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Changing Dependence of Tribal Communities on Forests for Food and Livelihood in Kandhamala District of Odisha

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ABSTRACT

The present study aimed at estimating the relative income from Non-timber forest products (NTFPs) in resource users' households and assessing the factors that influence this dependence. Using multi-stage random sampling method a total of 64 sample respondents were selected Tumudibandha block of Kandhamala district of Odisha. The results indicate that the landless (72.53 per cent) are dominant in the study area followed by marginal farmers (27.47 per cent with holdings of an average of 0.88 and 0.60 hectares of forest and revenue lands respectively. NTFP sector was the major employment-generating activity constituting 37 per cent (132 man-days) of the total days of employment. The extraction pattern of the NTFPs showed that there was a significant difference in the rate of extraction of NTFPs and also the number of days spent in the collection of each of these products. Out of the six NTFPs extracted from the forest, a few NTFPs make up a sizable proportion of household income. Mahula is the most important NTFP in terms of income which contributed 66 per cent for the collectors followed by Siali leaves (11 per cent), Harida and Bahada (10 per cent), Sal (8 per cent), Kendu (3 per cent), Chakunda (2 per cent). Villages operational under JFM (Joint Forest Management), CFM (Community Forest Management)/ CFR (Community Forest Rights) categories have different levels of dependence on forest. They take care of the forest on the basis of mutual trust and jointly defined duties and responsibilities. CFM has led to the regeneration of vast areas of degraded forest patches in the village.

Keywords: Kondhs, NTFPs, JFM, CFM, CFR
JEL: L73, O13, P32, Q23,

I

INTRODUCTION

Kondhs are a popular tribe in the Kandhamal district consisting of 53.6 per cent population of the district. The district has 68.18 per cent forest cover. Non-timber forest Products (NTFPs) include all biological materials other than timber, which are extracted from forests for human use (De Beer and McDermott, 1989). It is estimated that 90 per cent of the world's poor depend on forests for at least a portion of their income (Scherl *et al*., 2004). Understanding the socio-economic contribution of NTFPs necessitates the identification of factors that affect dependency on the NTFPs by the local people. The present study aims to estimate the relative NTFP income in resource users' households and assess the factors that influence this dependence. The dependence of households on forest-based income was measured by determining the relative income of forest-based income to the total income of households.

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In India, over 50 million people depend on NTFPs for subsistence and cash income (Hegde *et al.,* 1996). This provides 50 per cent of the household income for 20-30 per cent of the rural population particularly for tribal. Potentially around 3000 species of forest products are found to be useful, but only 126 have developed marketability (Maithani, 1994). About 50 per cent of the forest revenues and 70 per cent of the forest-based export income of the country come from NTFPs. Thus, it can be inferred that NTFPs form one of the mainstays of income and sustenance for many tribal communities. The collection of NTFPs by the tribals was primarily for meeting their subsistence needs. Over time, these NTFPs acquired commercial value resulting from huge trade transactions and income levels due to rising demand. Trade in NTFPs can act as an incentive for forest conservation by providing a source of income from resources that might otherwise appear to have little financial value.

Forest-based small-scale enterprise represents an opportunity for employment for rural, tribal, and marginalised groups which are based mainly upon the collection and processing of NTFP. Most NTFPs are by-products or end-products such as seeds, fruits, and leaves which may otherwise go as waste if not collected at the appropriate time. Since the early 1990s, non-timber forest products (NTFPs) have received increased attention for sustainable forest use and poverty alleviation. The potential of NTFP exploitation as a way to sustainable forest management was primarily based on the assumption that the commercial extraction of NTFPs from natural forests could simultaneously serve the goals of biodiversity conservation and poverty alleviation.

The proponents of the NTFP strategy' pointed to the benefits of NTFP exploitation for local communities, such as goods (food, fodder, fuel, medicine, construction material, and small wood for tools and handicrafts), income, and employment. Compared to timber, harvesting NTFPs seemed possible without major damage to the forest and its environmental services and biological diversity. Keeping in view this background, the present study has been undertaken with the following specific objectives : (i) To study the changing dependence of tribal communities on forests for food and livelihood security under changing market conditions. and (ii) to understand how the dependency on forests varies under different forest management/governance regimes {JFM (Joint Forest Management), CFM (Community Forest Management)/ CFR (Community Forest Rights), and others}.

II

MATERIALS AND METHODS

Method of Investigation

Multi-stage sampling method was used for the present study. Kandhamala district with the largest population of the Kondhs tribe was purposively selected. Among the blocks, the Tumudibandh block was selected randomly. The respondents were selected based on a proportionate random sampling method. A total64 respondents were selected for the study.

