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RESEARCH ARTICLE

LIVELIHOOD DEPENDENCY OF RURAL PEOPLE UTILIZING NON-TIMBER FOREST PRODUCT (NTFPs) IN A MOIST DECIDUOUS FOREST ZONE, WEST BENGAL, INDIA

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Corresponding Author*Debnath Palit****Abstract**

A study was undertaken to assess the diversity of non-timber forest products (NTFPs) and its resource potential in selected sites of Kanksa Forest Division of Burdwan District, West Bengal. Information about NTFPs are being collected at fourteen villages of the concerned study sites. The diversity however varies with availability and local knowledge. 23 major categories of nontimber forest products were recorded during our survey work at the present investigation which includes different forms of Dyes, grass, oil, wax, honey, gum, resin, food items (leaf, fruit, seed, herb, stem), bamboo, broom, basket, cotton, brush, paper, ornamental, worship, marriage rituals, leaves (Sal, Kendu, Datepalm), Sap and Flour. The present investigation revealed that although there is high resource potential in the study sites but lack of awareness, scientific knowledge, expertise and inadequate market information, income through commercialization of such species were found to be very low. The forest dwellers are progressively dependent on NTFPs for sustaining their daily livelihood instead of utilizing it as a prospective income source and for their socio-economic development

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INTRODUCTION

NON-timber forest products (NTFPs) are an integral part of development and survival of people living in and around forests and depending on them. The potential economic value of NTFPs either in terms of utilization or their market value is often underestimated or unknown (Wickens, 1994). Non-timber Forest Products (NTFPs) are important tools for addressing poverty issues for the marginalized, forest dependant communities, by contributing to livelihoods, including food security, income, health and sustainable human development (Ahenkan and Boon, 2008). Globally, an estimated 350 million people mostly in developing countries depend on NTFPs as their primary source of income, food, nutrition, and medicine (UND, 2004; FAO, 2005). These products play a vital role in sustaining the lives of local gatherers, who must increasingly adapt to diminishing resources to stay alive. The challenge is therefore to assess and quantify the value of these products and to transform the use of many of them as are socially and ecologically viable for subsistence and development (Saulei *et al* 1994).

The significance of NTFPs in rural livelihood improvement and for subsistence has been established by a number of studies (Shrestha *et al.* 2003; Gauli and Hauser, 2009), but little is known about their collection and marketing dynamics (Bista and Edward, 2006).

In India, there are about 15,000 plant species out of which nearly 3000 species (20%) yield NTFPs. However, only about 126 species (0.8%) have been commercially developed (Maithani, 1994). NTFP activities hold prospects for

integrated forms of development that yield higher rural incomes and conserve biodiversity while not competing with agriculture (Sharma 1992).

Rural populace especially forest dwellers in India depend on the forests not only to supplement their domestic requirements for foods, fodder, fibre and medicines but also to supplement their incomes by selling part or all of their collection in local markets. In India, more than 41 million tribals and forest dwellers derive their earnings from these products after consuming about 60% of collected NTFPs for personal use (Prasad, 1985). Contemporary multidimensional forest management has led to a much broader concept of non-wood products and services include landscape amenity, clean air, water storage, biodiversity, providing a space for recreation and tranquility (Seeland *et al* 2007). NTFP is potentially obtainable from about 3000 species found in the forests of India. NTFP collection, an important source of income for forest dwellers and rural poor, varies from state to state ranging from 5.4 to 55 percent. Moreover, 60% of NTFP is consumed as food or as a dietary supplement especially during lean season by forest dwellers. In Manipur, India alone, nearly 90% of the population depends on forest products as a major source and some 250000 women are employed in collecting forest products (FAO,1992). In Bastar district of Madhya Pradesh, about 75 % of forest dependent people supplement their food by tubers, flowers and fruits all the year round (Khare, 1998). In a household based survey at Midnapur forests, it was observed that of the 122 uses of plants or their parts listed by the people, the maximum were for food (44), followed by fuel (39) and medicinal purposes (18) (Malhotra *et al* 1991). Various study reveal that it is the poorest households with agricultural lands, livestock, adult males that are predominant collectors of forest products (Malhotra *et al.* 1991; Hegde and Daniel, 1992). NTFPs are estimated to generate 70% of all employment in the Indian forestry sector. Commercial NTFPs alone are estimated to generate Rs.3 billion annually. One study estimated that NTFP collection generates over 2 million person years of work annually (Shiva, 1995). In addition, millions of individuals are employed in NTFP processing and marketing. With the promulgation of Wildlife protection Act, access to collection of NTFP and fishing has been prohibited in some states causing deteriorating relationship between forest department and forest users group. However, some states have given free access to a number of NTFP collection and fishing. These primarily include fodder grasses, dry and fallen twigs and branches, leaf litter and leaves and where available mushrooms, edible tubers, flowers, fruits and medicinal herbs. But more valuable NTFP are excluded from free access (e.g. cashew nuts, bamboo and fibrous grasses) (Sarin *et al.* 1998). In addition, local communities do not get the full incomes they should from NTFP. They often get only collection charges even for products that have a very high market value. There are also products for which appropriate prices have not been set in the market. Sometimes marketing channels do not even exist. The market price for the NTFP, or the profits from products goes to middleman contractors, traders, industry etc. The Burdwan District is one of the biodiversity-rich forest regions of West Bengal, India, and limited information is available on the NTFPs of this region. Therefore, this study was undertaken in selected villages encompassing Kanksa Forest Division(KFD), Burdwan District with the following objectives as mentioned in box 1.

