The Role of Forestry Income in Reducing Poverty and Inequality Among the Baiga Tribes in Achanakmar Wildlife Sanctuary in Chhattisgarh

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ABSTRACT

Forest Rights Act (FRA), has not been properly implemented, otherwise it is a remarkable devolution process and could have been an example for implementation of other poverty reduction policies. Particular Vulnerable Tribal groups (PVTGs), whose major income is through forest and their poverty alleviation is possible only by up-scaling the forest income, which is envisaged in FRA. The land entitlement provided in the devolution process and agriculture income can also be a major contribution. Using data by survey from Core and Buffer area of Achanakmar Tiger reserve in Chhattisgarh, we derive the counterfactual of what Baiga household's income, poverty and inequality would be without forest and forest income. The results disparagingly show that, in the absence of forest income; poverty would have been deeper and income inequality would be more. The study indicates that land ownership, awareness, education and way of life are very pivotal in helping household gain access to their devolution gains. We also find that those who are entirely dependent on forests, have unique non-observable attributes that make them more innovative and productive NTFP collectors, implying positive selection on their attributes. Moreover, engagements in village activities have a positive spill over effect on household income.

Keywords: forest income, inequality, poverty, Chhattisgarh

JEL: J43, L73, Q01, Q23

I

INTRODUCTION

Forests are one of the important natural resources for the rural population in many of the developing nations. Forests contribute to the livelihood of about 252 million worldwide and they contribute directly to the livelihood of 90 per cent of those poor people living with less than 1.25 US Dollar per day income (De La O Campos *et al*., 2018). The poorest population, everywhere in all the countries are more directly depending on forests to varying extent (Sunderlin *et al*., 2005). Overall, about 27 per cent of these populations live in South Asia (Tetteh-Baah *et al.,* 2023). Most of forest dependent poor represent India's rural extreme poverty. Forest plays a key role in the lives of the tribal population in Chhattisgarh. Forests are the major source of livelihood of the poor in the state. About 40 per cent population in the state is below the poverty line (BPL) of which more than half of Schedule tribes (55.1 per cent) and Schedule Caste community (33.4 per cent) are multi-dimensionally poor (OPHI, 2020; IIPS, 2007). The situation of the primitive tribes is even more

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vulnerable and most of them are in the BPL category living in the forest area, cultivating forest land and depending on natural resources to eke out their living.

The concept of poverty has moved over time from its initial phenomenon as economic criteria (Rowntree, 1901) to take on numerous socio-economic categories (UNDP, 1990). The recently used concept of poverty extends from lowness of income, to deprivation of basic facilities, both of which are related to each other in a way and can be a cause of one another (UNDP, 1990; Sen, 1999). Chhattisgarh with considerable high forest density remains one of the poorest states in India in terms of monetary and socio-economic dimensions. Using data from a survey of rural households in the Core and Buffer area of Achanakmar Tiger Reserve, in Chhattisgarh, we address these issues by showing that (1) forest incomes contributes a key role in reduction of rural poverty relatively to other incomes; (2) forest incomes contribute to lower inequality in rural incomes.

The relationship of poverty and forest regime has very critical implications for efforts worldwide to fight poverty and to conserve the biodiversity (FAO, 2020). The relationship of man and resources is very complex, dynamic and many times emotional. Forests provide subsistence goods and incomes from the forest products and contribute to the livelihood of people through agriculture, employment and are an important reserve. The forests also additionally provide a range of environment services like pollution control, soil, and water conservation, etc. apart from the timber and Non-Timber Forest Produce (NTFPs), but are also cultural and religious base for the tribal population. With slowdown of the economy, particularly agricultural growth and looking at the poverty estimates it was thought that, there is a need for greater agriculture output to feed the people; keeping pace with the increasing population and to meet the greater food demands.

II

METHODOLOGY

Study Area

The study was conducted in Achanakmar Tiger Reserve (ATR) in Chhattisgarh, India which falls under the Bilaspur and Mungeli districts of Chhattisgarh. With an area of 914.01 sq. km it is one of the biggest wildlife sanctuaries in Chhattisgarh, which is home to many tribal communities, particularly the Particular Vulnerable Tribal Group (PVTG) Baiga living inside and adjacent to the sanctuary and depending heavily on forest resources for their livelihood (https://wiienvis.nic.in/database/trd_8222.aspx).

Source of Data Collection, Sampling and Data Analysis

Primary data is used in the study which is obtained from a set of questionnaires and survey conducted among the forest dependent households in the Achanakmar Tiger Reserve (ATR). The questionnaire captured data on the household

characteristics of the PVTGs benefiting out of the Forest Rights Act (FRA), and their livelihood dependence. The data collected consist of information on demographic as well as the socio-economic characteristics of the selected households. Other information like livelihood and income derivable from forest and other activities is also collected. Both the qualitative and quantitative research methods are to fulfil the objectives of the study. The household data include gender, age, household size, education, and occupational data. Household dependence on ATR is computed as the ratio of yearly income, earned from forests to the total annual income earned from other sources (agriculture, wage labour, migration and other income).

Income Inequality

The selection of measure on inequality is important for analysis of income distribution, among different income group of beneficiaries, Lorenz Curves, Gini Coefficient, and Decomposition through coefficient of variables are used. Inequality of income is calculated, while the engagement of the household is gauged by calculating the employment pattern with emphasis on the number of days of engagement in forest, while all other sources of employment is also calculated.

Decomposition Analysis Based on Coefficient of Variation

Decomposition of income source on the basis of Coefficient of Variation (CV) is done mainly due to inability of variance to meet the relative income principle. The relative concentration coefficient of the i-th source of income (C_i) is calculated by the formula:

$C_i = PiY (\sigma_1 / \mu_i) / (\sigma / \mu)$

Where, C_i = relative concentration of the i-th source in overall inequality and PiY= Correlation coefficient between the i-th source and the total income. σ_1 and σ are the standard deviation of the i-th source and total income and μ_i and μ are the mean income from the i-th source and total income respectively. The value of relative concentration coefficient (C_i), determines whether the i-th source of income is inequality is decreasing or increasing. In the next step, proportionate share of income from the i-th source to total income (w_i) was calculated.

$w_i = \mu_i / \mu$ here, fundamentally $\sum w_i = 1$

Now, $w_i c_i$ gives the proportion of total inequality contributed by the i-th source of income. The more the value of wici, higher would be the concentration of the i-th source of income inequality.

$w_i c_i = (\mu_i / \mu)$

Gini Coefficient

It is an index that estimates the extent of inequality of income distribution to calculate the effect of the forest income. To estimate the income inequality both exclusive and inclusive forest income are calculated. It has been derived from Lorenz

curve and the ratio of the area between Gini coefficient developed by Deaton (1997) was used.

$$G = \frac{N+1}{N-1} - \frac{2}{N(N-1)\mu} \times \sum_{i=i}^{n} PiXi$$

Where,

G = Gini coefficient

μ = Population mean income

P_i = Income rank P of person i with income X.

