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Socio-Economic Heterogeneity and Distributional Implications of Joint Forest Management (JFM): An Empirical Investigation from Orissa

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I

INTRODUCTION

In a developing economy like India, the development of rural economy through effective and proper management of common property resources (CPRs) such as forests has increasingly become an integral part of sustainable development policy in the past couple of decades. This policy initiative has, however, become largely popular due to a strong disillusionment with the performance of central management policy to provide sufficient incentives to the users to manage CPRs in a sustainable way. Some scholars (Jodha, 1986; Wade, R. 1987; Chopra *et al.*, 1989; Ostrom, 1990) argue that the well organised community-based institutions can play a significant role in overcoming the socio-economic problems faced by the rural economy and can avoid the tragedy of commons as envisaged by Hardin (1968). Having recognised this proposition, developing countries like India and other South Asian countries have started to support community-based forest resource management through granting community property rights over the local natural resources with a view to enhance local level economic development, poverty alleviation and environmental conservation.

The recognition of community-based forest has led to the devolution of forest resource management from centralised to local level user groups in India (Behera, 2006). In fact, Government of India adopted a participatory approach in management, protection, and development of forest resources under the aegis of Joint Forest Management (JFM) that was introduced in the National Forest Policy of 1988. The stakeholders are ensured property rights in the management of forest resources under the system of JFM. Under this policy initiative, the degraded national forests were handed over to the forest protection committees (FPCs) as community forest under a community-based property rights regime. In response to the national forest policy and to ensure equity and social justice, the state governments, which are responsible for forest management under Indian constitution, have started encouraging the communities living nearby the state forests for formation of forest protection committees (FPCs) under JFM. With regard to implementation of the new forest

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policy, a comparative analysis among the states of India shows that a poor and tribal dominated state like Orissa, which is located in the eastern part of India, is the first state to introduce participatory approach in the forest management by forming a number of FPCs in a bid to revive the degraded forest resources in the early 1990s. Till date, Orissa has the largest FPCs among all the Indian states. However, owing to socio-economic heterogeneity among the households, the distributive consequences of the JFM are likely to be uneven and have become a major subject of discussion as local level collective action.

In this study, an attempt has been made to address the relationship between socio-economic characteristics of households and their access to and benefits from community-based forest resource management under joint forest management (JFM) in India. In order to examine such relationship, a field investigation was undertaken covering 270 households from 12 different villages of four forest divisions of Orissa. The household level benefits were estimated in terms of employment generation, income from small timber and non-timber forest products (NTFPs), and fuel wood collection from the forest under the community management. Further, we have examined the distributional aspects of the JFM in terms of the benefits derived by the rich and poor households by adopting double log regression model.

II

SELECTED REVIEW OF LITERATURE

Poverty, property rights and distributive consequences of community-based management are increasingly becoming a major subject of debate, discussions and investigations, particularly on issues of local level collective action or community-based natural resource management over the past couple of years. One group of scholars advocate that common property resource appropriators can create and sustain the local management institutions that ensure equitable access to, and income from resource management. Furthermore, CPR literature claims that since poor people are heavily dependent on natural resources, they derive higher income and benefits from CPRs. Some scholars, on the other hand, postulate that compared to non-poor, the poor people may depend more on common resources, but in absolute terms their dependency is lower. Thus, the equity consequences of the common property resource institutions receive increasing importance in the various studies undertaken by several academicians over the years. Against this background, of debate pertaining to the CPR management institutions, the following studies are reviewed in brief to highlight the derived results by different scholars over the years.

Anderson (1995) found that wealthy and influential villagers in the control of forest councils use these resources for their personal use and poor do not gain from this JFM. A study based on the 180 households in 20 villages of Andhra Pradesh found that the rich households get larger chunk of income from the commercial exploitation of NTFPs by influencing the decision of the FPCs in their favour.