Box 1: Objectives of the study

- To prepare an inventory of the NTFPs extracted in the region.
- To estimate the quantity of NTFPs extracted by locals and the Forest Department.
- To estimate the income derived from NTFP gathering.
- To assess the livelihood dependency of the local people towards NTFPs.

MATERIAL AND METHODS

The Study Areas

The study was undertaken in fourteen villages (S1-S14; Lauhaguri, Dangal Majhpara, Chugho Bagan Para, Baganpara Majhpara, Dangal Mahalipara, Sundar Gram, Dangal, Baganpara, Piyarigajj, Sayer (Balarampur), Kherobari, Lohakonda, Kalikapur, Chitatandi) of Kanksa Forest Division. The adjoining areas of the fourteen study sites had a large population dependent on the forests for NTFPs. All these study sites depended on dry deciduous forests.

Background study

A preliminary survey was conducted to gather information on the geographic area of villages, occupation pattern, and other socio-economic aspects of the households. The interaction was held with officials, local political leaders, and local people to explore issues, challenges and opportunities of NTFP in the district. Apart from this, consultation with civil society organizations, business organization and Industry, district chapter was conducted to identify problem and opportunities of this sector. Similarly, key informant interview was conducted with selected community leaders, traders, collectors at the various study sites.

Questionnaire survey: A questionnaire survey was conducted to collect information on following issues- a) diversity of NTFPs extracted, the parts used, their end-uses as well and b) quantity of NTFPs gathered per typical trip and quantity collected in a season.

Secondary data was collected from DFO and local entrepreneurs at two clusters including research undertaken through different texts. Quantitative data were analyzed using descriptive statistics. Revenue and volume of NTFPs was analyzed on excel form to present it on the trend chart. Similarly qualitative data was analyzed through coding and memoing (Punch, 2005). The result was analyzed with livelihood approach to strategic intervention for further implication.

RESULTS:

Diversity and Utilization scenario of different NTFPs

Several NTFPs were found to be extracted in the different study sites of KFD of Burdwan District. (Table-1). 23 major categories of non-timber forest products were recorded during survey at the present investigation which includes different forms of Dyes, grass, oil, wax, honey, gum, resin, food items(leaf, fruit, seed, herb, stem),bamboo, broom, basket, cotton, brush, paper, ornamental, worship, marriage rituals, leaves (Sal, Kendu, Datepalm),Sap and Flour.

Survey reveals that among the different grass resources most popularized use of grass resources includes use as rope, roof thatching material and livestock material. Ornamental products were used for preparation of dress material, marriage and other cultural programme purpose. Among the various ornamental uses of NTFPs materials used in marriage rituals reflects higher potential use. Tree species producing oil are much more in use when compared to oil producing grass species. Among the different NTFPs wax, honey, gum, resin, food items such as leaves used as food material; edible herb and fruits reflecting higher potential use in comparison to stem and seed material used as food items. Data obtained during present investigation with respect to the use of bamboo and broom reflects lesser potential use. Among the different forest products cotton, basket, brush and paper reflecting lower potentiality. Kendu/biri leaves, Sal leaves and Date palm leaves reflected positive response as resources. Data obtained with respect to various uses of sap resources includes Date palm sap, fan palm sap and mole fruit sap. Higher positive response in terms of use was recorded in case of mole fruit in comparison to other sap products. Among the different flour resources Botum flour and Durga Flour reflected maximum use among the local stakeholders.