N = Rank of person with lowest income.

Measuring Forest Dependency

Dependency on forest can be defined and measured on the basis of different categories such as the production and use of NTFPs and the economics of the intangible use of "non-consumptive" forest resources. The varieties of NTFPs collected by household, their forest net income was dependent variable, while household characteristics (Age, household size, number of adult working, sex, education level of household, agriculture land size, land entitlement received, income from agriculture and other sources) are considered as independent explanatory variables. Annual Total Household Income (THI) is calculated as sum total of income a household is earning from different sources (if any). The THI is sum of Agriculture Income (AI), Forest Income (FI), Wage Income (WI) and other Non-Agriculture Income (NAI).

THI = AI+FI+WI+NAI

Quantitative Techniques

The descriptive statistics in the form of frequency and percentages are employed to define the characteristics of socio-economic variables of the forest dependent households and benefits derived from the forests. To calculate the factors influencing the household dependency on forests Tobit regression model was used. Forest dependency (Y) is calculated as the share of forest income in the household income. The Tobit model is described in terms of a latent variable Y*. The model of Tobit shown here assumes independent and normal distribution of population and error term in a maximum likelihood estimation (Woolridge, 2009) .

$Y_i * = x_i\beta + e_i$ if $y_i^* > 0$

$Y_i = 0$ if $y_i^* \geq 0$ $\mu \sim$ IIDN $(0,\sigma)$

The functional form of logistic regression model is expressed by the following identity.

$Y_i = \alpha + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \ldots \ldots \beta_n X_n + \varepsilon_i$ ⋯⋯⋯⋯⋯⋯   .…. (1)

Where Y_i is forest dependent and at log odds of the i-th household, α is constant, β_1, β_2, β_3…… β_n are coefficients of independent variables X_1, X_2, X_3, …..X_n and ε_i is an error term for the i-th household. Independent variables include varied range of household characteristics that determine poverty of the households. It includes composition of household and human capital X_1 = age of household head, X_2

= family size, X_3 = Farm Size (land holding), X_4 = Land Entitlement, X_5 = Agriculture Income, X_6 = Wage Labour Income, X_4 = Total Income.

III

RESULTS AND DISCUSSION

Demographic Feature

The structure and size of family are important factor influencing the collection of NTFPs in the Achanakmar Sanctuary which plays an important role in the devolution process. The entire family based occupation at the village level impacts the level of wellbeing. The size and structures of sample household in the study area are presented in Table 1. The average family size is 4 in Buffer and 5 in Core area. Baiga youth marries at tender age and make the family independent at post-marriage as per their tradition and constructs new house. Therefore, the population is not more in such nuclear family and the family size is small. The mean age (in years) is found to be 39 in Core and 45 in Buffer and overall mean age is 42. The family size is not varied significantly across Core and Buffer. The sex ratio of females over one thousand males is found to be 957 in Core, 911 in Buffer and the overall is 936 which is lower than the average sex ratio (991) of Chhattisgarh (Census, 2011). All the households among sample population are male dominated. The percentage of male is 51.1 per cent in the Core area and 52.3 per cent in the Buffer area. People of all age groups are involved in different activities like collection of forest produces, agriculture, wage labour and allied activities.

TABLE 1: DEMOGRAPHIC PROFILE OF HOUSEHOLDS IN THE STUDY AREA

Particulars	Study area		
	Core	Buffer	Overall
(1	(2)	(3)	(4)
Average family size (No.)	5	4	5
Number of Males (per cent)	489 (51.1)	405 (52.3)	894
Number of female (per cent)	468 (48.9)	369 (47.7)	837
Mean age of household head (Years)	39	45	42
Sex ratio (Female per '000 males)	957	911	936
Illiterate (No.)	321 (39.5)	217 (32.6)	538 (36.4)
Average animals (No.)	15	10	12.7

Source: Field Survey, 2018;
Figures in parentheses indicate percentage
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Education becomes an important ingredient in the whole development process of the tribal. The literate person perceives better about the FRA and their participation in claim and decision making is higher. Level of education of the sample household shows that majority of the households in Core (39.5 per cent) and Buffer (32.6 per cent) is illiterate and 58.9 per cent in Core and 56.2 per cent in Buffer are functional literate (who can write their name or can read). It is interesting to note that none of the population is Graduate in the core area. Due to high level of illiteracy or functional literacy, the dependency on forest and farming is high. Focus

of the government on education of PVTGs is very less as there is no high school inside the core area. As a result, the education of children, particularly the girl child is hampered significantly. It is observed that the Baiga families have a more traditional character and preferences rather than the mainstream education and employment. The level of literacy is poor for the adult than children. Improving the literacy rate and primary education are the focus of the government.

Land Holding Status

Land utilisation pattern determine the agriculture system existing in the area. Farm category wise land use pattern of sampled households is summarised in Table 2. The average size of land holding was 0.92 hectares in Core and 3.2 hectares in Buffer with an overall average of 1.1 hectares in the area. The farmers were classified according to land holding size, landless, marginal, small and large farmers. The landless and marginal farmers are more than half of population in Core (56.7 per cent), also in Buffer (52.7 per cent) and overall (54.9). There are no large farmers in among the sample Baiga Population. Hence land categorisation proves that the entire PVTG population are very much forest dependent, which has not yet benefited out of land provisions and the devolution process has been improper, even after 15 years of FRA.

TABLE 2: LAND DISTRIBUTION ACCORDING TO FARM SIZE AND AREA

Category	Core Area				Buffer Area				Overall			
	No of HH	Mean	SD	CV	No of HH	Mean	SD	CV	No of HH	Mean	SD	CV
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
Landless	25 (11.9)	0	0	0	44 (24.4)	0	0	0	69 (17.7)	0	0	0
Marginal (< 1 ha)	94 (44.8)	0.48	0.73	61	51 (28.3)	0.48	0.62	52.0	145 (37.2)	0.48	0.69	58.1
Small (1 to 2 ha)	59 (28.1)	1.35	0.58	17	38 (20.0)	1.36	0.54	16.1	95 (24.4)	1.36	0.56	16.8
Semi-medium (2 -4.ha)	32 (15.2)	2.09	0.51	10	31 (18.3)	2.70	1.26	18.9	65 (16.7)	2.4	1.23	20.7
Medium (4- 10 ha)	0	0	0	0	16 (8.9)	4.38	1.15	10.7	16 (4.1)	4.4	1.15	10.7
Large (>10 ha.)	0	0	0	0	0	0	0	0	0	0	0	0
Total	210 (100)	0.92	1.76	78	180 (100)	3.2	3.41	106.7	390 (100)	1.1	2.69	100

Source: Field Survey, 2018. Figures in parentheses indicate percentage.