Selection of the Study Area

The research work was carried out in the Tumudibandha block of Kandhamala district. The selection of the study area, however, was based on the following main considerations: (i)The study area had abundant NTFPs as a major livelihood option. (ii) Kandhamala has a dominant tribal population (53.6 per cent) with a higher dependence on forests for food and livelihood. (iii) The district showcases the existence of various management regimes like JFM, CFM, and CFR.

Joint forest management (JFM) is the concept of developing relationships between fringe forest groups and forest departments on the basis of mutual trust and jointly defined roles and responsibilities for forest protection and development. Community forestry management (CFM) is an evolving concept of forest management whereby the local community plays a significant role in forest management and land use decision-making by themselves in the facilitating support of government as well as change agents. The Community Forest Right (CFR) provides for recognition of the right to "protect, regenerate or conserve or manage" the community forest resource.

Data Collection

Method of Data Collection

The study is conducted for field-level primary data and the researcher involved himself in the collection the data required for the study by the following three methods: (i) direct observation, (ii) interviewing respondents (iii) records kept by respondents.

Analytical Tools and Techniques Used

Descriptive Statistics

Descriptive statistics (Mean, standard deviation, etc) 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 of the study area.

III

RESULTS AND DISCUSSION

Table 1 revealed that the average size of a family is 4 where the male and female along with two children on average complete the family. It was found that the maximum number of respondents had medium-sized families. It was revealed that the highest percentage of small and medium families constituting a total of 96 per cent may be due to the early marriages that are predominant in the tribal communities.

After their marriage, they live independently forming a nuclear family. Similar trends were also observed by Prakash (2003) and Gubbi and Macmillan (2008). However, the formation of the nuclear family depends on the level of education and employment (Parvathamma, 2004).

TABLE 1 SOCIO-ECONOMIC PROFILE OF THE TRIBAL COMMUNITY

Socio-Economic Characteristics	Kandhamaladistrict(surveyedvillages)	
	Number	Percentage
(1)	(2)	(3)
Size of the family (average)	4.30	
a. Adult males	1.20	27.91
b. Adult females	1.00	23.26
c. Children	2.10	48.84
Age of the head of the household (years)	64	
18-40	37	57.81
41-60	23	35.94
61-80	4	06.25
Literacy level of the households	148	
a. Adult males	43	29.05
b. Adult females	33	22.30
c. Children	72	48.65
Size of the landholding(ha)	1.48	
a. Forest land	0.88	59.46
b. Revenue land	0.60	40.54
Livestock(average)	7.50	
a. poultry	3.30	44.00
b. Piggery	6.90	92.00
c. Goat	5.0	66.67
d. Bullock	1.50	20.00
e. Cow	1	13.33

Landholding

Out of the total 64 surveyed tribal households, the landless (72.53 per cent are dominant in the study area followed by marginal farmers (27.47 per cent with holdings of an average of 0.88 and 0.60 hectares of forest and revenue lands respectively thus, indicating the dependence on the encroached forest lands for agriculture and revenue land for carrying out other activities. In fact, they own livestock because the rights to these lands are only usufruct.

Respondent's Involvement in Different Sectors

The tribals meet the food and income needs from the collection of NTFPs, wage-earning, agriculture, livestock rearing and services, and allied activities. Table 2 indicates that all tribal households are traditionally involved in NTFP collection. In addition, tribals also depend on wage earning (46.88 per cent) followed by agriculture (39.06 per cent), services and allied activities (34.38 per cent), and livestock rearing (18.75 per cent) whereas (28.13 per cent) of the respondents are jobless. In conclusion, NTFPs are San important activity in terms of labor contribution.

TABLE 2. SAMPLE RESPONDENTS IN DIFFERENT SECTORS

(per cent)

Activities	Number of respondents	Percentage
(1)	(2)	(3)
NTFPs	64	100
Agriculture	25	39.06
Livestockrearing	12	18.75
Wageearning	30	46.88
Servicesandalliedactivities	22	34.38
Jobless	18	28.13
Mean	28.5	
SD	18.44	

Employment Details

In the surveyed villages on average, the villagers spend 132 man-days for the collection of NTFPs and 112 man-days for agriculture (Table 3).