Livelihood dependency, Trade and Business of different NTFPs

Data presented in Table-2 reflects the trade and business scenario of NTFPs at different study sites. A good level of market and trade opportunity is present for sal leaves and mole fruit. There is significant level of outsourcing (0.45%) of NTFPs in the concerned study area. Local stakeholders are significantly dependent upon different types of NTFPs as reflected from the data presented in Table-2. Around 27 family/village and 47 individual persons/village are actively engaged in the business and trade of NTFPs. Results obtained from the different interview response reveals positive response for Sal leaf, processed NTFPs among the concerned study sites. Subdued response were obtained for kendu leaf, mole fruit ,Khuchna , Resin, Flour products. A positive feedback was obtained in relation to direct marketing of NTFPs from interviewees of the different studied sites. Lack of proper management of NTFP products through NGOs and other Government Organizations were found to be totally absent in the study area with respect to marketing, trade and business of NTFPs. Fig 2 depicts The selling price for NTFPs ranges between Rs 1200-1400/-. The rate of selling price were found to be more or less constant among different study sites and were found to be highest for Kalikapur. The income rate per person per day reflects significant variation ranging from Rs 200/- to 600/.

Fig 3 depicts the screeplot of the analysis and Fig 4 depicts the Symmetric biplot of observations (study sites) and Variables (NTFPs resources) derived from MCA in which F1 (35.65%) and F2 (24.99%) axes together explain the most adjusted inertia 60.64%. Fig 5 depicts the Dendrogram plot derived from cluster analysis of study sites based on NTFPs resources. Majority of sites with similar NTFPs distribution include 10 sites (S3, S4, S5, S6, S7, S8, S9, S10, S13, S14).

It was observed (Table 3) that twelve non-timber forest products (NTFP) was used mostly by Smt. Pakur Sen, Smt Rashmani Kisku, Smt Laxmi Soren, Sri Madan Besra, Sri Sukal Murmu which are as follows: Mol Fruit, Date palm sap, Mol fruit sap, Stem, Brush, Grass, Flower, Medicinal, Resin, Basket, Fan-Palm sap, Kendu biri Leaves. Among all the NTFPs, Mol fruit is less used and grass resource as a livestock feeding, mat, rope, etc. are used largely. Smt Laxmi Murmu, Smt Budin Bakshi, Smt Mukhil Murmu, Mungly Soren and Smt Singya Maddi used mostly four number of NTFPs (Kendu biri leaves, Bamboo, Date-palm leaves and Gum).\ Broom, Grass (as thatching) was solely used by Smt. Chobi Murmu, Smt Mungli Soren and Smt Laxmi Soren used NTFP basket resource.Regarding

the usages of NTFP products it was found that these persons depend on the NTFP resources for mostly day to day use. They use grass for livestock feeding, Bamboo for infrastructure building, Kendu biri leaves and various palm saps as a source of income. Apart from these the usages of NTFP resources as ornamental purpose is noted in minimal usage.

Affinity towards these NTFP resources is heterogeneous, i.e., Specific group of people in this study area uses specific types of NTFPs which may be due to their basic need or concerned socio-economic structure of this region. Various problems were identified during our present investigation of selected study sites of Burdwan District which are listed in box 2.

Box 2: Major concerns identified in NTFP Sector of Burdwan District

Lack of market information: information on price, quality and quantity demanded, market to sell the product, and the market chain,

Limited species-specific information such as availability, distribution, productivity, and regeneration potentials.

Lack of infrastructure for storage, value addition and grading of products,

Threats to NTFPs from over-grazing, deforestation and unsustainable harvesting,

Lack of clear policy on collection, trade permits and taxation, and

Lack of capacity with the communities for the better management of NTFPs.

Lack of adequate knowledge about the use potential of NTFPs

Table-1- Author Survey data obtained during field study.