For the marginal farmers, the average size is 0.48 hectares in both the areas, while it is almost similar in Core and Buffer (1.35 ha in Core and 1.36 ha in Buffer). The overall size of land holding of semi medium farmers is 2.4 hectares. Landholding in the Core area varies from 0.02 to 2.8 hectares, while in Buffer area it was 0.2 to 5.67 hectares, with overall variability of 100 per cent. The variability in

land size is highly skewed and the land distribution process is not uniform among the Baiga community. In Core area there are no medium farms. while it is only about 9 per cent in buffer. In the whole area, there is no large land holding families. It is found that 11.9 per cent in Core and 24.4 per cent households in Buffer are landless.

Occupational Distribution

The occupational structure of the household of the Core and Buffer area is given in Table 3. The household engagement as forest produces collectors both as primary occupants (46.2 per cent) as well as secondary occupants (40.8 per cent) is very high in Core area. In the Buffer area around 14 per cent of households are engaged as NTFP collectors as primary occupants. The reason being high availability of NTFP inside the Core area as ATR forest is rich in biodiversity. In the Buffer area NTFP collectors as secondary occupants are high (53.9 per cent) because NTFP season starts at post-monsoon, when the engagement in agriculture is less. Women from Buffer enter the Core, as it is adjacent and collect the forest produces. In Buffer area around 53 per cent of population is doing agriculture and their dependency on forest is lesser as primary occupants than that of Core area. About one-third of the populations are engaged in agriculture and majority of people are NTFP collectors in Core area due to land crisis. On an average the land holding of the household is comparatively better in the Buffer area but it has greater variability among the landholders, as a result a large number of populations are engaged as wage labour as primary occupant (27.2 per cent), and also as secondary occupant (38.2 per cent) in Core area to support the family. They work as agricultural labourers in big farms. Besides, they also engage by forest department for intercultural work inside the forest.

TABLE 3: OCCUPATIONAL DISTRIBUTION OF THE HOUSEHOLD IN THE AREA

Particulars	Household engaged					
	Core		Buffer		Overall	
	Primary	Secondary	Primary	Secondary	Primary	Secondary
(1)	(2)	(3)	(4)	(5)	(6)	(7)
Wage Labour	32 (15.24)	73 (38.22)	49 (27.2)	15 (8.3)	81 (20.77)	88 (23.72)
Agriculture	72 (34.29)	27 (14.14)	95 (52.8)	54 (30.0)	167 (42.82)	81 (21.83)
NTFP collectors	97 (46.19)	78 (40.84)	26 (14.4)	97 (53.9)	123 (31.54)	175 (47.17)
Business	2 (0.95)	0	4 (2.2)	5 (2.8)	6 (1.54)	5 (1.35)
Migrant Labour	2 (0.95)	11 (5.76)	1 (0.6)	5 (2.8)	3 (0.77)	16 (4.31)
Bamboo and wood crafts	2 (0.95)	2 (1.05)	0	4 (2.2)	2 (0.51)	6 (1.62)
Service	3 (1.43)	0	5 (2.8)	0	8 (2.05)	0
Total	210 (100)	191 (100)	180 (100)	180 (100)	390 (100)	371 (100)

Figures in parentheses indicate percentage.

Income Structure

The pattern of income and livelihood of the PVTG communities has been profiled in the study area. Since the study was conducted inside the sanctuary area, the relative importance of forests in the economy of households needs to be highlighted. Income has been generated from six major activities; NTFP collection, agriculture, earning as daily wage labour, migrant labour and service and allied activities, which is presented in Table 4.

TABLE 4: SECTOR WISE INCOME AND VARIATION IN INCOME OF SAMPLE HOUSEHOLDS

Sr. No.	Income Sources	Core			Buffer			Overall		
		Total HH Income (Rs.)	Avg.HH Income (Rs.)	CV (per cent)	Total HH Income (Rs.)	Avg. HH Income (Rs.)	CV (per cent)	Total HH Income (Rs.)	Avg.HH Income (Rs.)	CV (per cent)
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
1.	Agriculture	3192881 (36.7)	15424.5	83.1	2528418 (44.7)	14046.8	58.0	5721299 (45.6)	14670	63.0
2.	Forest Income	4057361 (46.6)	19506.5	109.4	1505105 (26.6)	8361.7	60.0	5562466 (44.3)	14263	77.4
3.	Wage Income	1047067 (12.0)	5009.9	153.8	1230320 (21.8)	6835.1	56.0	2277387 (18.1)	5839	80.5
4.	Service	203500 (2.3)	973.7	75.0	143900 (2.5)	799.4	63.0	347400 (2.8)	891	62.1
5.	Business	33720 (0.39)	160.6	60.0	169080 (3.0)	939.3	67.0	202800 (1.6)	520	69.4
6.	Migrants	131730 (1.5)	627.3	88.0	50977 (0.9)	283.2	63.0	182707 (1.5)	468	73.6
7.	Craftsmen	35375 (0.41)	168.5	53.0	28670 (0.5)	159.3	61.0	64045 (0.5)	164	75.2
Total		8701634	41436.4	42.9	3849532	21386	64.2	12551166	32182	74.0

The economic benefits from the forest resources and the area per se, have been explored in the study. NTFP collection and agriculture are the most prevalent income source in Core and Buffer area. A substantial proportion of income is from agriculture in the buffer (44.7 per cent), while that in Core is 36.7 per cent, NTFP income in the Core is 46.6 per cent, while in the buffer is 26.6 per cent and overall is 44.3 per cent. Furthermore, other income activities as wage labour in Core is 12 per cent, while it is 21.8 per cent in Buffer and income from other sources is very low both in Core (4.6 per cent) and in Buffer (6.9 per cent). Devolution process occurs due to the recognition of rights inside the protected area and also due to removal of restrictions for the people.

Paddy is the main crop apart from maize, millets, gram, mustard, potato and few vegetables. Crops are grown primarily for consumption only. Agriculture productions are rarely sold, and mostly used for household consumption, thus leading to no cash income from agriculture. Agriculture production is also low due to small land size. The land is undulated resulting in washing off of top soil. Lack of irrigation facilities is also another constraint. Livelihood income from fowls, livestock are also an important source of income which is not obtained on regular basis, while self-

employment like making finished bamboo products or carpentry is also the means of income.

With the increase in household income the share of NTFP income increases. It means those who depend on NTFP collection have better opportunity of income, while those having land; spent majority of their time for crop production. Mahua, Char, Baheda, Honey, Tendu leaves and Tikhur are the major NTFP's source of forest income as shown in Table 5. The area rich in biodiversity, gives more NTFP collection and engagement and income. The increase in biodiversity in the forest area will give more NTFP collection and engagement in NTFP collection will increase. The exclusive income from NTFPs is not a part of National Accounting system which is the real reasons to gauge the poverty of the PVTG communities, who are entirely forest dependent. This is important to understand for estimating poverty. In our study the incidence of poverty upsurges extremely in Core and also substantially in Buffer if forest income is not included in the income profile. The trade-off for forest income is found to be very low due to low literacy level and lack of skill for other non-forestry sector employment. On the other hand, the policy of diversion of forest for non-forestry use is the major factor of forest degradation.