TABLE 3. EMPLOYMENT DETAILS OF RESPONDENTS' IN SURVEY AREA OF KANDHAMALA

(*man-days per year*)

NTFP	per cent of total	Agriculture	Per cent of total	Farm labour	Per cent of total	Others	Per cent of total	Jobless	Per cent of total
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
132	37	112	31	23	6	23	6	71	20

Income Pattern

Table 4 indicates the income pattern of villages working under various management regimes. On an average the collection of Mahula species from forests provides the highest income (Rs. 4048) to the villagers followed by Harida and Bahada (Rs. 1384) over the years. Sal provides an income of Rs. 1085 followed by siali (Rs. 233). Kendu provides an income of Rs. 194 followed by Chakunda. No income was evident from Bhalia and Charkoli. The villagers realised a good source of income by selling these species at a higher price in the local market. Harida is sold at the rate of Rs. 5 per kg, and Bahada at the rate of Rs. 4 per kg. The price of Mahula for the year 2014-16 was Rs. 28 per kg and Siali leaves were sold at the rate of Rs. 12

TABLE 4: INCOME PATTERN OF THE VILLAGE BY COLLECTION AND SELLING OF NTFPS

(Rs.)

Species	JFM Village Sitapadi	CFM Village Indrimilla	CFR Village Kehelguda	Control Village Biringia
(1)	(2)	(3)	(4)	(5)
Harida and Bahada	1384	430	0	352
Mahula	4048	3967	2975	3623
Siali leaves	233	0	2157	0
Sal	1085	0	576	129
Kendu	194	0	89	437
Chakunda	81	475	0	0
Bhalia	0	0	0	0
Charkoli	0	0	0	0
Mean	878.13	609	724.63	567.63

per chakki (1 chakki = 50 leaves), Sal seeds are sold in packets (1 packet = 50 kg) and each kg of sal seeds costs Rs. 5. Sometimes villagers buy rice from the market in exchange for some packets of Sal seeds. Sal leaves in the nearby market are sold at the rate of Rs 10 per chakki (1 chakki = 50 leaves). Sometimes officials from TDCC, and DABUR also come to the village to purchase the products in lots; 2-3 members of each household of this village go to the forests to collect the species. They spend 6-7 hours daily for the said purpose. 2-3 members of each household of this village go to the forests to collect the species.

In Indrimilla village, the highest income is obtained from the collection and selling of Mahula (Rs. 3967) followed by Chakunda (Rs. 475). Harida and Bahada were sold at a good price which gave an annual income of Rs. 430 per house in the village. The mean income in 2014-16 was estimated to be Rs. 609.

In Kehelguda village, Mahula species provided the highest income per household in the village (Rs. 2975) followed by Siali leaves (Rs. 2157). Mahula was sold at the rate of Rs 25 per kg while silai leaves were sold at the rate of Rs. 12 per chakki where 1 chakki includes 80 leaves. The sale of Sal and Kendu leaves fetched an income of Rs 576 and Rs 89 respectively. Sal seeds were sold for Rs 8 per kg in the local Sirla market. Kendu leaves are collected by the locals for only four days a year. Harida and Bahada were not collected by the villagers in the last two years as these species could not be located in the forest area nearby. There has been no change in income due to the species like Chakunda, Bhalia, and Charkoli as these species are not present in the forests. Some households sell hill brooms at the rate of Rs. 50 per broom.

Biringia village is taken care of by the local residents. No management regime is active here. The villagers go to the village for 4-5 hours daily to collect the species in the natural seasons. For the last two years selling Mahula has given a good source of income to the villagers. Mahula has provided an income of Rs. 3623 by selling it at the rate of Rs 25 per kg followed by selling Kendu leaves at the rate of Rs 60 per keri per household in the village. This gave an additional income of Rs 437 to the villagers. During the years 2014-16, species like kendu, harida, bahada, sal, etc. added an extra benefit to their income. Harida and Bahada were sold at the rate of Rs 3 per kg each respectively. Sal seeds were sold at a rate of Rs 4 per kg and an additional income of Rs 129 was obtained per household. Improper road facilities impede their access to the nearby market which dissuaded these villagers from collecting more variety of species from the forests in spite of their availability of diverse species in these forests.