			S1	S2	S3	S4	S5	S6	S7	S8	S9	S10	S11	S12	S13	S14	
NTFP1	Dyes	Plant	No	No	No	No	No	No	No	No	No	No	No	No	No	No	
		Bark	No	No	No	No	No	No	No	No	No	No	No	No	No	No	
		Fruit(Mol Fruit)	Yes	No	No	No	No	No	No	No	No	No	No	No	No	No	
NTFP2	Grass	Mat	No	No	No	No	No	No	Yes	No	No	No	No	No	No	No	
		Rope	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	
		Thatching	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
		Livestock feeding	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes
NTFP3	Oil	Grass	No	No	No	No	No	No	No	No	No	No	No	No	No	No	
		Tree	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
NTFP4	Wax		No	No	No	No	No	No	No	No	No	No	No	No	No	No	
NTFP5	Honey		No	No	No	No	No	No	No	No	No	No	No	No	No	No	
NTFP6	Gum		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
NTFP7	Resin		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
NTFP8	Food	Leaf	No	No	No	No	No	No	No	No	No	No	No	No	No	No	
		Edible herb	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
		Fruit	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
		Seed	No	No	No	No	No	No	Yes	No	No	No	No	No	No	No	
		Stem	No	No	Yes	No	No	No	No	No	No	No	No	No	No	No	
NTFP9	Bamboo		No	No	No	No	No	No	No	Yes	No	No	No	No	No		
NTFP10	Broom		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes		
NTFP11	Cotton		No	No	No	No	No	No	No	No	No	No	No	No	No		
NTFP12	Basket		Yes	Yes	Yes	No	No	No	No	Yes	No	No	Yes	No	No		
NTFP13	Brush		Yes	Yes	Yes	Yes	No	No	No	No	No	Yes	Yes	No	No		
NTFP14	Paper		No	No	No	No	No	No	No	No	No	No	No	No	No		
NTFP15	Ornamental	Dressing	No	No	No	No	No	No	No	No	No	No	No	Yes	No	No	
		Marrige	No	No	No	No	No	No	No	No	No	No	No	Yes	No	No	
		Cultural programme	No	No	No	No	No	No	No	No	No	No	No	Yes	No	No	
NTFP16	Worship		No	No	No	No	No	No	No	No	No	No	No	No	No		
NTFP17	Marrige rituals		Yes	Yes	Yes	Yes	No	No	No	No	No	No	No	No	No		
NTFP18	Medicinal		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes		
NTFP19	Shorea Sp leaves		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes		
NTFP20	Kendu/Biri leaves		No	No	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes	No	Yes	Yes		
NTFP21	Date palm leaves		Yes	Yes	No	No	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes		
NTFP22	Sap	Date palm	No	Yes	No	No	No	No	No	No	No	No	No	No	No		
		Fanpalm	No	No	No	No	No	No	No	No	No	No	Yes	No	No		
		Molefruit	Yes	No	No	No	No	No	No	No	No	No	Yes	No	No		
NTFP23	Flour	Durga	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes		
		Peyali	No	No	No	No	No	No	No	No	No	No	No	No	No		
		Botum	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes		

Table-2 Descriptive statistics of various measured variables related to NTFP survey in the study site.

	Minimum	Maximum	Mean	Standard deviation (n-1)
AGE_PER	18	62	40.28	13.06
N_OUT (%)	0	0.7	0.45	0.2
N_SELL_SHO	1000	1500	1164.28	121.57
N_SELL_MOL	0	300	42.85	108.94
N1_TRD_FAM	10	50	26.57	14.46
N1_TRD_PER	20	100	46.71	26.98
N2_TRD_FAM	10	50	25.14	12.87
N2_TRD_PER	20	100	48.14	26.55

Age-AGE_PER, NTFP outsourcing(%)- N_OUT(%), NTFP Selling price(Rs)[Shorea leaf Rs/thousand]- N_SELL_SHO, NTFP Selling price(Rs)[Mole fruit Rs/Kg]- N_SELL_MOL, NTFP trade involved Family(village)- N1_TRD_FAM, NTFP trade involved Person(village)-N1_TRD_PER, NTFP actual trade Family(village)-N2_TRD_FAM, NTFP actual trade Person(village)-N2_TRD_PER

Fig 2: Line diagram representing economic outputs of NTFPs through purchase and selling in different study sites

