoon	Herb	Poaceae	Inflorescence	Broom making
5	*Asparagus racemosus*	Satabari	Herb	Lilliaceae	Tuber	Medicine
6	*Azadirachta indica*	Neem	Tree	Meliaceae	Leaf, fruit and bark	Medicinal, soap making
7	*Bauhinia vahlii*	Siali	Climber	Fabaceae	Leaf	Plate making
					Bark	Rope making
					Seed	Edible
8	*Bauhinia variegata*	Kuler	Climber	Fabaceae	Young leaves	Green vegetable
9	*Bombax ceiba*	Semul	Tree	Malvaceae	Floss	Floss is used to stuff pillows
10	*Boswellia serrata*	Salia	Tree	Burseraceae	Gum	Binding material
11	*Buchanania lanzan*	Char	Tree	Anacardiaceae	Fruit	Edible
					Seed	
12	*Bamboo*	Baunsa	Shrub	Poaceae	Young sprouts	Culinary use, pickles
					Stem	Bamboo craft
13	*Cassia fistula*	Sunari	Tree	Fabaceae	Root	Medicinal
					Flower	Temple offering
14	*Cassia tora*	Senna	Shrub	Fabaceae	Leaf and seeds	medicinal
15	*Centella asiatica*	Thalkudi	Herb	Apiaceae	Whole plant	Medicinal
16	*Cochlospermum religiosum*	Ganhiar	Tree	Bixaceae	Flower	Temple offering, edible
17	*Curcuma aromatica*	Bana Haladi	Herb	Zingiberaceae	Rhizome	Edible, medicinal

18	*Cynodon dactylon*	Duba	Herb	Poaceae	Whole plant	Medicinal
19	*Dioscorea bulbifera*	Kanda	Climber	Dioscoraceae	Tuber	Edible
20	*Diospyros melanoxylon*	Kendu	Tree	Ebenaceae	Leaf	Beedi making
					Fruit	Edible
21	*Ficus recemosa*	Dimiri	Tree	Moraceae	Fruit	Edible, medicinal
22	*Hemidesmus indicus*	Antamula	Herb	Apocynaceae	Root	Medicinal
23	*Holarrhena pubescens*	Kurei	Tree	Apocynaceae	Floss	Floss is used to stuff the pillows
24	*Hyptis suaveolens*	Bana Tulasi	Herb	Lamiaceae	Seed	Edible, medicinal
25	*Madhuca longifolia*	Mahula	Tree	Sapotaceae	Flower	Culinary use, cattle feeding, liquor making
					Fruit	Culinary use, pickle
					Seed	Edible, medicinal seed oil
26	*Mallotus philippensis*	Kamala Gundi	Tree	Euphorbiaceae	Flower and fruit	Extraction of Dye
27	*Phoenix acaulis*	Bhuin Khajuri	Shrub	Arecaceae	fruits	Edible
28	*Phyllanthus emblica*	Aonla	Tree	Phyllanthaceae	Fruits	Edible, medicinal
29	*Rauvolfia tetraphylla*	Patalagaruda	Shrub	Apocynaceae	Root	Medicinal
30	*Schleichera oleosa*	Kusum	Tree	Sapindaceae	Fruit	Edible
					Seed	Oil production
31	*Semecarpus anacardium*	Bhalia	Tree	Anacardiaceae	Fruit	Edible, medicinal
					Seed	
32	*Shorea robusta*	Sal	Tree	Dipterocarpaceae	Leaf	Plate making
					Seed	Oil production
					Resin	Ritualistic use
					Young saplings	Tooth stick
33	*Strychnos nux-vomica*	Kochila	Tree	Loganiaceae	Seeds	Medicinal
34	*Syzygium cumini*	Jamun	Tree	Myrtaceae	Fruit	Edible

35	*Tamarindus indica*	Tentuli	Tree	Fabaceae	Fruit	Edible, medicinal
					Seed	Medicinal
					Tender leaf	Medicinal
36	*Terminalia arjuna*	Arjuna	Tree	Combretaceae	Fruit, bark	Medicinal
37	*Terminalia bellirica*	Bahada	Tree	Combretaceae	Fruit	Medicinal
38	*Terminalia chebula*	Harida	Tree	Combretaceae	Fruit	Edible, medicinal
39	*Woodfordia fruticosa*	Dhatuki	Shrub	Lythraceae	Flower	Temple offering, medicinal
40	*Wild mushrooms*				Fruiting body	Culinary use
41	*Ziziphus mauritiana*	Ber	Tree	Rhamnaceae	Fruits	Edible, medicinal
42	*Ziziphus oenoplia*	Kantei Koli	Shrub	Rhamnaceae	Fruits	Edible

Figure 4.6: Chara (*Buchanania lanzan*) seeds

Figure 4.7: Harvesting of chara fruits

Fig4.8. Mahula Flower (*Madhuca longifolia*) collected by a tribal

Fig 4.9 Drying of kendu leaves

Fig 4.10 Sal (*Shorea robusta*) leaves

Fig 4.11 Harida (*T. chebula*) seeds

Fig 4.12 Aonla (*Emblica officinalis*)

Fig 4.13 Bahara (*Terminalia bellereica*)

Fig 4.14: Hill brooms

4.2.1 Contribution of NTFPs towards total cash income per household:

In the study area the respondent families used to collect almost 30 to 40 different NTFPs. However, only few of these contributed significantly to the total household income. In the study area, chara seeds and mahua flowers accounted around 60% of total annual NTFP income (Fig. 4.6). It was found that, after chara and mahua flowers, the next important NTFP is sal leaves which contributed 13% to the total income followed by kendu leaves (11%), senna seeds (5%) and hill brooms (4%). Bahada and harida contributed almost the same i.e. 2% each. Aonla contributed 3% to the total NTFP income.

The total income generated from NTFP per household per year added up to INR 7634.02. More time was spent for the collection of chara seeds and mahua flowers during their peak season. Availability of abundant numbers of trees in nearby forest areas and high demand of these products in the local market and domestic use contributes to higher income generated by chara seeds and mahua flowers in spite of low prices and poor marketing facility of these products. Contrary to this in a study by Tejaswi (2008) it was noticed that Lichens which was available only for a span of 4 months contributed to 42.59% of the total NTFP income because of their high price per unit kg and the high demand for the commodity in the international market.