TABLE 5: INCOME FROM FOREST PRODUCE INSIDE THE SANCTUARY

NTFP	Household Collects		Average Dist. covered (in km)	Man-days Per Household		Quantity Collected		Total Income (in Rs.)	Income per Household (in Rs.)
	Number	Per cent		Days	Amount (in Rs.)	Quantity (Kg)	Rate (in Rs.)		
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Mahua	201	95.71	3.8	42.0	6300.0	3.0	30.0	9000.00	2700.00
Hill broom	172	81.90	4.4	262.5	39375.0	20.4	20.0	40800.00	1425.00
Harra	184	87.62	3.75	40.0	6000.0	30.0	2.2	6600.00	600.00
Charota	188	89.52	1.4	1.69	253.1	2.25	12.9	2902.5	2649.38
Bamboo	175	83.33	8.25	195	29250.0	300	10.0	30000	750.00
Bheda	174	82.86	5.5	45.6	6840.0	7.35	12.5	9187.5	2347.50
Sal Gum	187	89.05	2.74	5.9	896.3	20.7	10.0	2076	1179.72
Mushroom	180	85.71	2.96	2.0	301.2	5.42	400.0	2168	1866.78
Mahua seeds	174	82.86	2.54	6.5	975.0	25	75.0	1875	900.00
Honey	170	80.95	6.35	6.2	932.8	17	300.0	5100	4167.23
Saja	153	72.86	3	12	1800.0	1.5	25.0	3750	1950.00
Char	157	74.76	1.5	4	600.0	5.23	6.0	3138	2538.00
Thikur	178	84.76	2.25	4.98	747.0	7.5	250.0	1875	1128.00
Sal Seeds	160	76.19	1.75	49.5	7425.0	8.75	10.0	8750	1325.00

Net Return Generated from NTFP Collection

The net return generated from NTFP collection by Baiga households is calculated from the quantity and the price and is presented in Table 6. Labour cost in NTFP collection is taken into consideration and accordingly the opportunity cost is calculated and deducted from the groups return to find out the net return (Svarrer and Olsen, 2008). The cost of transportation is zero as the agents collect from the village itself. The result throws light on the fact that the PVTGs derive minimum benefits

TABLE 6: ECONOMICS OF NTFP COLLECTION INSIDE ACHANAKMAR SANCTUARY

Name of NTFP	No. of Household Collecting	Ave Distance Covered (in Km)	Labour Man days of Household (No.)	Opportunity Cost of Labour (INR)		Qty Collected per Household (in Kg)		Rate (in Rs.)	Average household Income (Rs.)	Net Return per household (Rs.)	Net Return per Kg	Net return per rupee cost (Rs.)
(1)	(2)	(3)	(4)	Total (5)	Mean (6)	Total (7)	Mean (8)	(9)	(10)	(11)	(12)	(13)
Mahua	201 (95.7)	3.8	8040 (11.5)	1206000	1668	36984	184.0	35	6440	4772.0	25.9	136.3
Hill Broom	172 (81.9)	4.4	1806 (2.6)	270900	20232	16237	94.40	20	21000	768.2	0.4	76.8
Harra	184(87.6)	3.75	1840 (2.6)	276000	1500	5870	31.9	50	1500	0.0	0.0	0.0
Charota	188 (89.5)	1.4	317.3 (0.5)	47595	683	22410	119.2	10	2384	1701.5	14.3	85.1
Bamboo	175 (83.3)	8.25	34125 (48.9)	5118750	12460	53235	304.2	100	30420	17960.0	59.0	179.6
Bheda	174 (82.9)	5.5	974.4 (1.4)	146160	525	17035	97.9	20	1958	1433.0	14.6	71.7
Sal Gum	187 (89.1)	2.74	2988.3 (4.3)	448245	5250	3048	16.3	150	6000	750.0	2.5	37.5
Mushroom	180 (85.7)	2.96	4320 (6.2)	648000	1225	2574	14.3	300	2145	920.0	64.3	6.1
Mahua Seeds	174 (82.9)	2.54	2001 (2.9)	300150	750	4350	25	70	2500	1750.0	70.0	17.5
Honey	170 (80.9)	6.35	1326 (1.9)	198900	1125	1802	10.6	150	5250	4125.0	55.0	58.9
Mahuline	153 (72.9)	3	1836 (2.6)	275400	1256	14535	95	20	9500	8243.8	86.8	82.4
Char	157 (74.8)	1.5	942 (1.3)	141300.0	437.50	1993	12.7	100	1270	832.5	65.6	8.3
Thikur	178 (84.8)	2.25	6226.4 (8.9)	933960.0	1050.0	4895	27.5	200	2750	1700.0	61.8	17.0
Sal Seeds	160 (76.2)	1.75	3120 (4.5)	468000	750.00	24000	150	20	3000	2250.0	15.0	112.5
Total	-	-	69862.4	10479360	-	-	-	-	-	47205.9	-	-

Labour cost @Rs 200 per day.

from all the collected products, even the fact remain that the collection process is labour intensive as there is no cost involved in the collection process and nothing is paid for the collection. If the labour is valued with MNREGA rate, the opportunity cost will be more than the income from NTFP. MNREGA suffers because it is irregular and people have to wait for payment. Even though the price obtained from NTFP are at the low end but the PVTGs feel that collection of NTFP is the best option. Since Baiga is closer to forest traditionally they are more comfortable collecting NTFP than doing manual labour. Incomes generated from NTFP are quite significant and returns are easily available as compared to other source of income.

Poverty Analysis

Poverty is very profound, far-reaching, and even rampant among the PVTGs in Chhattisgarh. These communities are living in the forest area and have a high prevalence of poverty and malnourishment. All the Baiga households in the area are below poverty line (BPL), while Chhattisgarh has 32 per cent tribal population, 44 per cent is forest, and still almost 50 per cent population are BPL. The forest rights Act, a phenomenal act to overcome poverty and disparity in forest-dwelling communities has failed to achieve its goal of poverty alleviation.

The idea of relative poverty is taken into consideration for poverty analysis in this research study. Income disparities are taken as an indicator of poverty, regardless of already defined poverty line. While taking relative poverty, income disparity is as much relevant to the measurement of poverty *per se* (Bourguignon, 2004). We consider the income distribution of all sample households and have included the income received either in cash or kind. This total income is divided into seven main sources of income, *viz.*, agriculture, wage labour, NTFP collectors, business, migrant labour, craftsmen, and services. Income from services is included which is obtained from jobs like government and non-government, teaching, forest department, etc. These are the regular sources of income. Business income includes net income from shops, selling products from village to village; craftsmen are bamboo artisans doing carpentry or wood art. The migrant labours usually go outside the village to do menial work.