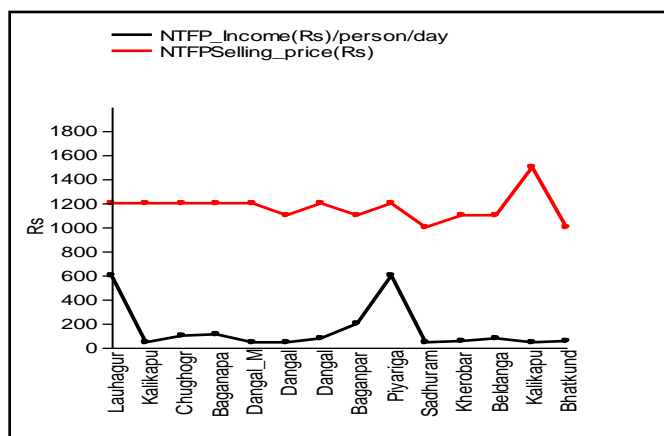


Fig 3: Scree Plot of F1 to F7 axes derived from MCA

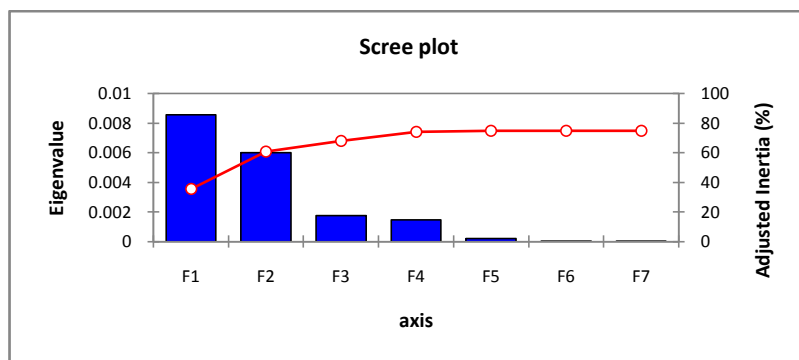


Fig 4: Multiple correspondence analysis of various NTFP resources (Red dots) in the study sites (Blue dots)

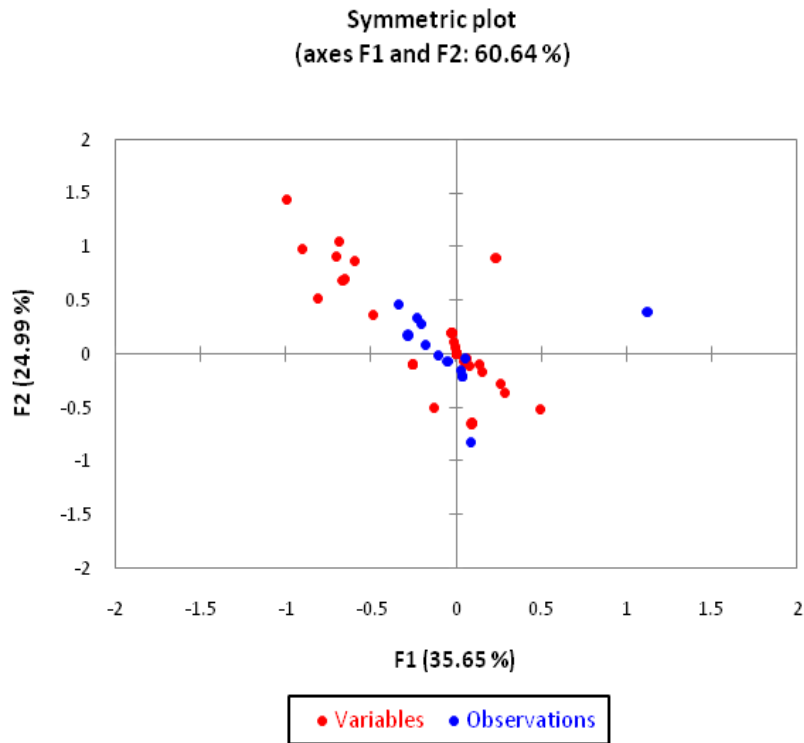


Fig 5: Dendrogram plot derived from AHC analysis of study sites based on NTFPs resources

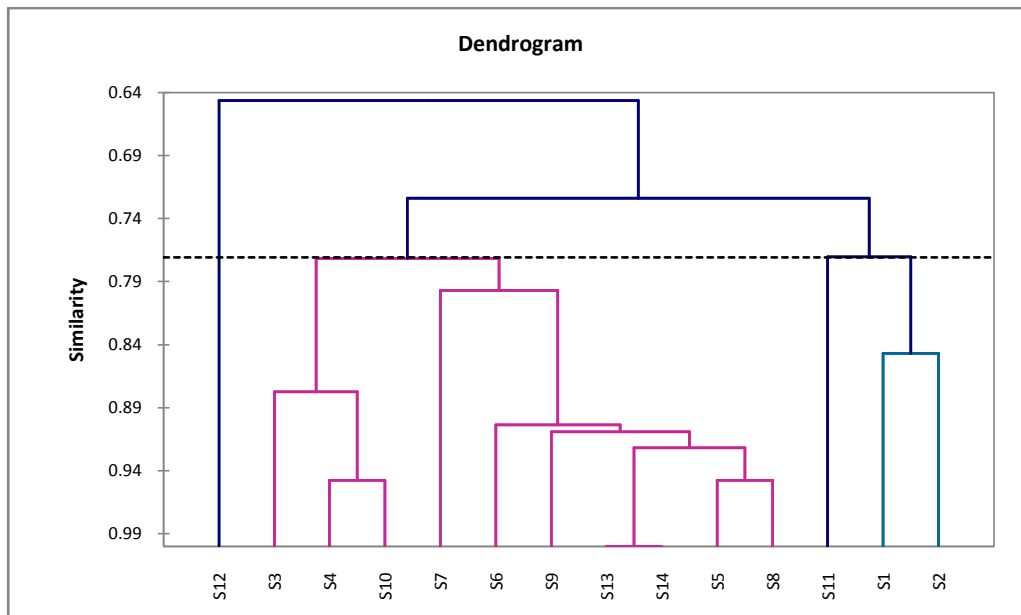


Table 3: Survey of representative on NTFPs utilization during the study period.