Table 4.8: Contribution of different NTFP to cash income:

NTFPs	No. Of HH involved yr	Quantity collected		Home consumption		Quantity sold		Income generated	
		MEAN	S.D	MEAN	S.D	MEAN	S. D	MEAN	S.D
Chara seeds	98(98)	15.66	2.99	2.05	1.86	13.62	2.89	2718.36 (35.60)	630.61
Mahua flowers	98(98)	119.46	18.37	26.98	12.21	92.43	15.72	1847.44 (24.20)	335.43
Kendu leaves	70(70)	48.97	15.08	-	-	48.97	15.08	829.68 (10.86)	256.88
Sal leaves	63(63)	64.58	12.76	-	-	64.58	12.76	996.69 (13.05)	219.97
Senna seeds	57(57)	30.70	6.26	-	-	30.70	6.26	409.23 (5.36)	155.56
Hillbrooms	52(52)	11.41	7.89	-	-	11.41	7.89	325.77 (4.24)	126.31
Harida	38(38)	12.60	6.61	-	-	12.60	6.61	138.69 (1.81)	110.76
Bahada	35(35)	4.63	0.76	-	-	4.63	0.76	137.68 (1.80)	79.57
Aonla	24(24)	4.76	0.99	-	-	4.76	0.99	230.48 (3.01)	76.73
Total	-	-	-	-	-	-	-	**7634.02 (100)**	-

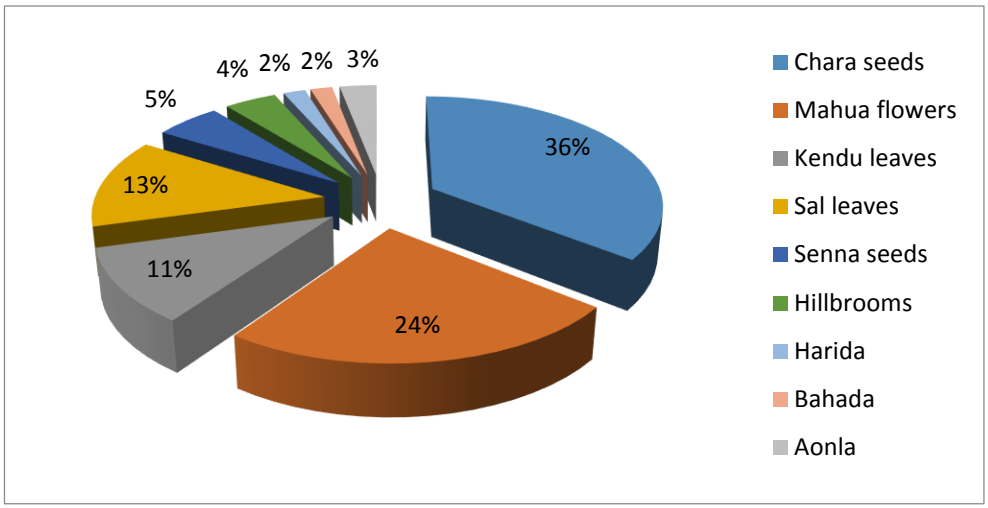

Figure 4.15. Percentage contribution of different NTFPs to Net return.

4.2.2 Net returns generated from NTFP collection:

The net returns generated from the NTFPs collected by the respondents were found out from the quantity collected and the price obtained per kilogram. The transportation cost was taken to be zero as the agents approached the respondents for collecting the NTFP. The labour input in NTFP extraction was considered and the opportunity cost was also calculated and deducted from the gross returns to find out the net returns (Svarrer & Olsen, 2008). Opportunity cost is the economic cost of an action or decision in terms of what is given up to carry out that action (USDA, 2012). In the present study, the opportunity cost was measured using the local labour wage of the study area and the cost of time spent for NTFP collection. It was observed from the result that the highest net returns were obtained from chara seeds (INR 892.56), mahua flowers (INR 592.84) and sal leaves (INR 246.99) followed by hill brooms (INR 219.52). The net returns from NTFPs were chara seeds > mahua flowers > sal leaves > senna seeds > hill brooms > kendu leaves > bahada > harida > aonla. It was observed from the result that the opportunity cost was directly proportional to the net income of some of the products like chara seeds, mahua flowers, sal leaves, hill brooms, senna seeds and kendu leaves. In aonla, harida and bahada, it was found that the opportunity cost scored out the net returns. The net returns per rupee cost was ranged from 1.00(aonla) to a high of 29.67 (mahua flower). Hence reference and low cost involved the income generated from NTFP may be considered as the most important income source for the forest fringe community. The gross income from the NTFP was estimated to be INR 7632.00. Similar results were observed in the study conducted by Shylajan and Mythili (2007). They gave a gross income per house hold of INR.9542.00 in the case of forest fringe Kattunaikkan tribal community.

Table 4.9. Economics of NTFPs collectors (HH/year)

Particulars of NTFPs	Quantity sold (kg)	Price/Kg (INR/Kg)	Gross returns (INR)	Transportation cost (INR)	Labour man days	Opportunity cost of labour* (INR)	Net return (INR)	Net return /kg	Net return /rupee cost
Chara seeds	13.62	199.58	2718.36	0	21.48(34.43)	1825.80	892.56	65.53	4.472
Mahua flowers	92.46	19.98	1847.44	0	14.76(23.66)	1254.60	592.84	6.41	29.67
Kendu leaves	48.97	16.94	829.68	0	8.56(13.72)	727.6	102.08	2.08	6.02
Sal leaves	64.58	15.44	996.69	0	8.82(14.13)	749.7	246.99	3.82	15.99
Senna seeds	30.70	13.32	409.23	0	2.74(4.39)	232.9	176.33	5.74	13.2
Hill broom	11.41	28.55	325.77	0	1.25(2.03)	106.25	219.52	19.23	7.68
Harida	12.60	11.00	138.69	0	1.36(2.18)	115.6	23.09	1.83	2.09
Bahada	12.47	11.04	137.68	0	1.23(1.97)	104.55	33.13	2.65	3.00
Aonla	4.80	47.01	230.48	0	2.18(3.49)	185.3	45.18	9.41	1.00
Total			7634.02	0	62.38 (100)	5302.3	2331.66		

Note: *local wage rate were considered 85 Rs.

