Livelihood dependence on non-timber forest products (NTFPs) – A study of jenukuruba tribes in south India

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INTRODUCTION

Poverty and backwardness characterize the tribal economy in India. India has about 84.32 million tribal population, consisting 8.20 per cent of country's total population (2001 census). The tribal population in India consists of as many as 250 groups, speaking about 105 languages and 225 subsidiary languages. In the context of socio-economic development, the tribals in India vary from one another, starting from primitive life style to modern way of living. The primitive tribal economy is intimately connected with forests. Non-Timber Forest Products (NTFPs) form the main stay of income and sustenance for many of these tribal communities (Rao, 1987; Gauraha, 1992; Chopra, 1993; Mallik, 2000). About 60 per cent of NTFPs is consumed by about 7 crore tribals in the country. NTFPs contribute about 10 to 40 per cent of the tribal household earnings (Shiva, 1993). The income from NTFPs and the extent of extraction will depend, among others, the factors like the state policy on forest access and land use, the forest type and the demand for NTFPs (Bautista, 1992).

In recent years, the demand for NTFPs has increased many folds. The increase in demand of NTFPs is met by the over exploitation of the stock of natural capital without corresponding to the sustainability of the ecosystem. The Government intervention, in this context, by legislation and other measures has alienated the forest dwellers for their

rehabilitation. In the process of rehabilitation, the tribals not only face the problem of adaptation to monetized economy, but their dependence on NTFPs for income has increased and their access to forests declined. The efforts to rehabilitate the tribals met with limited success since many of them still continue to dwell in the interior forests and heavily depend on forest for their livelihood. For their successful rehabilitation, it is important to understand the nature and extent of households' dependence on NTFPs as a first step in planning for tribal development. This study, therefore, is an attempt to understand the socio- economic characteristics of tribal households and their dependence on NTFPs for livelihood, with special reference to Jenukuruba tribes of Heggada Devanakote (H.D.Kote) in South India.

DATA AND METHODOLOGY

The study was confined to the Jenukuruba, a primitive tribe, which accounted for the highest population (60%) out of the six different sects of tribes inhabiting the Heggade Devanakote (H.D.Kote) taluk of Mysore district, in south India. The H.D Kote forest (Kakanakote Range Forest) is a protected belt covered by the 'Rajeev Gandhi National Park' which spreads across 643 sq. km. of Mysore and Kodagu districts adjoining Western Ghats. In view of the importance of this forest with respect to species diversity and tiger population, the core area is declared as National Park and the protected area is chosen for implementation of

Project Tiger with a view to preserve the biological wealth of such importance as National heritage for all times.

The study made use of primary data consisting 180 tribal households based on a stratified two stage sampling technique. The households' dependency on forests and the factors influencing NTFPs collection was estimated using Logit model. Logit model is generally used to predict the effect of changes in independent variables on probability of response to a group or category (Aldrich and Forrest, 1984; Maddala, 1983). In the present study, it is employed to capture the probability of a particular household would indulge in the collection of NTFPs.

The logit model based on the logistic probability is specified as

$$P_i = F(Z_i) = F\left(a + \sum_{i=1}^{n} b_i X_i\right) = \frac{1}{1+e^{-z}}$$

Where

$$Z_i = a + \sum_{i=1}^{n} b_i X_i$$

After simplifying the above formula for estimation purpose, the equation can be represented in the linear form as

$$Z = \ln(P_i / 1-P_i) = a + b_i X_i + u_i = L_i$$

where

P_i	=	Probability that $Y_i = 1$ i.e., a randomly chosen tribal household collects NTFPs.
$1-P_i$	=	Probability that $Y_i = 0$, that tribal household will not go for NTFPs collection
b_i	=	Coefficient to be estimated.
X_i	=	Independent variables

e = base of natural logarithm
L_i = is called logit as it follows logistic regression.
u_i = is the stochastic error term

$P_i/(1-P_i)$ is the odds ratio in favour of a household will go for collection of NTFPs-the ratio of the probability that a household will go for collection of NTFPs to the probability that it will not go.

Given the limitations of OLS, the maximum likelihood technique was used in estimating the logit coefficients. The marginal effect of the i^{th} variable on P_i is given by the first derivative of P_i with respect to X_i.

$$dp/dX_i = b_iP_i (1-P_i)$$

Thus the elasticity of probability is

$$Ep = b_i (1-P_i) X_i$$

RESULTS AND DISCUSSION

Socio-Economic Profile

H.D.Kote region of Mysore district in South India has been the home of wild aboriginal tribe 'Jenukurubas' since ancient times. The Jenukurubas have continuous and intimate interaction with forest vegetation as they have been deriving most of their basic requirements such as food, fodder, fuel, fruit and fibre from the forest. Extraction, processing and marketing NTFPs are still a major source of employment and income to the vast majority of these tribal people.