		IF1	IF2	IF3	IF4	IF5	IF6	IF7	IF8	IF9	IF10	IF11	IF12	IF13	IF14
Q1	Name	Smt Pakur sen	Smt Rasmani Kisku	Sri Madan Besra	Sri Sukal Murmu	Smt Laxmi Murmu	Smt Chabi Murmu	Smt Singya Moddi	Sri Som moddi	Smt Budin Baski	Smt Mungli Soren	Smt Laxmi Soren	Smt Lakshi Soren	Smt Moongli Soren	Smt Mukhi Murmu
	Village	Lauhaguri	Dangal Majhpara	Chugho Bagan Para	Baganpara Majhpara	Dangal Mahalipara	Sundar Gram	Dangal	Baganpara	Piyarigajji	Sayer(Balarampur)	Kherobari	Lohakonda	Kalikapur	Chitatandi
Q2	Address	Post	MolanDighi	Bankati	Molan Dighi	Bankati	Bankati	Bankati	Bankati	Bankati	Kota	Bankati	Chotoramchandrapur	Moukhira	Gar
	Police station	Kanksa	Kanksa	Kanksa	Kanksa	Kanksa	Kanksa	Kanksa	Kanksa	Kanksa	Budbud	Kanksa	Aushgram	Aushgram	Aushgram
Q3	Age/Sex	43F	45F	45M	27M	55F	39F	62F	45M	42M	55F	28F	20F	40F	18F
Q4	Forest name	Garjantal	Kuthiban	Garjantal	Garjantal	Kuthiban	Dangalban	Dangalban	Garjantal	Piyarigajiban	Sadhuram Puban	Garjantal	Beldangan	Kuthiban	Bhatkunda
Q5	Location	Lauhaguri	Kalikapur	Chughogram	Baganapara	Dangal Mahalipara	Dangal	Dangal	Baganpara	Piyarigajji	Sadhuram	Kherobari	Beldanga	Kalikapur	Bhatkunda
Q6	NTFP	Shorela leaf	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	Kendu leaf	No	No	No	No	No	No	No	No	No	Yes	No	No	No	Yes
	Mole fruit	No	No	Yes	Yes	No	No	No	No	No	Yes	Yes	Yes	No	No
	Khuchna	No	No	Yes	Yes	No	No	No	No	No	No	No	No	No	No
	Resin	No	No	No	No	No	No	No	Yes	No	No	No	No	No	No
	Flour	No	No	No	No	No	No	No	No	No	No	Yes	Yes	No	No
	Other	No	No	No	No	No	No	No	No	No	No	No	No	No	No
Q7	NTFP amount/day	Shorela leaf(Bag)	1	1	1	1	1	1	1	1	1	1	1	1	1
	Kendu leaf	0	0	0	0	0	0	0	0	0	-	-	-	0	-
	Mole fruit(Kg)	0	0	-	5	0	0	0	-	0	-	-	-	0	-
	Khuchna(100gm)	0	0	-	500	0	0	0	-	0	-	-	-	0	-
	Resin(100gm)	0	0	0	0	0	0	0	-	0	0	0	-	0	-
	Flour	0	0	0	0	0	0	0	0	0	0	0	-	0	-
	Oth	0	0	0	0	0	0	0	0	0	0	0	-	0	-
Q8	NTFP sell	Direct	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	Processed	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Q9	NTFPselling price(Rs)	Shorela leaf Rs/thousand	1200	1200	1200	1200	1100	1200	1100	1200	1000	1100	1100	?	1000
	Kendu leaf Rs/ Kg	0	0	0	0	0	0	0	0	0	-	-	-	-	-
	Mole fruit Rs/Kg	0	0	300	300	0	0	0	?	0	-	-	-	-	-
	Khuchna Rs/100gm	0	0	10	10	0	0	0	0	0	0	-	-	-	-
	Resin Rs/100gm	0	0	0	0	0	0	0	100	0	0	-	-	-	-
	Flour Rs/100gm	0	0	0	0	0	0	0	0	0	0	-	-	-	-
	Other	0	0	0	0	0	0	0	0	0	0	-	-	-	-
Q10	NTFP Sell price fluctuation(weekly/monthly)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Q11	NTFP Sell price fluctuation(Seasonal)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Q12	NTFP Income(Rs)/person/day	600	50	100	110	50	50	75	200	600	50	60	80	50	60
Q13	NTFP Income(Rs)/person/Month	18000	15000	3000	3300	1500	1500	2250	6000	18000	1500	1800	2400	1500	1800
Q14	NTFP persons/Family	1	1	1	2	2	1	1	2	2	1	1	2	2	1
Q15	NTFP trade involved	Family	26	50	50	31	14	10	20	20	50	15	36	15	20
	Person	45	100	30	55	29	20	35	40	100	25	75	25	25	50
Q16	NTFP actual trade	Family	26	50	30	31	14	10	20	20	50	15	36	15	20
	Person	45	100	50	55	29	20	35	40	100	25	75	25	25	50
Q17	NTFP market	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Q18	NTFP outsourcing	No	0%	50%	45%	44%	52%	50%	50%	45%	60%	50%	60%	70%	55%
Q19	NTFP Gos/NGOs grants	No	No	No	No	No	No	No	No	No	No	No	No	No	No
Q20	SHG(NTFP)	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