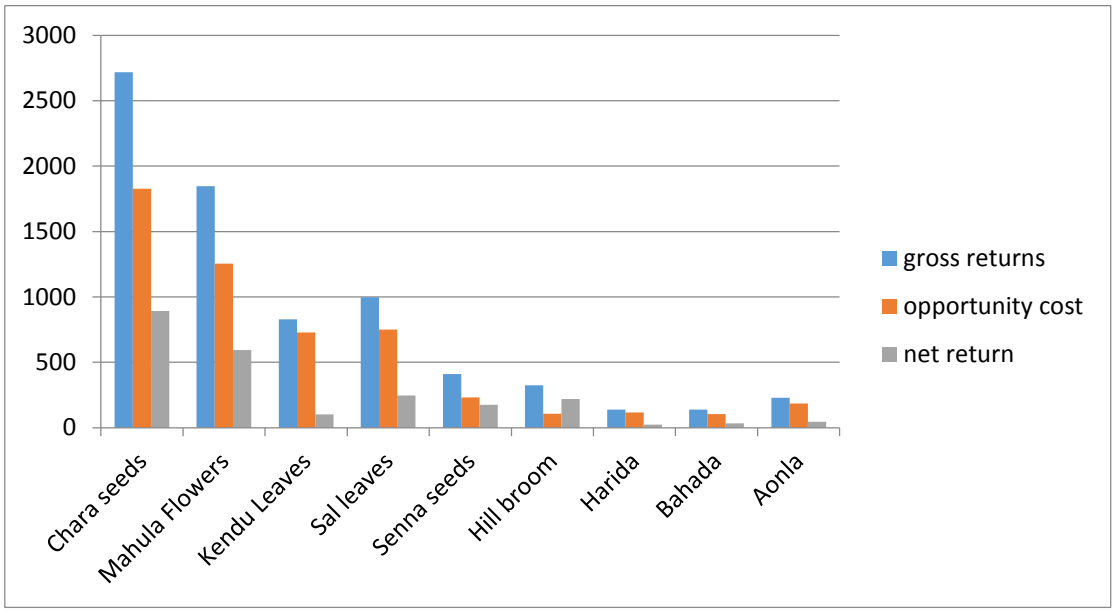

Figure 4.16. Economics of different NTFPs

4.2.3 Association Studies:

4.2.3.1 The relationship between the socio economic variables:

Table 4.10: Correlation of socio-economic variables

Variables	Family size	Age	Literacy level	Land	Livestock
Family size	1.000				
Age	0.367**	1.000			
literacylevel	0.043NS	0.423**	1.000		
Land	0.027NS	-0.018NS	0.179NS	1.000	
Livestock	0.499**	0.165NS	-0.036NS	0.391**	1.000

**. Correlation is significant at the 0.01 level (2-tailed).
*. Correlation is significant at the 0.05 level (2-tailed).

Interpretation of Table 4.10 showed that there are significant correlation between family size (adult male, adult female and children) with age and livestock. Age (0.367**) and livestock (0.499**) is positively correlated with the family size. Age is positively correlated with literacy level (0.423**) and land is positively correlated with livestock.

Analysis of data showed with increase in family size, demand for the livestock increases because of their own requirement and for more livelihood support. With increase in age the literacy level also increases because of awareness. It was found that there is a strong correlation between land holding and livestock, showed that the villagers who are owners of land generally prefer livestock farming.

4.2.3.2 The relationship between different income sources:

Table 4.11: Correlation of different income sources

Variables	Agriculture & shifting cultivation	NTFPs	Livestock	Wages	Others
Agriculture & shifting cultivation	1.000				
NTFPs	-0.211	1.000			
Livestock	0.411**	0.225*	1.000		
Wages	-0.103	-0.076	-0.205*	1.000	
Others	0.146	-0.249*	0.076	-0.206*	1.000

**. Correlation is significant at the 0.01 level (2-tailed).
*. Correlation is significant at the 0.05 level (2-tailed).

Interpretation of Table 4.11 showed that there are significant and positive correlation between agriculture and shifting cultivation with livestock (0.411**). NTFPs was found to be significantly and positively correlated with livestock (0.225*) and negatively correlated with other occupation (services/business) (-0.249*). Livestock was found to be significantly and negatively correlated with wages (-0.205*). Wages was found to be significantly negatively correlated with other occupation (-0.206*).

Analysis of Table 4.11 showed that who are engaged in agriculture and shifting cultivation activities are in possession of more number of livestock. Also the landless persons who are collecting NTFPs for their livelihood also were in possession of goats, poultry birds for their subsistence. The persons who were economically poor and did not possess livestock were mainly depended upon wage

earning for their livelihood. The villagers who were engaged in service and business were not depending upon wages for their livelihood. Shylajan and Mythili (2007) have reported an inverse relationship between household income from non-wood forest products and income from cultivation indicating that households with more agricultural income depend less on NTFP. This is also in concurrence with Tejaswi's (2008) observed that the major determinant factors of NTFP income are time spent for collection and income from wages, farm, services and allied activities.

4.3. Marketing network and valuation of NTFPs:

4.3.1 Channel design for chara seeds:

Chara seeds provided good employment generation in the study area. The primary collectors collected the fruits in groups and use some part for home consumption. They either sold them directly in the market or to the private traders through panchayat office. There was no involvement of wholesale traders or other agencies. The marketing channel is in the form of 1. Primary collector- home consumption and 2. Primary collector - panchayat office - private traders (inside state) – Big traders (Outside state).