In a similar study, Hill and Shields (1998) observed that community incentives in JFM in India are not so clear-cut. The study undertaken by them is based on 130 households in Andhra Pradesh, Madhya Pradesh and Rajasthan based on the random sampling technique method. The findings of the study show that the main losers in the JFM are fuel wood head loaders who are often from the poorest sub-group within the village studied. On the other hand, Sreedhar and Bhaskar (2000) had sought to analyse the impacts of Joint Forest Management (JFM) in Anantpur Forest Circle in Andhra Pradesh on forest rejuvenation and livelihoods of participant households while focusing on equity and sustainability of JFM. The study was conducted covering a sample of 10 per cent of Vana Samrakshana Samithis (VSS) by using a combination of observation and interview methods. It was found in the study that JFM had considerable impact on forest regeneration and on the livelihoods of the participant households encompassing economic, social, political, and environmental domains. The forestry works alone generated as much as Rs. 1.89 lakh person days of additional employment through which a sum of Rs.75.4 lakhs was paid to the members in the form of the wages. Furthermore, some members could benefit by the sale of non-timber forest products (NTFPs) while others could take up subsidiary occupations. Besides these, the VSS activities paved the way for the emergence of collective and social consciousness among the people, creating a positive attitude towards education, health, family planning and gender equality. In the same way, the VSS contributed to the emergence of leadership among men and women at the grassroot level. They were also successful in making the people environment friendly. However equality has been the built-in component of JFM in the sense that over 90 per cent of the expenditure incurred on forest works is being paid to the members in the form of wages. In addition, the income generating programmes (IGPs) taken up by the women groups were only of small scale in nature because of the meager funds at their disposal. These need to be scaled up through the mobilisation of outside resources by undertaking capacity building programmes. It was also found that the people's involvement was not upto the desired level and effective community participation, flexibility in operation and promotion of IGPs through the women groups need to be ensured for the sustainability of JFM. This calls for immediate attention of the forest department to initiate appropriate measures.

In a study, Kumar (2002) found that it is the rich who gain under the joint forest management (JFM) over 40 years time horizon and poor are the net loser in this process, using cost benefit analysis in six villages of Ranchi district in Jharkhand state. The study uses 2.93 per cent social discount rate while estimating the future cost and benefits at present value in terms of social preference to different stakeholders. The low SDR is justified in the study that the future flow of forest in perpetuity is not reduced while extracting as much as forest produce as we desire. The 40 years time horizon has been taken in this study keeping in mind the long gestation period of the forestry projects. In addition, the different weights of 0.58, 0.82, 0.88, 1.34, are attached to different households by stratifying the households

into large farmers (more than 4 ha of land), medium farmers (2-4 ha), small farmers (1-2 ha), marginal farmers (upto 1ha) and landless farmers respectively.

The study has failed to quantify the externalities such as biodiversity conservation, control of environmental pollution, aesthetic and cultural values, etc., while estimating costs and benefits of joint forest management (JFM) forest projects in the studied villages. Moreover, the stratification of households into four types considering only the land ownership mentioned above and following the classification norms of the World Bank is not appropriate for this study. The classification should have been made by taking into account other household endowments such as livestock, income from non-land assets, etc. so that it could have become more appropriate in this context. Apart from this, the number of classification should have been confined to two: rich households and landless and poor households so that considerations of equity could have become quite clear.

In a study of two districts of Nepal, Adhikari (2002) made an attempt to find out the distributional consequences of the community-based resource management on multiple users and stakeholder groups in the region using some econometric techniques. The study was based on the primary data collected from a survey of 309 households from the mid-hills of Nepal where community forestry intervention has been implemented for the last two decades. The findings of the study suggested that the poor stakeholders are currently benefiting less from community forestry than the relatively better off households. In addition, both annual average gross and net income from community forestry is higher for richer and middle income households. The econometric results show that some socio-economic variables of the resource using group place stringent limits on the extent to which certain groups are able to gain access to and benefit from collective action. In other words, income from common property forestry is directly associated with household's private endowments.

Ironically, while investigating the potentiality of CPRs such as forest resources, in a poor state like Orissa, Rath and Sahu (2004) have identified that there is a good scope for harnessing of CPRs in Orissa. They found that proper utilisation of CPRs would bring improvements in the standard of living of the people, particularly the poor landless labourers and tribals in terms of increasing employment and income generation opportunities for them. Further, they have argued that the very success of rural development policy depends on the active people's participation and stakeholders should be granted more management rights over the CPRs, more particularly in the rural area.

From studies reviewed it is apparent that the debate of distributional outcome of CPR institutions is yet to be settled properly setting aside the conflicting views in this regard. Realising the significance of this issue of JFM we have made an attempt to address this issue by adopting double log regression model in our study.