Increasing inequality has major consequences for maintaining sustainable economic growth as well as posing threats to social stability. Continuous increase in disparity has been detrimental to the objective of poverty reduction. Forest Rights Act, which was properly implemented, had the tremendous potential to reduce poverty by providing opportunities for PVTGs to practice settled agriculture through entitlements to land and access to forest resources. It also had promises of expanding the social protection through integrating welfare schemes for the beneficiaries. But improper implementation has increased inequalities; the average land entitlement provided to the Baiga community is very low, which in no way would have changed the income level from agriculture. There are also provisions of convergence of other

welfare. The rights to Community Forests, which is one of the major rights for dependent communities, have not been devolved in the protected areas.

This study consequently tried to analyse poverty based on socio-economic variables. The study seeks to identify the source of disparity through the decomposition of inequality indices in the poverty-ridden Achanakmar Tiger Reserve of Chhattisgarh. Thus, this research may have some implications for further study to take up the serious issue of rural poverty and income inequality in the area.

Quintile Income Analysis

Forests are the natural wealth for the Baiga PVTG households which gives many benefits, that accounts for multiple items in their lives, which are not only major source of income but also acts as safety net for predictable and un-predictable interlude of income; or as medium of aggregation of wealth to overcome poverty.

It has been seen that the forest income in Core in the lowest quintile is low (18.8 per cent), while the HH participation is good (40.5 per cent), while in second lowest quintile in Core the share of forest income rises (31.4 per cent) and share of income continues to increase in subsequent quarters moving higher with higher total income. Similarly, in Buffer the share of agriculture income rises and the share of income from NTFP decrease, which means opt for agriculture. As collection of NTFPs are seasonal, and the households at the lower quartiles of income cannot take the risk of climate vagaries, when their wage labour from their permanent employers though being victimized are assured. These people who are at the lower quartile of income among the poorest of the Baiga population are highly indebted through their employer who exploit them and also collect their forest produce at lower price, as they are bound to sell to them only due to their prolonging loans which are verbal and not properly documented by the illiterate tribals. Collection of NTFPs require less skills. Storing, drying and marketing are skilled work which fetches remunerative prices but these are time consuming which is not possible for people struggling to meet their two square meals. The high income populations are favourably positioned to access and explore market and take advantage of the high returns through alternative market areas, which has higher margin of profits. If we see Table 5 we find that the distance covered to get forest produce is also greater which again is time consuming. Forests are receding day by day and the rich biodiversity is being replaced by monoculture plantations, impacting the lives of the people. The forests are means of revenue earning for the government, as also envisaged in the amendment of 1927 Forest Act and the old rich biodiversity is going to be replaced by new exotic tree species as also part of the REDD (Reduced Emission through Deforestation and Forest degradation) plus under the climate justice policies. The sale of forest produce brings cash income which are used for buying assets, for education and health needs or for marriage in the family for the upper section, while for poorest of poor it is used to repay loans or debt servicing for future loan entitlements and the vicious circle continues. Also, due to being inside the sanctuary area and always

being at the mercy of forest department for any development activity or for livelihood, entering into forest for these poorest section without bribe, becomes crime and the court cases on such families are high than the rich people who bribe the lower officials and enter. Devolution of forest rights strengthens the gram sabha for access and use of forest for livelihood which is not the case in the protected areas due to threat of displacement looming large on them. Also there is ban on collection of Tendu (*Diaspora melanoxylon*) leaves inside the sanctuary area which contributes to 10 per cent of annual income of tribal households (Kumar, 2020). The FRA gives power to gram sabha to practice trade and marketing of forest produce and the skill development of the gram sabha has to be done for this, but in the area still conferring the entitlement of Community Forest Rights is yet to be done leave aside the management and control of forest by the Gram Sabha. The sale and income from gram sabha to go into their account for more localised planning.

Another important part of forest is the intangible benefits of forest in the lives of the PVTGs apart from the cultural and spiritual benefits are the amount of potential these forest produces have in overcoming the malnourishment and food self-sufficiency which do not have market value, but are highly nutritious like wild forest vegetable [Koilar bhaji, bohar bhaji (*Cordia dichotoma*), etc.] and the tubers. These products do not hold space in market but are consumed as alternative to cultivated vegetable. This was proved during the critical COVID period. These intangible benefits are difficult to account for but important for the poorest community. In agriculture and as wage labour their engagement are high above 70 per cent, while the share of household income in the lowest of quintile, majorly comes from agriculture (48.8 per cent) in Core and high in Buffer (54.1 per cent) as wage labour (24.6 per cent) in Core, while in Buffer it is from forest income. The share of wage labour income is high in 4th quintile in the buffer.

Decomposition of Income Inequality

The Gini coefficient which shows the degree of inequality in the distribution of income from different sources, i.e., from farm, from forests, wage labour and is calculated to determine the level of inequality. With the devolution, access to forest and role of NTFPs in household income inequality is calculated by Gini Coefficient. To study the role of forest income in household income inequality, Gini coefficients were estimated and the results have been presented in Table 7. The inclusion of NTFPs income in household income on core has reduced the inequality in total income, as well as in buffer. Thus, it proves that income from forest helps in diminishing income disparity among the PVTGs in the protected areas similar finding have been shown in studies by Heubach *et al*. (2011). In case of Core area, Gini coefficient for farm income without Forest income (0.59) reduced to (0.46) with the inclusion of NTFP incomes.

TABLE 7: DECOMPOSITION OF INCOME INEQUALITY BASED ON GINI WITH AND WITHOUT FOREST INCOME

Particulars	Core	Buffer	Total
(1)	(2)	(3)	(4)
Agriculture	0.63	0.54	0.50
Forest Based	0.55	0.54	0.57
Wage Labour	0.64	0.51	0.59
Without Forest Income	0.59	0.53	0.56
Total (With Forest Income)	0.46	0.49	0.47

Work Force Composition

The distribution of family population in relation to the available labour force among the occupants in Core, Buffer and in the overall area of sample population is shown in Table 8. It is assumed that people in the age group 18-60 years are actively engaged in useful economic activities and are termed as working force. The dependent is found to be 34.6 per cent in case of Core area and 35 per cent in case of Buffer area. The overall dependency level with respect to total workers is 34.8 per cent. The engagement as primary occupation as NTFP collectors is high (53.4 per cent) in Core and it is less (15.2 per cent) in Buffer. Agriculture in Core area is mainly subsistence agriculture and the engagement is low (29.8 per cent). As secondary source of household engagement, collection of NTFPs has highest engagement (61.1 per cent) as active adults, while for agriculture (18.9 per cent) is quite similar. The active adults for buffer are high in agriculture (58.4 per cent) and secondary occupations (48.7 per cent). The engagement of wage labour in Buffer is also high as primary (20.4 per cent) and in secondary sectors (18.7 per cent). The NTFP collectors are more as secondary occupants (23.6 per cent).