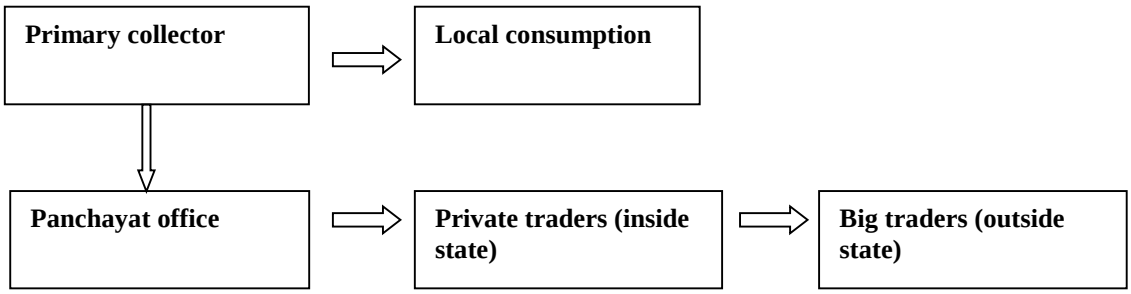

Figure 4.17. Marketing channels of chara (*Buchanania lanzan*) seeds

4.3.2 Channel design of mahua flower:

Mahua flowers which was an important NTFPs for their income generation economic condition of view are collected by the primary collectors who kept a little amount of products with themselves for own consumption and also some amount directly sold to whole seller and some to the whole seller through intermediate trader. Intermediate traders sold the product to the big trader inside state who later

sold it to the commission agent who further sells it to big traders of outside state. Some whole sellers also sell the flowers directly to the big trader of outside state.The different forms of market channel are 1. Primary collector-Local consumption. 2. Primary Collector- Intermediate Trader- Whole Sellers- Big Trader (Outside state) 3. Primary Collector- Intermediate Trader- Big Trader (Inside state) - Commission Agent- Big Trader (Outside state) and 4. Primary Collector- Whole Sellers- Big Trader (Outside state). (Fig. 4.9)

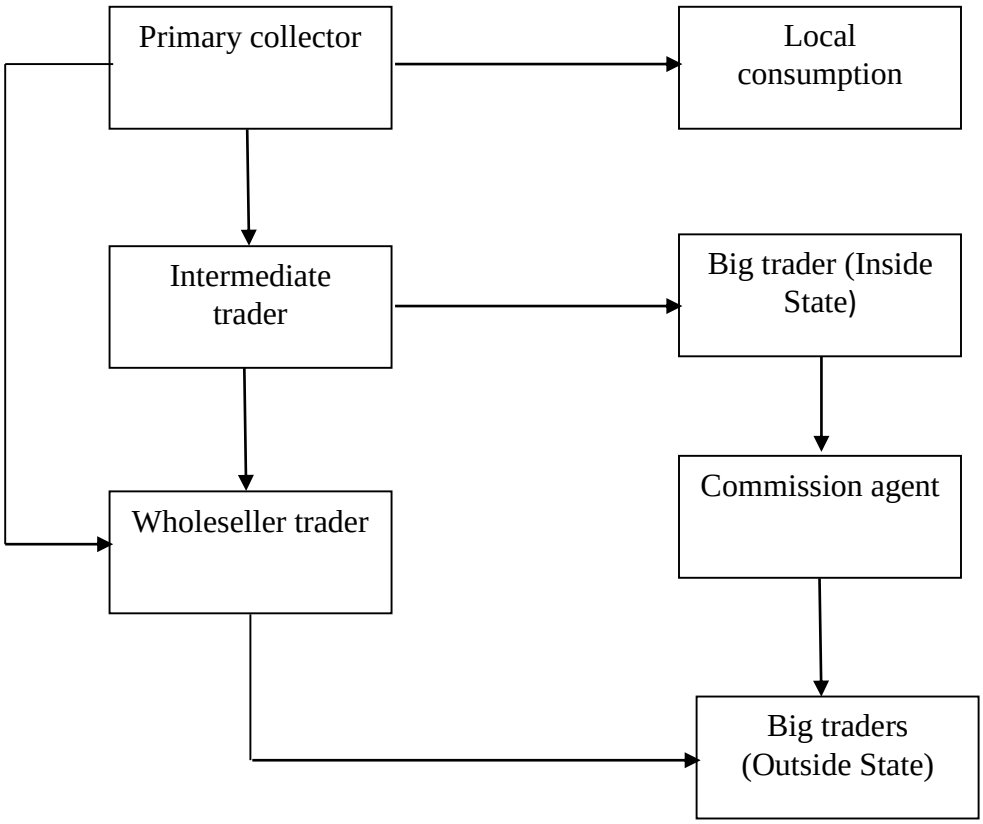

Figure 4.18: Marketing channels of mahua (*Madhuca longifolia*) leaves

4.3.3 Channel design of kendu leaves

There were two ways of kendu leaves disposal observed over Sundargarh division. The first one includes disposal of leaves from OFDC to consumers under registered traders and bidi factories. The second one included mostly from private traders to consumers via. hat, local traders and plate makers through blending with sal leaves for leaf plate making. Although, second one was less price fetching. Further, besides OFDC no agency was observed to encroach its monopoly over kendu leaves was found in investigation. (Fig 9).

Sakhrie and Sharma (2015) observed two types of marketing channel in marketing of bamboo shoots in Dimapur district of Nagaland which are: producer-consumer (channel I) and producer-commission agent-consumer (channel II). They too described length of channel varied with commodities and also quantity to be moved, nature and degree of specialisation of production.