III

STUDY AREA, METHODOLOGY AND DATA COLLECTION

The study area chosen is Orissa, a state where forests and tribal economy play a crucial role, which is situated on the east coast of India along the Bay of Bengal. The state has a large number of tribal population (15.8 per cent of the total population of the state), who primarily depend on forests and other natural resources for their livelihood. It has a geographical area of 155,707 km^2 that constitutes 4.7 per cent of the country's geographic area. It lies in the tropical zone between latitude 17^0 47′ and 22^0 34′ N and longitude 81^0 22′ and 87^0 29′ E. The average annual rainfall varies between 1,200 mm to 1,600 mm and the average annual temperature ranges between 25.0^0 C to 27.5^0 C. The state can be divided into four distinct physiographic regions, viz., Northern Plateau, Eastern Ghat, Central table land and coastal plains. The state is served by three major rivers, the Mahanadi, the Brahmani and the Baitarani. The State is endowed with rich mineral and forest resources, it has a coastline of 480 km. and a continental shelf area of 24,000 sq. km.

An examination of the forest coverage area of major states in India reveals that the state of Orissa is well endowed with forest resources in comparison to other major states of India. It is the third largest state in terms of forest coverage area in India, which accounts for 7.38 per cent of the total forest area in the country. Madhya Pradesh accounts for the largest forest cover of the country (i.e., 20.68 per cent), followed by Arunachal Pradesh (10.80 per cent), Maharashtra (7.32 per cent) and Andhra Pradesh (6.94 per cent). However, the seven North-eastern states together comprise 25.70 per cent of the total forest coverage area.

Though the forest area in the state during 1998-99 was 58,135 sq. km., which constitutes 37.34 per cent of the total geographical area of the state, it had declined over years. As per the *State of Forest Report, 2003*, the state has only 48,366 sq km. of forest cover, i.e., 31.06 per cent of the total geographical area of the state. Further, the grouping of the forest area into different components shows that 28,170 sq km is dense forest and 20.19 sq km. is open forest. In fact, though the recorded forest areas constitutes about 37.34 per cent of the total geographical area of the state, actual forest cover exists over only 31.06 per cent of geographical area and out of this 12.97 per cent is open forest. The National Forest Policy stipulates that 33 per cent of the geographical area should be under forest cover. With a view to enhance the forest coverage area, the State government has initiated many measures and in compliance with the provisions made by the National Forest Policy of 1988, it has promoted many Forest Protection Committees (FPCs) in different forest divisions of the state. After the Joint Forest Management (JFM) resolution implemented by the state government, so far there have been 15,985 FPCs formed in the state and they are involved in taking care of the management of around 8,21,504 hectares of state forests area across the twenty-seven forest divisions of the state.

In spite of these natural endowments, the state is regarded as one of the most backward states in India. The state's economy is characterised by low per capita income, low capital formation, and inadequate exploitation of plentiful natural resources and poor development of socio-economic infrastructure. Moreover, poverty along with severe unemployment is also widespread in the state. As per the estimates of the Planning Commission, 47 per cent of population is below the poverty line in contrast to all-India average of 26 per cent. Unemployment is also a formidable problem. It had been estimated that the total backlog of unemployment at the beginning of 1999-2000 was of the order of 8.27 lakh. The magnitude of unemployment would be severe in future owing to growing population and lower employment opportunities being generated in the state. It is also observed that the God gifted natural resources are yet to be fully utilised by the state over the last five decades to mitigate the magnitude of poverty and unemployment, due to a number of social, political, economic and climatic factors.

The study was carried out in four forest divisions of Orissa where community-based forest resources management institutions under the aegis of JFM have been established since early 1990s. Multi stage sampling method was adopted to select the study villages. For this study, twelve FPCs from four forest divisions are selected, of which six FPCs (Kendumundi, Kandhakhal, Bhezapadar, Hatikut, Budhikhamari and Khasadiha) are located in the tribal dominated districts of Kalahandi and Mayurbhanj and the rest six FPCs (Sudhasahi, Baniasahi, Madanmohanpatna, Kushapplah, Bimpada and Kotpallah) are situated in the non-tribal districts of Angul and Khurda. The following map shows our area of study.

Map showing the location of the study area

The land use pattern of the study villages are categorised as cultivated land, area not available for cultivation, village forest area, and culturable waste and grazing land. Apart from this classification these three villages have provided access rights to the protection and management of the state forests. Though the caste structure is heterogeneous and comprising various castes, such as, *Brahmins, Khandayats, Sudras* and *Tribals*, but the tribals constitute the dominant group among the two tribal districts whereas the non-tribal form major caste in the other two non-tribal districts. Moreover, it has been found that a large proportion of the total population in these villages are subsistence farmers and forest dwellers. The immediate source of livelihood of the study area is the collection and selling of NTFPs, such as fuel wood, bamboo, *Kendu leaves*, *Sal leaves*, *honey*, *gum*, *lac*, *mahua* flower, medicinal herbs, etc.