In Table 1, the socio-economic characteristics of sample households are presented. The nucleus nature of the sample households determines the composition of the family. Due to this, the family size is small .An

average family comprised of 5 members, of which 1.85 males, 1.50 adult females and 1.55 children. Adult literacy was very low at just 9.64 percent. The total literacy of the tribal households was only 15.87 percent. The tribals of H.D.Kote, in general, are resource poor and lack permanent assets since their main occupation used to be food gathering in the forests and collection of minor forest products (NTFPs). Out of the total of 180 households included in the study, 60 percent of them were landless, 25 percent of them were marginal farmers and the rest i.e.15 percent of them were small farmers. The average size of the land was only 0.45 ha which was entirely dry. The tribals did not possess any other assets worth mentioning except a few livestock. The livestock units owned by the households ranged from 0.60 incase of milch and draft animals to 6.30 units in case of poultry birds. Housing is a problem which most tribals face, particularly, the landless. Majority of them live in huts built out of locally available material and they lack water, electricity and sanitation. Proper housing facilities are to be provided to the tribals so that they have permanent place to live and children can concentrate on studies.

Employment And Income

The major economic activity of the region includes agriculture, allied activities, NTFPs collection and wage income. The composition of employment and income is presented in Table- 2.The table indicates that the overall employment level per household was to the extent of 270.32

man days per annum. Among the different employment opportunities available, the collection of NTFPs provided the maximum employment to the extent of 50.98 percent of the total employment of the households followed by wage employment (33.95%), agriculture (11.65 %) and allied sector (3.42 %).When the three categories were compared, on an average, 407.13 man days of employment was generated on small farm households per annum, followed by marginal farm households (237.3 man days per annum) and landless households (237.40 man days/annum).

The NTFPs, which had only user value earlier, have acquired exchange value in recent times due to commercialization of these products. The tribal households, not only collected NTFPs for consumption purpose but also for earning cash income. Due to this NTFPs have contributed the most to the total employment on all the three categories of the households. These products are easy to collect, readily available, above all, needs no investment and yields immediate returns. In view of these features, it attracts the tribals for collection.

With regards to income, the tribal households, in general, earned an average income of Rs.10,849.55 per annum, which is far below the poverty line (Table.2). The wage income contributed the most (40.78%) to the total income followed by NTFPs (39.47%), agriculture (13.31%) and allied sectors (6.44%). When three categories of households were compared, wage income generated the most incase of landless and

marginal farm households followed by NTFPs. In case of landless households, the third major source of income was allied sector. Whereas, incase of marginal farm households agriculture was the third major contributor to the total income followed by allied sector. In case of small farmer households agriculture was the major source of income generator followed by NTFPs, allied sector and wage income.

The foregoing analysis clearly brings into focus the importance of NTFPs on the livelihood of the different categories of the households. In general, NTFPs contributed more than one third of the total household income of the tribals. They also generate vital non-cash income, which is related to the intake of nutrients. Wage is however, the largest cash income earning activity. But the average income is below the poverty level. The tribals continue to depend upon NTFPs, as a fall back arrangement for income and employment, as they do not have other alternative source of employment. Therefore, a major effort is required to lift the income earning potential of these hapless inhabitants.

Factors Influencing Households' Dependence on NTFPs

In the H.D.Kote National Park area, the collection of NTFPs is restricted and outside the National Park its availability is negligible. However, the tribals continue to depend upon the NTFPs in spite of the restrictions. Therefore, it is important to know the factors contributing their collection. In order to understand the importance of NTFPs as an economic activity among tribals, a multiple linear regression with income

from NTFPs as a dependent variable and family type, family size, days of employment, landholding and agricultural income as independent variables was estimated by method of OLS. The estimated equation is presented below: -

$$C = 59.182 + 4.273X_1^* + 3.147X_2^* - 0.231X_3 - 1.847X_4^* - 0.046X_5$$
$$\qquad\qquad (1.123) \quad (1.415) \quad (2.906) \quad (80673) \quad (1.965)$$

R^2=0.538

(Figures in the parentheses are the Standard errors of the estimates)

Where,

C	=	Income from NTFPs
X_1	=	Family type (Nuclear/Joint) taking the value of 1 if joint family, 0 if nuclear family
X_2	=	Family size i.e. no. of members in the family
X_3	=	Number of man days employed
X_4	=	Land holdings (hectare)
X_5	=	Annual income from Agriculture (Rs. per annum)

The results provided some useful insight to undertake NTFPs collection. Among the five variables included in the model, only three variables namely family type, family size and possession of land holdings had an impact on the collection of NTFPs by the tribals and in turn the income derived from it. The joint family system of living and the large family size has contributed positively towards NTFPs income earned by the tribal households, whereas possession of landholdings and greater opportunities for wage employment had negative impact on household income from NTFPs.

Further, Logit model was employed to capture the probability of a particular tribal household going in for collection of NTFPs with a given

set of socio economic background. Hence the previous analysis was extended to determine how the casual factors influence the probability of increased dependence on NTFPs. The results of the logit analysis are presented in Table 5.