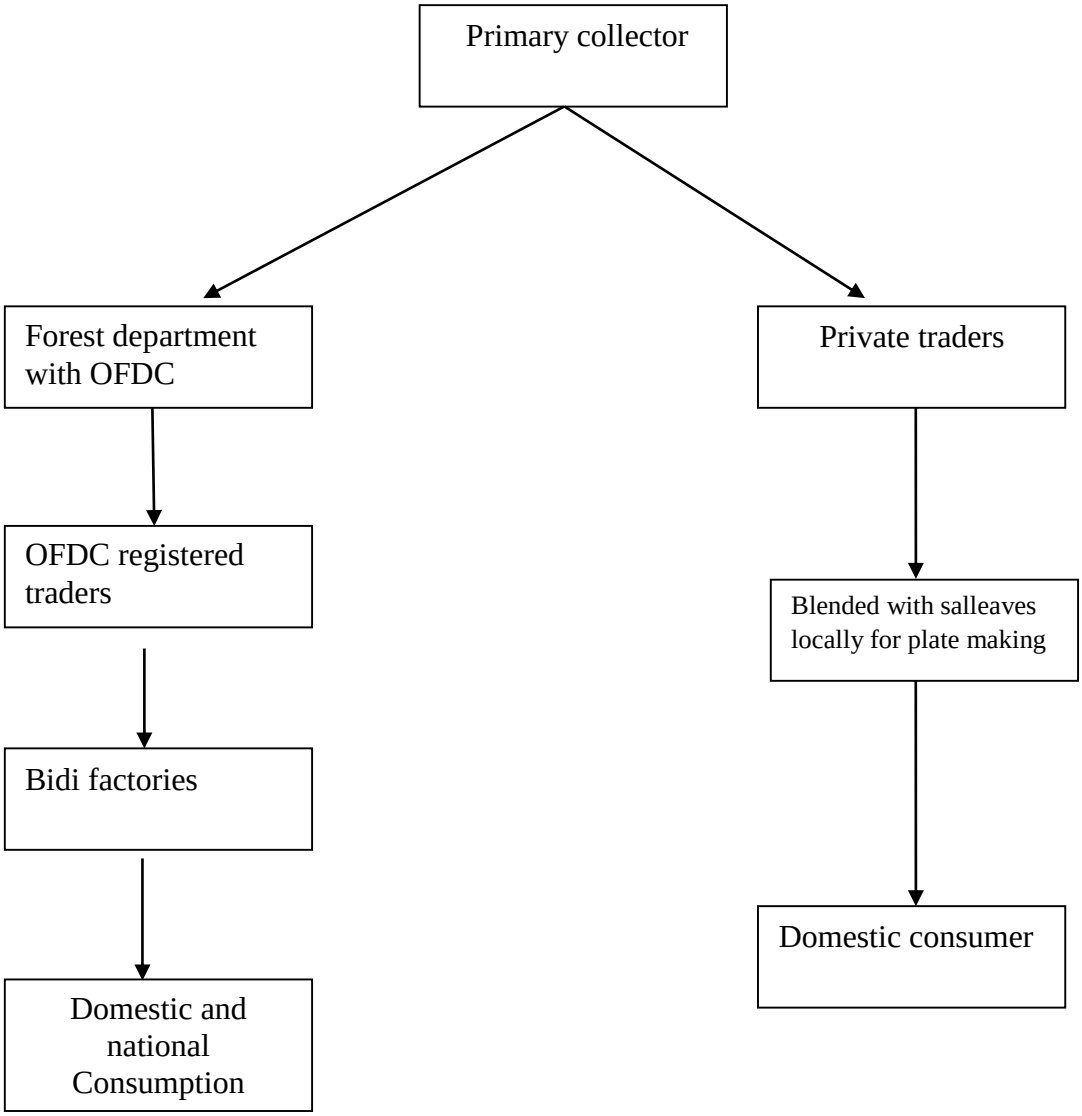

Figure 4.19. Marketing channels of kendu leaves

4.3.3 Channel design of sal leaves

Sal leaves are an important role for increasing the economic condition of the country. There were different marketing channel for sal leaves in the study area. They were 1. Primary collector - khali agent - contractual processors - big trader-consumer. 2. Primary collector-weekly/bi weekly hat-processors cum trader-big trader-whole seller and 3. Primary collector-agent-contractual processor-big trader-whole sellers- retailer-consumer.