DISCUSSION

Forest and forest resources, primarily NTFPs, play an important role in the viability and survival of forest dwellers in India because of the importance of forests in their social, cultural and economic survival Status of NTFPs in livelihood strategies of forest households is highlighted by the very favorable income returns time spent in collection and stability of income from NTFPs (Yamada *et al* 1997).

The relationship between local people and NTFPs in the present study the wealth of indigenous knowledge on the different aspects of plant utilization in the concerned study sites. Indigenous knowledge plays an important role in

the extraction of NTFPs (Narendran *et al* 2001). Forest foods are often important for poorer groups of rural areas. They provide an available and accessible source of a diverse range of food. These forest foods have comparable nutritional quality with domesticated varieties. They do significantly supplement the overall diversity and nutritional quality of rural people's diets (Falconer and Arnold,1991). Women are much involved in the NTFP gathering, processing and commercialisation, which indicates that the potential is there for NTFP related activities to empower them and raise their status in the household and in the community at large. CIFOR research has shown that women represent more than 94 % of traders operating in rural and urban markets in Cameroon (Ndoye *et al* 1997). In Ghana, women coordinate 85 % of the chew-stick trade. In South Africa, women carry out more than 80 % of the harvest and trade of umemezi (*Cassipourea flanaganii*) (Sunderland *et al* 2004). During our present investigation at various study sites of Burdwan district we observed several forest food items similarly contributing towards the dietary, economic gain of the tribal people. Although there are diverse group of products present in the concerned study sites such as sal leaf, kendu leaf, datepalm leaf, oil, wax, honey have a good market value, income through commercialization of such species was very low due to inadequate market information. The local community were unaware about the possibility of selling their forest products. Nevertheless some of the products such as different food items, bamboo broom sticks, cotton, brush, paper, oil yielding grass and tree species, ornamental, sap and flour resources were used and sold in the market in small scale.

In general, the diverse group of NTFPs were used mainly for local subsistence and less used for trade, income generation and livelihood improvement. Our findings were similar with earlier findings of Uprety *et al* (2010) in Bardiya District of Nepal. During our present study it was found that the rural people specially tribal communities in Burdwan District in and around the selected study sites utilizes and trades several NTFPs in different ways but without paying adequate attention to their conservation. Also there is possibility of overharvesting of the nontimber forest products. It is generally accepted that NTFP harvesting tends to maintain forest cover, particularly when compared with other alternative land uses (Ruiz Pérez *et al* 2005). The effects on biodiversity are variable; NTFP based activities generally maintain a substantial amount of the species naturally occurring, although it certainly affects them, especially those most sensitive to human presence or those which are also collected in parallel with the commercial gathering of the main NTFPs (Ticktin, 2004). This extraction can also seriously affect the populations being exploited, particularly in the context of wild gathering and market expansion. The promotion of commercial uses of NTFPs can then be viewed as a double-edged sword, with potential and risks.

The socioeconomic data of the present investigation reveals (revealed from the response of interviewees) that most of the people in the seven study sites engaged with NTFP collection, harvesting, processing etc belongs to tribal community and below the below poverty level (BPL). Therefore they are very much dependent upon these NTFPs for maintaining their daily livelihood. The dependency of the people on the NTFPs ranges from highly preferred sal leaves, kendu leaves to widely use edible plant species and grass species. Food plants are usually an important category for the native people, as shown in other studies which include Rossato (1999) in Atlantic Forest Coast of Brazil; Gemedo-Dalle *et al* (2005) in Ethiopia; and Mbuvi and Boon (2009) in Kenya.