Based on the average socio-economic characteristics of the sampled households, the average probability that a household would resort to NTFPs collection was estimated. This was done by substituting the average values of the variables into the Logit function and calculating the probabilities from the estimated value of the Logit function so obtained. The average function so obtained was 0.35 indicating that the average household in the study area would go for NTFPs collection was 35 percent. This is because of higher non-NTFPs incomes that they are deriving from other sources such as wage employment, agriculture and allied activities. In other words, it implies that wage employment, land ownership and income from agriculture, lowered the probability that a household would go for NTFPs collection. Joint family systems and large family size would increase the probability of collection of NTFPs by the tribal household. Thus, the results of Logit analysis were broadly similar with the previous analysis indicating that family size and family type contributed positively to NTFPs income and labour employment, landholdings and agricultural income contributing negatively to NTFPs dependence. A point that emerges clearly from the results is that forest based activities provide a cushion to absorb surplus labour force in the

family and provide them with gainful employment without conflicting with agricultural activities.

CONCLUSIONS

NTFPs play a key role in the life and economy of the tribal community living in and around the protected forests of H.D.Kote region. The income derived from NTFPs was the single largest source but it was not sufficient to meet even their subsistence requirement of food. Therefore, in order to meet the caloric deficit they are forced to depend on edible forest products to sustain themselves.

The results of Logit analysis have explained that wage employment, land ownership and agricultural income significantly reduced the probability of tribal households involving in NTFPs collection. Thus, there is every evidence to show that it is primarily out of sheer necessity that the tribals venture for NTFPs and not for their commercial gains.

From the policy point of view, it is important to recognize that the extent of dependence on NTFPs is strong and its sudden withdrawal will severely affect the employment and income of the stakeholders. Therefore, a phased withdrawal of NTFPs is a desirable option. They should be weaned away gradually by providing with income generating activities through direct development programmes or indirectly, through systematic efforts, by training them in alternative vocations and providing them the much needed production assets and the marketing avenues.

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Table 1. Socio-economic characteristics of the tribal households

Sl.No.	Socio-economic characteristics	Per household
1	Size of the family (numbers)	4.90
	a. Number of adult males	1.85
	b. Number of adult females	1.50
	c. Number of children	1.55
2	Land holding size (ha.)	0.45
3	Livestock (numbers)	
	a. Cattle	0.60
	b. Poultry	6.30
4	Literacy (%)	**Average**
	a. Adult literacy	9.64
	b. Total literacy	15.87
5	Status of Land ownership (%)	
	a. Landless	60.00
	b. Marginal farmers	25.00
	c. Small farmers	15.00

Note:
1. Marginal farmers – households with landholding upto 1 ha.
2. Small farmers – households with land holding more than 1 ha. and up to 2.5 ha.

Table 2. Composition of annual employment and income of tribal households-landholding wise

Source	Landless		Marginal holdings		Small holdings		Pooled	
	Employment	**Income**	**Employment**	**Income**	**Employment**	**Income**	**Employment**	**Income**
Agriculture	0.00	-	52.05	1646.25	123.08	6883.00	31.46	1,444.06
	(0.00)		(19.47)	(15.25)	(30.23)	(38.67)	(11.65)	(13.31)
Allied	0.00	271.25	15.80	529.00	35.33	2688.92	9.25	698.34
	(0.00)	(2.97)	(5.91)	(4.90)	(8.68)	(15.10)	(3.42)	(6.34)
NTFPs	135.42	4071.82	110.05	4020.11	193.72	5562.36	137.82	4,282.48
	(57.04)	(44.57)	(41.17)	(37.24)	(47.58)	(31.25)	(50.98)	(39.47)
Wage	101.98	4791.67	89.40	4600.00	55.00	2666.67	91.79	4,425.00
	(42.96)	(52.46)	(33.45)	(42.61)	(13.51)	(14.98)	(33.95)	(40.78)
Total	**237.40**	**9134.74**	**267.30**	**10795.36**	**407.13**	**17801.28**	**270.32**	**10,849.88**
	(100.00)	**(100.00)**	**(100.00)**	**(100.00)**	**(100.00)**	**(100.00)**	**(100.00)**	**(100.00)**

Note: Figure in the parentheses indicate percentage to column total
Marginal holdings-households with land holding upto 1 ha
Small holdings –households with land holdings more than 1 ha and upto 2.5 hectare
Employment in mandays per annum per households
Incomes in rupees per annum

Table 3. Effects of socio-economic characteristics on the probability of being dependent on NTFPs (Results of logit analysis)

Independent variables	Logit coefficient	Mean value	Elasticity
Constant	3.1522	-	-
Family type (Nuclear/Joint)	0.7182	0.17214	0.0972
Family size [No.]	0.1531	4.9030	0.1715
Employment [No.]	-0.0132	175.2010	-1.4811
Land holdings [hectares]	-0.6422	0.4500	-0.3922
Family income (Rs. Per annum)	-0.0080	6617.8000	-0.3142

Average Probability = 0.35