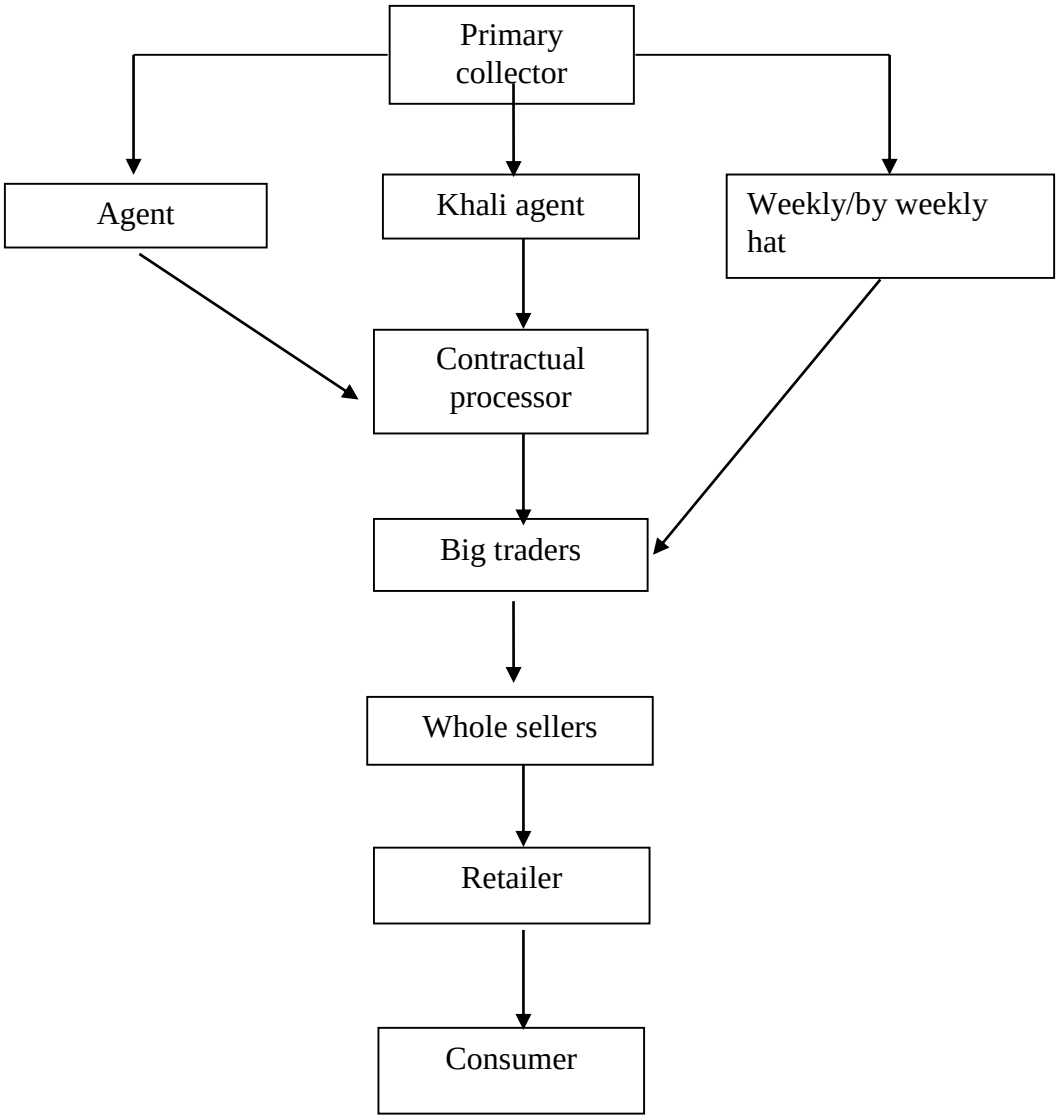

Figure 4.20: Marketing channels of sal leaves

4.3.4 Channel costing of kendu leaves.

The purchasing cost, selling price, marketing cost, marketing margin and market efficiency of both channels taking 20 kerries as an unit regarding kendu leaves marketing in presented in Table 10. The marketing through channel 1 per 20 kerries involves Rs.20 purchasing price of OFDC for which selling price is Rs.33 out of total Rs.21 profit. The marketing cost covers Rs.8.4 (drying, bagging and transportation) and profit margin becomes Rs.12.60. Simultaneously, for traders marketing selling price becomes Rs.50.50 and marketing cost becomes Rs.6.60. The margin he gets each Rs.10.90. Bidi manufacturer gets imposes Rs.101.20 and margin gets Rs.184.30, to this retailer gets profit Rs.220.40 by selling at Rs.702/20 kerry. Channel 1 is more efficiency than the channel 2.

Table 4.12: Channel costing of kendu leaves in the studied area

Functionaries	**Parameter**									
	Channel 1					Channel 2				
	Name	Purchasing price (Rs.)	Selling price(Rs.)	Marketing cost (Rs.)	Margin realised (Rs.)	Name	Purchasing price (Rs.)	Selling price (Rs.)	Marketing cost (Rs.)	Margin realised (Rs.)
1st	OFDC	12/20 kerry	33/20 kerry	8.4/20 kerry	12.6/20 kerry	Private trader (unregistered)	5/20 kerry	14.5/20 kerry	4.5/20 kerry	5.0/20 kerry
2nd	Trader (registered)	33/20 kerry	50.5/20 kerry	6.6/20 kerry	10.9/20 kerry	Plate maker	14.5/20 kerry	79/20 kerry	31.6/20 kerry	32.9/20 kerry
3rd	Bidi manufacturer	50.5/20 kerry	336/20 kerry	101.2/20 kerry	184.3/20 kerry	Consumer	79/20 kerry			
4th	Retailer	336/20 kerry	702/20 kerry	145.6/20 kerry	220.4/20 kerry					
5th	Consumer	702/20 kerry								
Marketing efficiency	263.6%					204.9%				

Note: Kerry = 400 leaves, 1 leaf = 8 bidi, For retailer 1 bidi = .50, In channel 2, 1 bundle =100 leaves and 1 bundle plate = Rs. 22

The profit margin as in channel I is not realised in second channel to which cultivators produce is disposed of without following the protocol. For 20 kerry owner gets Rs.5 to which plate maker gets by Rs.14.5 from local traders who gets margin Rs. 5. The last functionary consumer purchases Rs. 79 for which plate maker for blending with Sal leaves gets margin Rs.32.90. Market efficiency is more in first route (263.6%) and less in second route (204.9%).

4.3.5 Challenges in marketing

The major challenges were no formal market, illiteracy, lack of exposure, no storage facility, lack of institutional support, lack of market information, lack of demand of the products, poor quality of the products, remoteness of the village and low Shelf life in priority order. The solutions to the challenges were well established market involving primary stakeholders, development of infrastructure for cold storage to be developed, information about market and price of the produce through SMS or by different government institution, market functionaries may be proactive for timely disposal besides, value addition may be made to increase durability and marketability, Govt. institutions should arrange some exposure visit to successful market for the farmers and location and demand specific products should be chosen knowledge about demands of product should be known to dwellers.

4.3.6 Strength and deficiency in marketing of NTFPs in the study area:

Table 4.13: SWOT analysis

Strength	Weakness
i) Bestowed with rich natural and forest resources. ii) Improving initiatives of government to increase forest cover. iii) Formation of VSS in forest watch and ward iv) Implementation of OFSDP in three forest Divisions 1. Sundargarh 2. Bonai 3. Panposh	i) Increasing forest degradation with increasing population & human needs. ii) Rapid depletion of forest due to industrial, mining and commercial purposes. iii) Illegal activities by forest mafia and vested interests iv) Limited effective watch and ward measures. v) Loss of bio-diversity with forest destruction vi) Markets are not well developed. Most of the employment opportunities are due to forest and agricultural sources that varies as per climatic conditions.

Opportunity	**Threat**
i) Better community engagement for forest protection and natural generation of forest. ii) Tapping the scope of ecotourism iii) Better and greater involvement of promoted VSS / JFM committees. iv) Cultivation of NTFPs can fetch additional income, quality employment, scope for growth of rural economy, optimum utilisation of agriculture infrastructure.	i) Clearing of forest area for increasing mining activities. ii) Illegal felling and smuggling. iii) Middle men cashing on secrecy. iv) Risk of failure and price fall.

SUMMARY AND CONCLUSION

Forests worldwide generate substantial number of goods and services that benefit mankind. These values may be categorized as 1. Direct value use (values arising from consumptive and non-consumptive uses of forests like timber, fuel, extraction of other biological materials, tourism etc.) 2. Indirect value uses (values arising from various forest services like soil and water conservation, carbon sequestration etc.) 3. Option values (values reflecting a willingness to pay, to conserve the option of making use of a forest even though no current use is made of it) 4. Nonuse values also known as existence or passive use values (values that reflect a willingness to pay for the forest in a sustained use) (Pearce, 2001). Forests are a vital and significant sources of subsistence, employment and occupation, income and economy, food security, poverty alleviation, development and survival of the tribal people living in adjoining forest areas (FAO, 1989). Forests produce multitude of NTFPs like medicinal plants, dyes, mushrooms, fruits, resins, bark, roots and tubers, leaves, flowers, seeds, honey, lichens and so on. Despite their immense significance in the rural livelihood, there aren't any specific measures to sustainably harvest these products or standardize their prices or process these products so that the dependent population receives the maximum income from them. In addition, markets for these products are relatively unorganized and complex. Tribal people, who are often poor or landless are linked to the forests and forest produce. All of these factors contribute to the complexity of livelihood dependency on NTFP and their accurate estimation. With this background, the main thrust of the present study **"A study on livelihood dependency of forest fringe community & marketing and economics of forest produces in Sundargarh forest division, Odisha"** is to assess the contribution of NTFP towards income and employment for ensuring food and livelihood security for the forest fringe community with proper marketing and valuation with the following specific objective:

1. To study the participation and behavior of forest fringe community/ people in NTFPs extraction and use (collection, processing and marketing) in Sundargarh division.
2. To evaluate marketing and economics of NTFPs in Sundargarh division, Odisha.