There is no doubt that NTFPs play a critical role in providing subsistence and cash income to a large proportion of the world's population (Pimentel *et al* 1997). Studies from all tropical regions indicate that it is often the poorest households in rural communities that are most directly dependent on NTFPs (Marshall *et al* 2005). In Bardiya district of Nepal, the gathering of NTFPs is a source of employment and livelihood for the local population (Shrestha *et al* 2003). But in present study the local people were found less aware about the market value of many species and therefore not able to generate significant income from NTFPs though they offer huge opportunities. Therefore, the identification and prioritization of the species were carried out for the management and commercial purpose. It can guide the NTFP related activities in the region and provide choices to the communities. Also inappropriate market development for different NTFPs in the concerned study also adds to the poverty factor of local stakeholders. NTFP collectors harvest forest products for various destinations: local direct consumption or home industry, local traders, regional industries, middlemen involved in large trade chains – often for export markets– or official concessionaires. This variety of destinations makes it difficult to draw general conclusions about the modes of benefit distribution between the different parties involved. Some local and still “traditional” collection organizational setups remain very unbalanced with patrons drawing the largest share of the economic benefit and redistributing only some mere social benefits for local stakeholders. However, an effective marketing information system is required to motivate and aware NTFP collectors about their products, and also to increase their bargaining power to obtain better prices for their products (Karki, 2003). Under the right circumstances, these values can be translated into incentives for conservation of the habitats in which NTFPs are found (Hamilton, 2004) and thereby ensure ecological sustainability of the resources to some extent (Uprety, 2008).

From a marketing point of view, NTFPs represent one of the most challenging groups of products because of their number, versatility, end use variation, dissimilarities of the producer base and resource richness (Lintu, 1995). Due

to lack of resources in district forest office, the effective monitoring and generating species-specific information is not possible (DFO pers comm). The policy and regulatory environment for conservation and commercialization of NTFPs has been criticized as being ambiguous and ineffective, supporting previous findings (Kunwar *et al* 2009). It is therefore important to develop sound and sustainable strategies to mainstream NTFPs into the modern economy, while guaranteeing their accessibility to local communities. However, as the development of NTFPs increases, there is a danger of unsustainable exploitation; increasing demand can lead people to disregard traditional sustainable harvesting techniques. The management of NTFPs, especially their income and employment generation functions, must not ignore the local indigenous knowledge, the ecological impacts of NTFPs extraction, the development of appropriate small-scale enterprises and cooperatives for collecting, processing, marketing, monitoring, and sharing of rights and benefits. The existing channels for the flow of conservation related information varies from place to place.

CONCLUSIONS AND RECOMMENDATIONS

It is clear that NTFPs as a group, contribute more than timber to domestic and international economies. There is potential to further increase income from NTFPs in the forest zones studied, especially the moist deciduous forest zone, given that there are more species that could yield NTFPs and contribute to household income. However, restraint needs to be exercised in the harvest of NTFPs, as unsustainable extraction practices may develop due to increasing demand, causing communities to disregard traditional harvest techniques. Conversely, faulty techniques of harvest may result in loss of natural stock and affect regeneration.

Improving the marketing strategies and incomes of rural dwellers involved in NTFP production and commercialization is an important task in line with the Millennium Development Goals (MDGs). This can be achieved by stimulating cost effective small-scale forest based enterprises that will use labour intensive technologies based on selected NTFPs. Strategies may include: carrying out feasibility studies on NTFPs based enterprises and discussing with communities about various options and their profitability, training local communities (including minorities and women) on how to commercialize their products by assisting them to take advantage of selling opportunities in distant markets, how to analyze and capitalize on market trends, how to take advantage of commodity chain analysis and how to employ strategies such as vertical and horizontal integration.

In order to avoid the drastic consequences mentioned above, information about NTFP yields as well as extraction rates needs to be generated for taking decisions on whether a given practice is sustainable or not in the long run. Research is also required on the ecological aspects of NTFPs such as distribution, regeneration pattern, growth rates, yield in different forest types and silvicultural techniques for managing multiple products. The extraction and utilization rates over time and different seasons need to be assessed over a period to identify trends or patterns in yield and use of NTFPs. Research is also required on various harvest mechanisms as such knowledge will ensure sustainable harvest of resources, which in turn can contribute to the economic well-being of the people and involve them in the conservation of biodiversity. However, NTFP activities should be based on participatory planning and management, as socio-cultural issues play an important role in the sustainability of the NTFP resource base.

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