The Average Change in the Income

Table 5 gives a clear idea of the average change in the income pattern of all four villages. A marginal change in the income pattern was observed in the sample villages where each village has quoted a rise in income due to an additional source of income from the collection of NTFPs from forests. The village under JFM has

TABLE 5: AVERAGE CHANGE IN INCOME PATTERN OF THE SAMPLE VILLAGES

	The average change in income over years (in Rs.)	
Sample villages	2012-14	2014-16
(1)	(2)	(3)
Village under JFM (Sitapadi)	7106.5	12666.88
Village under CFM (Indrimilla)	3805.563	6017.938
Village under CFR (Kehelguda)	990.625	2725
Control Village (Biringia)	2094.375	5610
Mean	3499.265625	6754.953125
Standard Error	1334.570876	2102.487656
Median	2949.96875	5813.96875
standard deviation	2669.141751	4204.975312
Sample Variance	7124317.688	17681817.38
Kurtosis	0.477060205	2.357389218
Skewness	0.995877948	1.248811368
Range	6115.875	9941.875
Minimum	990.625	2725
Maximum	7106.5	12666.875

recorded the highest change in income where an additional of Rs 5560.38 was credited to each household followed by an average of Rs 2302.38 for the village under CFM. The village which is taken as control has observed a rise in the amount of Rs 3515.63 followed by Rs 1734.38 for the village under CFR. Of all the four villages surveyed the village working under JFM i.e., Sitapadi has obtained the highest income (Rs12666.88) in comparison to all the other three villages as more number of people in this village are involved in the process of collection of the NTFPs. They are actively involved in the daily collection during the morning and evening hours and selling in the nearby market on weekdays. The village under CFM i.e., Indrimilla has also recorded an increase of Rs 2212.375 in the last two years. The households of the village under CFR have recorded the lowest increase in income as compared to the other three villages. This is due to less collection of species from the forests. Each household of the Village Biringia has recorded an increase in Rs 3515.63 in the last two years as compared to the year 2012-14. The mean annual income of the villages is found to be Rs. 6754.96 and S.D. 4204.98.

In the year 2012-14, 41 per cent of the total income by the selling of NTFPs was obtained by selling Mahula whereas in the year 2014-16, this increased to 66 per cent. For Mahula there has been an increase of 25 per cent. In the case of selling Harida and Bahada, there has been a decrease in the overall income percentage. In 2012-14, 28 per cent of the income was contributed by these species whereas in 2014-16 this sector contributed only 10 per cent. There has been an increase in the contribution of Sal to income from 3 per cent to 8 per cent in the years 2012-14 and 2014-16 respectively. The percentage of income obtained from Siali leaves has increased from 1 per cent to 11 per cent during the last two years. During the year 2012-14, 23 per cent of income was contributed by Charkoli which was reduced to 0 percent in 2014-16. This is mainly due to the non-availability of the species in the nearby forests. Chakunda contributes 2 per cent whereas Kendu contributes 3percent

to the income pattern. Overall, Mahula emerges as the highest source of income for the villagers thereby providing 66percent of the total income from it followed by the selling of Siali leaves (11per cent. The income obtained by selling of Harida Bahada has decreased for the years 2014-16 in comparison to 2012-14. In the years 2012-14, selling of Charkoli was a good source of income which has not added a penny to the income obtained in 2014-16. The rest of the species (Sal, Kendu, Chakunda) have added some profit to the income.

Collection of NTFPs

The respondents of all four surveyed villages mostly opt for species like Mahula (*Madhuca indica*), Harida (*Terminalia chebula*), Bahada (*Terminalia bellerica*), Sal (*Shorearobusta*), Bhalia (*Semecarpusanacardium)*, Kendu (*Diospyrous melanoxylon*), and siali (*Bahuniavariegata*) (Table 6). These species are available in plenty in most of the villages and accessibility to the forest areas is also good. Hill brooms are also obtained from some villages but they are not sold in the market as the number of brooms obtained varies between 2-4.

TABLE 6: MAJOR NTFPS IN THE STUDY AREA

Sl. No. (1)	Oriya Name (2)	Scientific Name (3)	Family (4)	Parts collected (5)	Season of Availability (6)	Harvesting Method (7)
1.	Mahula	*Madhucaindica*	Sapotaceae	Flower	Mar-Apr	Dropping
				Seed	June-July	Plucking
2.	Harida	*Terminaliachebula*	Combretaceae	Fruit	Oct-Jan	Plucking
3.	Bahada	*Terminaliabellerica*	Combretaceae	Fruit	Oct-Jan	Plucking
				Toothstick	All-season	Cutting
				Leaf	May-Feb	Plucking
4.	Sal	*Shorearobusta*	Dipterocarpaceae	Seed	Aug-Sept	Dropping
				Resin	Allseason	Scrapping
5.	Bhalia	*Semecarpusanacardium*	Anacardiaceae	Fruit/Seed	Dec-Jan	Plucking
6.	Kendu	*Diospyrousmelanoxylon*	Ebenaceae	Fruit	Mar-May	Plucking
7.	Siali	*Bahuniavariegate*	Caesalpiniaceae	Leaf	All-season	Plucking