For this purpose, the study was undertaken at Hemgiri and Ujjalpur range of Sundargarh forest division. Hundred households were sampled randomly from 6 villages and information was collected through structured questionnaire, personal interview and secondary information. After analysis of the information, the key findings are presented below:

5.1 Key research findings:

5.1.1: Simple livelihood survey or participation and behavior of forest fringe community/ people in NTFPs extraction and use

- Socio-economic profile of the average household size was very small (5.37) with on average 1.50, 1.72 and 2.15 of adult males, adult females and children respectively. It is because they prefer to live in nuclear family.
- The study on age group revealed that all age categories of people were involved in NTFP collection although the majority of respondents i.e. 36% were in the age group of above 50.
- The literacy rate of females (35.53%) was much higher than adult females (18.79%). Literacy was highest for children (41.35%) because of tribal development programmes, free educational programmes and mid-day meal facilities of the Government.
- Out of the 100 family studied 21 families were either landless or having less than 0.5 acre of land. 43% of respondents had a very small size of land holding i.e. less than 2 acre. 36% of the respondent had more than 2 acres of land.
- About 50% of the total population studied owned livestock with an average of 3.70 animals per household
- Regarding involvement in different income generating sectors, the respondents were involved in different income generating sectors i.e. collection of NTFP, shifting cultivation, daily wages, agriculture, livestock rearing and services and allied activities.
- NTFP collection was the most important activity among the respondents as all of them in the area were involved in this activity followed by agriculture (89%), shifting cultivation (42%) livestock rearing (85%), daily wages (79.00%) and services and allied activities (5.00%).

- The daily wage sector generated the highest employment opportunity, with respect to the number of man days per household per year (32.68%) followed by NTFP (25.06%), agriculture (19.99%) and other sectors.
- Among the various sectors, average annual income generated from agriculture was highest (INR.6200.00) accounting 29.93% followed by NTFP contributing 28.30% (INR.5861.00) to the total average annual income (INR.20710.00) of the respondents.

5.1.2: Marketing and economics of NTFPs

5.1.2.1: Contribution of NTFP towards total income

- A total of 42 NTFPs were collected from the forests by the respondents all-round the year. But few of them contribute to the net income of the studied families viz. chara seeds, mahua flowers, kendu leaves, sal leaves, senna seeds, hill brooms, harida, bahada and aonla.
- Among various NTFP, mahua flowers, sal leaves and kendu leaves were collected annually in higher quantities i.e. 119.46 kg, 64.58 kg and 48.97 kg respectively but fetched low price i.e. INR.19.98, INR.15.44 and INR.16.94 per kg respectively. Whereas chara seeds was collected in small quantity i.e. 13.62 kg but fetch more price i.e. INR. 199.58 Per kg.
- In terms of employment generated from various NTFP, chara seeds and mahua flowers formed the major portion contributing 58%(36 days/HH/year) of the total NTFP employment (62 days/HH/year).
- The study on contribution of NTFP towards total household cash income revealed that chara seeds and mahua flowers together accounted for around 60 % (INR. 4565.80) of total annual NTFP income (INR.7634.00).
- Chara seeds and mahua flowers also contributed highest (INR. 1485.00) to the total average net returns generated from NTFP income (INR. 2332.00).
- Tobit model analysis revealed that the income from NTFP had a positive relationship with time spent for livestock farming, while income from daily wages and others (services and allied activities) exerted a negative influence on the share of the NTFP income of households of studied area.

5.1.2.2: Marketing Network and valuation of NTFPs

- In case of chara seeds, the marketing channels were in the form of 1. primary collector- local consumption and 2. Primary collector-Panchayat office-private traders (inside state)-big traders (outside state).
- In case of mahua flowers, the marketing channels were in the form of 1. Primary collector-Local consumption. 2. Primary Collector- Intermediate Trader- Whole Sellers- Big Trader (Outside state) 3. Primary Collector- Intermediate Trader- Big Trader (Inside state) - Commission Agent- Big Trader (Outside state). 4. Primary Collector- Whole Sellers- Big Trader (Outside state).
- For sal leaves, the marketing channels were in the form of 1. Primary collector-khali agent-contractual processors-big trader-consumer. 2. Primary collector-weekly/bi weekly hat-processors cum trader-big trader-whole seller. 3. Primary collector-agent-contractual processor-big trader-whole sellers- retailer-consumer.
- There were two ways of marketing channel found for kendu leaves, channel 1. primary collector - OFDC - registered traders - bidi factories – domestic and national consumers. Channel 2. Primary collector – private traders – blended with sal leaves for plate making – domestic consumer. The profit margin for channel 1 was more than channel 2. Marketing efficiency was more in first route (263.6%) and less in second route (204.9%).
- The major constraints for marketing and faced by the respondents were mainly because of illiteracy, lack of market information, storage facility, lack of institutional support, lack of demand of the products, poor quality of the products, remoteness of the villages and low shelf life.

5.2: Conclusion

1. On the basis of the result obtained from the present investigation, following conclusions are presented in three sections. To conclude, NTFP is an important source of employment and income for the forest fringe communities, Sundargarh forest division.
2. It is noteworthy that though NTFP contributes a lower proportion of total household income (about 25%) than wage earning (33%), it acted as safety nets in times of food scarcity and during off seasons where agricultural and wage income

was nil. NTFP played a prominent role in both life and livelihood support for the villagers.