The Labour Force Ratio and the Labour Participation Ratio in the Core area for primary occupants is shown in Table 8. The Labour Force Ratio for wage labour is the highest in Core (69.2) as well as the Labour Participation Ratio is also highest (85.1), while in the Core area, the Labour Force Ratio for agriculture and NTFP is 64.1 per cent and 64.6 per cent, respectively. The Labour Participation Ratio for agriculture (73.2 per cent) and for NTFP collectors (80 per cent) is significant. In buffer area, the labour force ratio is highest for agriculture (71.3 per cent) followed by NTFP collectors (64.4 per cent) as primary occupants, while the work force for wage labour (46.7 per cent) which is comparatively less. In primary sector of Buffer, the Labour Participation Ratio is highest for wage labour (97.8 per cent) and for agriculture (87.6 per cent) and for NTFP collection (89.5 per cent), while as secondary occupants it is high for NTFP collectors (92.6 per cent). A significant number of populations also migrate in Buffer (4.6 per cent), but are less in Core area (1.12 per cent). The engagement of workers as wage labour is low in Buffer area and may be due to higher engagement in agriculture, while in Core area, NTFP collection leads to higher employment opportunities. In Buffer area, the women are also engaged in agriculture as primary occupants, thus engagement of women as NTFP collectors is less.

TABLE 8: DISTRIBUTION OF WORK FORCE IN THE STUDY AREA

Category	Core					Buffer				
	Family size	Total workers in household (No.)	Workers engaged (No.)	Labour force ratio*	Labour participation ratio**	Family size	Total workers in household (No.)	Workers engaged (No.)	Labour force ratio*	Labour participation ratio**
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Wage labour	107	74 (11.82)	63 (12.94)	69.2	85.1	199	93 (18.5)	91 (20.4)	46.73	97.8
Agriculture	309	198 (31.6)	145 (29.77)	64.1	73.2	418	298 (59.2)	261 (58.4)	71.29	87.6
NTFP collectors	503	325 (51.92)	260 (53.39)	64.6	80.0	118	76 (15.1)	68 (15.2)	64.41	89.5
Business	6	5 (0.8)	4 (0.82)	83.3	80.0	5	4 (0.8)	3 (0.7)	80.00	75.0
Migrants	7	7 (1.12)	5 (1.03)	100.0	71.4	24	23 (4.6)	18 (4.0)	95.83	78.3
Craftsmen	12	9 (1.43)	4 (0.82)	75.0	44.4	-	-	-	-	-
Service	13	8 (1.28)	6 (1.23)	61.5	75.0	10	9 (1.8)	6 (1.3)	90.00	66.7
Total	957	626	487	65.4	77.8	774	503	447	64.99	88.9

Figures in parentheses indicate percentage
*   Labour force Ratio-Total Workers w.r.t. family size
 ** Labour Participation Ratio-Dependency ratio W.r.t. total Workers.

Since NTFP collection is done mostly in summer when schools are closed, and there is no agriculture season, all the household members from children to adult, men and women are engaged in NTFP collection, and while for wage labour it is highest as its engagement is very high as compare to the household engagement. The reason being that wage labour employment is due to unskilled labourers who work on casual basis. The engagement of people can be more if the government takes an effort to set up NTFP processing unit or even millet processing centre which can give employment opportunities and will reduce migration.

The landless population is solely engaged as wage labour. Migration increases due to lack of work, which leads to indirect dislocation of youths to other areas and it becomes permanent over the periods of time and the specific culture and identity of the forest based PVTGs is lost. The PVTG population inside the Core area is still to overcome the historical injustice meted out to them by not settling their land rights even during the colonial period. In case of secondary occupation, the second employment option is as NTFP collectors as forest products viz., Mahua, Tendu, Char, etc. bloom during spring and summer season when people are free and they enter the core area to collect major produces. The households engage in NTFP collection do the same work regularly and their major dependency vests on NTFP. Due to lack of land entitlements but rich bio-diversity supports the forest based PVTGs in the Core area. Non-inclusion of forest income specifically in the National Income Accounting System (NIAS), does not make the picture of poverty index clear in which income from forest is taken as allied agriculture income rather than taking it

as part of major income, which is one of the discriminations for the forest dependent and tribal population. The Labour Participation Ratio is very low and it is impacted by a variety of reasons of social, economic, and demographic factors. Had the devolution process would have been proper there would have been increase in agriculture holding and the Labour Force Participation may increase. Also, if the management of forest is handed over to people as part of devolution process under FRA, there would have been more bio-diversity as the employment options may create more employment opportunity, rather than management being in the hands of forest department, whose sole motive of considering forest as means of revenue regeneration, which leads to plantation of only commercial crops, thereby discouraging the bio-diversity.

The area also has less literacy rate and there is lack of opportunity for young people to learn trade, which also becomes a factor for low labour force participation. Till the skills of the people are increased, there has to be engagement more as menial labour to curb malnourishment and hunger. In households in buffer area there are more scope of workers to be engaged as wage labour as the available labour is more than engaged labour. Since youths migrate more seasonally to work outside, so locally the abundance labour is not found, which may be due to lack of work or low wage rate locally, but this is not the case in core area, where people work in the village or collect NTFPs and the needs are also limited, so the migration rate from forest are less. The decrease in employment opportunities means, that economy is operating below its potential and thus, inflation at local level leads to lower wages. Also due to lack of skills of people to take advantage of forest based economy there is structural unemployment. There is a need to develop the skills of resource based occupation for generating more forest engagement; and government should develop such pro-people policies which can generate employment for more nature based engagement. Technological advances are also required for developing forest based industries.

In Buffer the income inequality has decreased to 0.49 from 0.53. NTFPs help in diminishing income disparities in the area. The inclusion of income of NTFPs in the total household income considerably reduces the inequality between the household. It is evident from the table that the level of inequality in total income in Overall area is 0.47 and without forest income it increases to 0.56. The forest based income inequality is at the lowest from other sources of income (agriculture and wage labour) except at an overall level it varied from 0.57 to 0.50 for agriculture, while for core and buffer it is at the lowest. The inequality of agriculture was lowest in the Buffer area. It can be concluded that the income derived by sample households from forests has helped in reducing the income inequality. Thus FRA needs to be properly implemented which has the potential of poverty alleviation among the forest dependent poor.

Multidimensional Decomposition of Income Inequality Among Households

To analyse the structure of income as a part of devolution process, there has been emphasis on the income from forest in the total household income; but to calculate the disparity in poverty; income from other sources has also been calculated. Variation in income from different sources was also analysed, while it was found that maximum variation was for wage income 93.5 per cent in the Core due to variation in type of work received either in forest department or as wage labour, while within core (62 per cent) and buffer (58 per cent) for agriculture income depends on landholding size. Overall variation in income from forest sources was 66.5 per cent in core and was 60 per cent in buffer due to different type of NTFP available and dependency ratio being high in Core. The higher variation income from forest income was reported also due to variation in prices in the core and Buffer. The prices are fluctuating as price varies due to restriction of entry inside the protected area of the traders. Even though government has fixed minimum support prices (MSP) of NTFP products, but this is not extended to the collectors by the traders.