Comparison Between Days Allotted for Collection, Amount Collected, and Quantity Consumed of NTFPs

Table 7 indicate that out of the four sample villages, the villagers of the village under CFR (Kehelguda) give more days for collection of the NTFPs but collect less

TABLE 7: DAYS ALLOTTED AND QUANTITY CONSUMED DURING THE COLLECTION OF NTFPS

Villages	Days allotted for collection of NTFPs (avg.) (2)	Quantity collected (in kg) (3)	Quantity consumed (in kg) (4)
JFMvil.Sitapadi	122.125	122	46.875
CFMvil.Indrimilla	103.9	68.5	19.375
CFRvil.Kehelguda	165.57	118	13.125
CONTROLvil.Biringia	108.87	91	45.875

amount as compared to the people of JFM village(Sitapadi) who collect nearly the same amount of NTFPs as the days spent for collection. In CFM village Indrimilla and control village Biringia, the collection is less as compared to the days allotted for it.

Change in Dependency on Forests Due to the Effect of the Management Regimes

Millions of people live in and near India's forest lands but have no legal right to their homes, lands, or livelihoods. A few government officials have all the power over forests and forest dwellers. The result is both forests and people die. Management regimes like JFM, CFM, and CFR recognise forest dwellers' rights and make conservation more accountable. The schemes include:

- Grant legal recognition to the rights of traditional forest dwelling communities, partially correcting the injustice caused by the forest laws.
- Make a beginning towards giving communities and the public a voice in forest and wildlife conservation.

CHANGE IN DEPENDENCY ON FOREST DUE TO THE EFFECT OF THE MANAGEMENT REGIMES
COMPARISON OF FOREST STATUS

Control village Biringia	**Village under JFM(Sitapadi)**	**Observed change in dependency**
People were cutting trees in large no.s earlier but now they have decreased the practice to some extent. They are understanding themselves the importance of forests and have also started planting some forest species like Bhalia ,Bamboo,Teak etc..	Registered under JFM since7 years(2009). Area under JFM= 127.527 ha.Villagers are collecting the species on daily basis without destroying the trees.	The dependency has increased in case of JFM Village Sitapadi but the condition of forest needs attention for better improvement on sustainable basis.
Control village Biringia People were cutting trees in large numbers earlier but now they have decreased the practice to some extent.They are understanding themselves the importance of forest sandhaveal so started plantings ome forest species like Bhalia,Bamboo,Teak.	**Village under CFM (Indrimilla)** Registered under CFM since 20years (1996). Meetings are held weekly and villagers are given the duty to take care of the forests voluntarily.	**Quantum of change**The dependency on theforesthasdecreasedforest dwellingtribals'aregettingopportunities in variouswagelabourrelatedschemesandaremovingoutofthevillage.
Control village Biringia People were cutting trees in large numbers earlier but now they have decreased the practice to some extent. They are understanding themselves the importance of forests and have also started planting some forest species like Bhalia, Bamboo,Teak.	**Village under CFR (Kehelguda)** The rights like land rights,use rights and rights to protect and conserve the forest are being given to the local dwellers in 2014.	**Quantum of change** The forest is under maintenance and its condition is improving. The dependency has also increased after the rights were given to the dwellers. But they are not aware of most of the rights provided to them.

IV

CONCLUSION

The study indicated that the NTFP sector was the major employment-generating activity constituting 37 per cent (132 man-days) of the total days of employment and the sale of NTFPs provides an important source of cash income for poor forest dwellers.

The extraction pattern of the NTFPs showed that there was a significant difference in the rate of extraction of NTFPs and also the number of days spent in the collection of each of these products. A total of six NTFPs were extracted from the forest. Out of these, a few NTFPs make a sizable proportion of household income. Mahula was the most important NTFP in terms of income which contributed 66 per cent for the collectors followed by Siali leaves (11 per cent. During the period 2012-14, Charkoli and Bhalia were also a major source of income but in the subsequent years 2014-16, these species were no longer visible in the area.

The dependency on forests of the dwellers in the villages under the management regimes (JFM, CFM, CFR) is more as compared to the control village mostly due to the schemes by the forest department being taken up along with the partnership of the locals. The village under CFM also deals in the same way whereas in CFR the rights are given to the villagers to improve the forest conditions along with their economic improvement. This has increased their interest to take care of the forest as well as derive the products from it for their livelihood management and development of economic status keeping in view the sustainable development of the forests.

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