3. NTFP were collected for both subsistence and for sale for cash income. NTFP were found to be the second major employment and income generator as well.
4. The study presents the income and employment pattern of the tribal households from different sectors. The study indicates that gathering NTFPs is the most prominent source of income and represents 'nitty-gritty' component of livelihood strategies among the forest dwellers.
5. Knowledge is power. But it has also been money in the NTFP sector. Some are losing money simply because they don't have the right information, especially related to the prices of the NTFPs in an imperfect market structure. Flow of information mechanism should be developed in local level.
6. Due to lack of marketing facilities, it was seen that the dependency from forest is decreasing fast and leading to migration, mal-nutrition, poverty etc and people do not take interest for the safe guard of the forest, which impacts the environment and climate significantly.

Recommendations and suggestions of the study

- The present study confirms that the NTFP are closely linked to the social, economic and cultural lifestyle of the people in the study area and eliminating them from their natural surroundings would not be acceptable. The fact also remains that because of these livelihood dependencies, the forest resources are also getting depleted as in case like shifting cultivation. There is an immediate requirement for the scientific management of the forest resources and their correct documentation.
- There is also necessity of an organized collection and trade of these commodities which may be made instrumental by setting up of co-operative societies or collection and trade centers by the Government. This ensures proper documentation of the quantity, trade and economics of collection and also will help better income for the collectors.
- Some agroforestry models which include these NTFP species may be tried in the area itself as on Farm Trials. Natural resource based income activities like apiculture will also help them improve their livelihoods.

- The administrative machinary should ensure that the benefits of the government schemes and policies reach such tribes which are residing in remote areas and improve their infrastructural facilities.
- Trainings on improved agricultural practices may be imparted to them and above all certain awareness programmes or information dissemination at the village level which will make them aware of the importance of forests, their sustainable use and impacts of human induced deforestation will discourage them to adopt the undesirable practices like shifting cultivation

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Appendix I
Interview questionnaire

ORISSA UNIVRSITY OF AGRICULTURE AND TECHNOLOGY

UNIVERSITY (OUAT)

COLLEGE OF FORESTRY

Bhubaneswar-751003

This information is gathered for the purpose of research work of the M.Sc programme of College of Forestry. A study is being conducted on the "**A study on livelihood dependency of forest fringe community, marketing and economics of forest produces in Sundargarh forest division, Odisha**". It is purely for educational purpose.

I. General information

Date: / /

District_____

Tehsil/ Block_____ Village _____

Investigator _____

Name of the respondent _____

Ethnic group/ tribe to which the respondent belong _____

II. Family Details:

Sl.No	Family Members*	Sex	Age (Yrs)	Educations#	Occupations**

*1-Self, 2-Spouse of head, 3-Married child, 4-Spouse of married child, 5-Unmarried child, 6-Grand child, 7- Father- in-law, 8- Mother-in-law, 9- others (Specify) **1-Agriculture , 2-NTFP, 3 –Wage labour, 4- Private employee, 5- Govt. employee, 6- Business, 7- House wife, 8- Not working, 9- Student, 10- Others

#1- Masters, 2- Degree, 3- Pre University, 4- Secondary School, 5-
Middle School, 6- Primary School, 7- Illiterate/Others

III. Details of the land holdings:

Type of Ownership	**Rainfed (ha)**	**Irrigated (ha)**	**Subsidiary(ha)**
Owned			
Leased in			
Leased out			
Land less			
Grand Total			

Total Operational holding: owned land + leased land – leased out land:_____

Lease Value: _____

Types of Soil: _____

IV. Family Income (Include subsidiary occupation also):

Family members	**Occupation**	**Income (Rs.)**	
		Monthly	**Annual**

V. Time spent for the 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)								
Jan- March (avg)								
April- June (avg)								
Oct-December								
Total (avg)								

VI. Returns:

Name of the Products	Main products				By Products			
	Qty. Produced (Kg.)	Own consumption	Qty. sold (Kg.)	Price /unit (INR)	Qty. Produced (Kg.)	Own consumption	Qty. sold (Kg.)	Price /unit (INR)

Total income (Main products) _____

Total Income (By products) _____

VII. Livestock Production and Income:

Particulars	Number	Production (lts/kg)	Own consumption	Sale	Price/unit	Total income
Cow						
Goat						
Buffalo						
Poultry						
Others (specify)						

VIII. Information on the NTFPs gathered from the forests:

Particulars	1	2	3	4	5	6	7
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 (Kg) (male) Jan-march April-June July-September Oct- Dec							
Qty. collected (kg) (Female) Jan-march April-June July-September Oct-Dec							
Distance travelled/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. Quantity b. Uses							
Sale of NTFP Quantity (kg)							
To whom sold							
Transportation cost (INR/trip)							
Price received (INR/kg)							
Total income from sales							
End use of the NTFP							

IX. Market Information

	Source of Information
How do you get information about the selling price of commodities	Agent/ middleman 1
	Bazaar 2
	Radio 3
	Government source/ Gram Panchayat -4
	Friends/ Members of the community 5
	Others –6 (Specify)

X Storage Systems -

What are the storage systems in place	Traditional systems of storage (sacks / bins etc)	1
	Community storage	2
	Commercial storage	3
	Others (specify)	99

XI Processing system

Do you process any items before sale Yes/No

If yes, give details

Item	Quantity in Qtl	Quantity in Qtl	Processing Location	
Processed	Harvested		Where	Distance from your village

If the processing of items helps you to realise better remuneration? Yes / No

If Yes

Items processed	Sale without process			Sale by processing			
	Qty. in Qtl.	Sale rate of raw materials/Qtl	Other expenses for sale/Qtl	Sale rate of processed material/Qtl	Processing expenses/ Qtl	Other expenses for sale/Qtl	Net profit /Qtl

XII. Marketing of processed Product:

Where do you sale your finished products?

Items	Where do you sale	Distance from village	Approx. % of finished products marketed	Where do you get maximum remuneration
	Own village:1			In city/Town:1
	Weekly Hat:2			By middle man : 2
	Nearby village:3			In Hats:3
	Middle man:4			Nearby village:4
	Town/city:5			In own village:5
	Other: 99 (Specify			