There is a considerable disparity in the contribution to income from different sources across the different income quintiles. Agriculture and wage labour are the dominant sources of income for lowest and the second lowest quintiles, accounting for three-fourth of the share of income; while with increase in quintile, the share of NTFP increases while wage labour goes down considerably. This pattern of income distribution depicts that the poor households are majorly households doing wage labour and agriculture, while the rich to richer diversify towards NTFP collection. In the case of NTFP collection, the ratio of participation rate to income share increases with income level. This is an important conclusion regarding the diversification of the poor households in the bottom of the quartile as they opt for lower paid, low – return wage labour activities, while the rich to richer tends to be involved more in NTFP based high income activities.
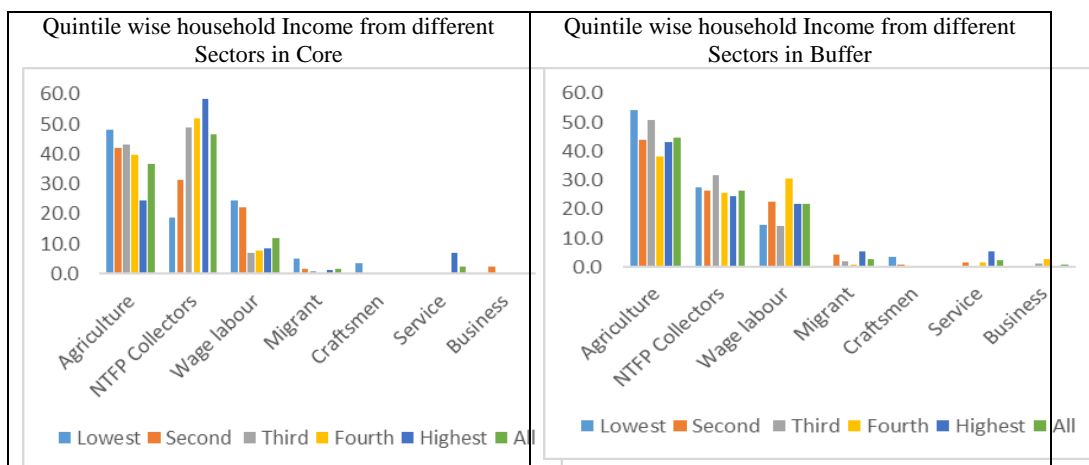
Factors Influencing Household's Dependence on Forests

The Tobit for the Core area and Buffer area is presented in Tables 9 and 10. The effect of family size on the share of forest income in total income was positive and significant at a 5 per cent level of significance in the core area. Being inside the forest and lack of other income opportunities, these households depend heavily on the forest income. Therefore, an effort is made to study the factors influencing the household dependence on forests for income generation and the results are presented in Tables 9 and 10. During survey it is observed that the forest households in the area do not have access to formal credit due to lack of sufficient collateral security like land and less opportunities of crop diversification. The relationship of forests income with various socio-economic factors varies substantially from area to area, village to village, household to household and product to product. Table 6 shows that large part of the income comes from different NTFPs which have to be managed properly to reduce poverty.

TABLE 9: ESTIMATES OF TOBIT REGRESSION IN CORE AGAINST THE SOCIO-ECONOMIC VARIABLES

Explanatory Variables (1)	Coefficient (2)	P value (3)
Constant	0.4596	0.00
Age of HH head	-0.0001	0.90
Family Size	0.0106**	0.01
Land Holding	0.0054	0.31
Land Entitlement	0.0091	0.20
Farm Income	-0.0001***	0.00
Wage Labour Income	-0.0002***	0.00
Total Income	0.0000***	0.00
Number of Observations	210	
Log-likelihood	191.011	

*** and ** indicate $p<0.01$ and $p<0.05$, respectively.

TABLE 10: ESTIMATES OF TOBIT REGRESSION IN BUFFER AGAINST THE SOCIO-ECONOMIC VARIABLES

Explanatory Variables (1)	Coefficient (2)	P value (3)
Constant	0.3642	0.00
Age of household head	-0.0013	0.25
Family size	0.0017	0.84
Land holding	0.0027	0.52
Land entitlement	0.0000	0.61
Farm income	-0.0000***	0.00
Wage labour income	-0.0000***	0.00
Total income	-0.0000***	0.00
Number of observations	180	
Log-likelihood	55.29	

*** indicate $p<0.01$.

Larger the family size, more people would be available for forest related activities and hence can fetch higher share of forest income in total income. Variables such as agriculture income, wages of labour, and income from other sources were found to be negative and significant at 1 per cent level of significance. This implies

there is an inverse relationship between agriculture income and forest income. It is obvious that forest income will decrease with the increase in labour wage and people will prefer to engage themselves in labour wage rather than fetching income from forest.

Importance of Forest Devolution to the Community

Forests have immense value due to its economic sustainability and ecological role they play. These roles have many benefits to the forest dependent communities and are means to endorse the standard of living. Forest benefits are generally categorised into four sub-groups, i.e., provisioning benefits; regulating benefits; cultural and supporting (Morris and Camino, 2011). Availability of firewood is the most perceived benefit of all (100 per cent) and the households collect firewood because of access due to rights. Entitlement to land, collection of NTFPs and Medicines, availability of building materials, etc., are the provisioning benefits. The study has focused on provisioning benefits, and the focus on the other benefits is beyond the scope of this study. The tourism potential of forests is also low due to lack of property or infrastructure provisions in the forest area. Forests have abundant biodiversity, which is fast degrading, and there is a need for more conservation activities. The abundance of resources in Achanakmar Tiger Reserve has not been well appreciated except for the limited consumptive benefits.

Gender is a phenomenon within a society, which works only through institutions which work only when practical but this is subject to change. In a patriarchal society, gender relations are important in resource-based societies. In the resource-based livelihood sector, the majority of work is done by women but they do not have the right to acquire the properties based on their names. Forest productivity has very little discrimination with regard to gender relations for its collection, technology skills, and education, but when it comes towards economics, it is blind. Exploitation in the market and harassment by forest staff is inherent in patriarchy but not explicitly within society.

The Forests Rights Act (FRA) made it mandatory that land entitlement be given in the name of women though their access to means of production (land, capital, market, technology) is very limited. Poverty impacts women, including child nutrition and access to health care. The forest vegetables and tubers, which is gender nutrition, have condensed due to monoculture plantations. As women have a very significant role in the collection of NTFPs, gathering water, fruits, ad foods, they are directly affected by environmental degradation. The more enriched the biodiversity better will be the conditions of children and women. Thus, biodiversity conservation ensures their well-being. The choice of tree plantation is always gender-based, and the priority decision is for revenue-earning trees, which are looked at from a male point of view and, thus, are strongly considered.

Forest Rights Act is not merely settling of rights but strengthening the local institutions and their governance, regulating access, control over harvesting,

marketing of NTFPs, development of villages and generating the traditional forest based employment and uplifting livelihood by enriching biodiversity. However, any such promises have not been fulfilled in Chhattisgarh which is challenged by mining, particularly coal and iron ore and government do not want to look beyond land rights.

IV

CONCLUSION AND RECOMMENDATIONS

The data signifies that though the health of the forest is good, the lack of any forest produce processing units inside the park makes the nature of work as collectors and direct selling to middlemen as NTFP collection does not have any regulated market process, and the middlemen are quite active controlling the forest produce business. The other occupational engagements in household business or as service holders or as bamboo and woodcraft artisans are not significant, but seasonal migrants as a secondary source of income are quite significant in the core area.

The reason is that wage labour employment is confinded to unskilled labour working on a casual basis, while most of the female household members are engaged as NTFP collectors, whose work is mainly concentrated to collection and selling to middlemen. It is very clear that the absence of any regulated market system for forest produce still exists and prominent which should be focused upon. Engagement of people can be more if the government makes an effort to set up any NTFP processing unit or even a millet processing unit, which will give more employment opportunities and can reduce migration.

Poverty is very profound, far-reaching, and even rampant among the PVTGs in Chhattisgarh. These communities are living in the forest area and have a high prevalence of poverty and malnourishment. The Forest Rights Act, a phenomenal act to overcome poverty and disparity in forest-dwelling communities, has failed to achieve its goal of poverty alleviation. The study seeks to identify the source of inequality through the decomposition of inequality indices in the poverty-ridden Achanakmar Tiger Reserve of Chhattisgarh. Accordingly, all the selected households are sub-divided into four categories i.e., a quartile based on the average per capita annual income. Income distribution of all sample households is considered. We have included the income received either in cash or kind. The total income is sub-divided into seven main sources of income, viz. agriculture, wage labour, NTFP collectors, business, migrant labour, craftsmen, and services. Income from services included income obtained from jobs like government and non-government, teaching, forest department, etc. These are regular sources of income. Business income includes net income from shops, selling products from village to village; craftsmen are bamboo artisans doing carpentry or wood art. The migrant labours go outside the village to do menial work. Increasing inequality has major consequences for maintaining sustainable economic growth as well as creating threats to social stability. Continuous increase in disparity has been detrimental to the objective of poverty reduction.

There have to be strategies in development which should be looked at from a gender lens, from the tribal lens, and the democratic framework should emerge in totality for their rights and not as more appendages to policies and planning. The policy of FRA by giving land entitlement is not empowerment but it creates ambiguity. It should have led to making them act as a group for the protection and management of resources.

The study recommends that empowerment programmes and skill development have to be designed and established for forest households, particularly youths, to get engaged in other employment aside the forest-related activities. Access to credit may reduce level of dependency on forests, and provisions of institutional support as well as proper devolution are required in order to ensure the economic upliftment of the Baiga Community in the Achanakmar Wildlife Sanctuary, Chhattisgarh.

REFERENCES

Bourguignon, F. (2004). The Poverty- Growth Inequality Triangle, Paper presented at the Indian Council for Research on International Economics Relations, 4th February, New Delhi- ICRIEC

De La O Campos, A. P., Villani, C., Davis, B., Takagi, M. (2018). Ending extreme poverty in rural areas- Sustaining livelihoods to leave no one behind. FAO, Rome, 84 pp accessed from https://www.fao.org/3/ca1908en/ca1908en.pdf in June 20th, 2023.

Deaton, A., (1997), *The Analysis of Household Surveys: A Micro Econometric Approach to Development Policy,* The World Bank, The John Hopkins University Press Baltimore. MD.

FAO and UNEP (2020). The State of the World's Forests 2020: Forests, Biodiversity and People. Rome. https://doi.org/10.4060/ca8642en

Heubach, K., Wittig, R., Nuppenau, E.A. and Kahn, K. (2011). The Economic Importance of Non-Timber Forest Produce (NTFPs) for Livelihood Maintenance of Rural West African Communities: A Case Study from Northern Benin",. Ecological Economics, Vol. 70, Np.11, pp.1991-2001.

International Institute of Population Sciences (IIPS) and Macro International (NFHS) (2007). *National Family Health Survey (NFHS-3), 2005-06,* Vol-1, Mumbai, India. https://dhsprogram.com/pubs/pdf/frind3/frind3-vol1andvol2.pdf

Kumar, R. (2020), COVID-19 Lockdown Deals Blow to Rajasthan's Tendu Leaf Economy. Down to Earth, May 06, New Delhi. Accessed from https://www.downtoearth.org.in/news/economy/covid-19-lockdown-deals-blow-to-rajasthan-s-tendu-leaf-economy-70901 on 6th August, 2023.

Morris, J., and M. Camino (2011), Economic Assessment of Fresh water, Wetlands and Flood plains (FWF) ecosystem services. UK National Ecosystem Assessment Working Paper, UK NEA Economic Analysis report. From http://uknea.unep_wcmc.org/lonk.click.aspx?fileticket=1VLEq per cent2BXAI per cent2BQ per cent3D&tabid=82 (last accessed on 06.06.2023)

OPHI, (2020). Multidimensional Poverty in Chhattisgarh: A Measure for Action. Oxford Poverty and Human Development Initiative, University of Oxford, accessed on December 21st, 2021 from https://ophi.org.uk/wp-content/uploads/Chhattisgarh_2020_online_4vs.pdf

Rowntree, B.S. (1901), *Poverty: A Study of Town Life*, Macmillan, London, U.K.

Sen, A. (1999). *Development as Freedom,* Anchor Books, New York, U.S.A.

Tetteh-Baah, S.K., Jolliffe, D.M., Lakner, C., Mahler, D.G. (2023), "Where in the World Do the Poor Live? It Depends on How Poverty is Defined", accessed from https://datatopics.worldbank.org/world-development-indicators/stories/where-do-the-poor-live.html on 2nd September.

Sunderlin, W.D. and H.T. Ba. (2005). Poverty Alleviation and Forests in Vietnam, Center for International Forestry Research Proceedings, Bogor, Indonesia.

Svarrer, K., and Olsen, C.S. (2008), "The Economic Value of Non-Timber Forest Products- A Case Study from Malaysia", *Journal of Sustainable Forestry*, 20(i): 17-41.

UNDP, (1990). Human Development Report: Concept and Measurement of Human Development, New York. https://hdr.undp.org/system/files/documents/hdr1990encompletenostatspdf.pdf

Woolridge, J. M. (2009). Introductory Econometrics: A Modern Approach, 5th Edition Cengage Learning India, South-Western Mason, OH, accessed from on 31st May,2023, https://economics.ut.ac.ir/documents/3030266/14100645/Jeffrey_M._Wooldridge_Introductory_Econometrics_A_Modern_Approach__2012.pdf