The study is based on primary and secondary sources of data. Under secondary data, information about total FPCs villages and the history of their establishment, their land use pattern, demographic trend, and access to forests resource were collected from their respective forest blocks. Primary data on household level variables, their dependency on forest and management of community forestry were randomly collected in 12 villages through a semi close ended household questionnaire for a period of two months from January to March 2005. The main criteria for the categorisation of the households are: land owned, number of livestock ownership and income from off-farm activities. The household is classified into three major categories, namely, medium, small and marginal farmers and landless poor agricultural labourers. A total of 22 per cent households are randomly selected from each FPCs. In the field investigation 318 households are covered by using semi-closed questionnaires covering three important areas: demographic, landholding and off farm production activities and their participation in the natural resource management and utilisation.

IV

INCOME AND EMPLOYMENT FROM THE FOREST UNDER JFM

The total dependency of households on the forests has been calculated by summing up the total income derived from both fuel wood and small timber, and NTFPs. The trend of average total income received by the households who are actively participating in the FPC activities is presented Table 1.

An examination of the data in the above table indicates that the poor and landless farmers along with small and marginal farmers get maximum benefits in terms of income from the forest resources which are being managed by the FPCs. While the medium farmers earn about 9 to 13 per cent of their income from forest resources managed by FPCs across the study villages, the poor and landless farmers earn 54 to 64 per cent of their total income from the forest resources except in two villages, such as, Kendumundi of Kalhandi forest division and Mandal Singh of Khurdha

TABLE 1. AVERAGE TOTAL INCOME GENERATED BY THE GROUPS FROM FOREST PRODUCES

(*Rs. per annum*)

Groups / Name of Village/Division (1)	Medium (2)	Small and Marginal (3)	Poor and landless (4)
Khurda Forest Division			
Kusapalla	4890	6590	7240
	(12.54)	(32.00)	(60.00)
Kotpalla	4720	6660	7220
	(11.25)	(33.50)	(60.12)
Mandal Singh	2100	3110	4620
	(9.50)	(16.50)	(42.00)
Anugul Forest Division			
Madan	2410	6220	7235
Mohanpatana	(10.06)	(31.21)	(60.20)
Baniasahi	2130	5660	7456
	(10.25)	(31.56)	(61.50)
Sudhasahi	2100	4840	6685
	(9.75)	(25.5)	(54.78)
Baripada Forest Division			
Hatikut	6200	8524	9700
	(12.50)	(36.00)	(63.50)
Khasadiha	5805	8330	8620
	(13.45)	(35.45)	(64.56)
Budhikhamari	5605	8170	8570
	(12.28)	(54.00)	(64.90)
Kalahandi Forest Division			
Bhejapadar	4010	6110	7460
	(9.35)	(32.00)	(60.23)
Kandhakhal	4910	6344	7720
	(11.45)	(31.46)	(60.45)
Kendumundi	2110	3765	4000
	(9.23)	(18.78)	(31.00)

Notes: (1) Total income from forests under FPC comprises both income from fuel wood and small timber and NTFPs.

(2) Figures in parentheses denote the average income from forests as a percentage of total income of the households per annum.

forest division, where the FPC is not effective. Further, the small and marginal farmers get around 32 per cent to 36 per cent of their total income from the forest resources except in three villages, viz., Mandal Singh, Sudhasahi and Kendumundi, where less than 18 per cent of their total income per annum comes from forest resources due to absence of effective FPCs. It is clearly evident from the above analysis that the poor and landless farmers gain maximum benefits in terms of income from the forests resources being managed by FPCs in most of study villages.

The data in Table 2 establish the fact that the poor and landless households substantially gain from the employment opportunities generated due to the effective and proper functioning of FPC in our study villages. It is found that the poor and landless households gain more than 150 days of employment in the forest-related

activities per annum in Kusapallah, Kotpallah, Madanmohan Patana, Hatikot, Khasadiha, Budhikhamari, Bhejapadar and Kandhakhal. In fact, FPC is very effective and successful in these villages and the implementation of micro plan and proper commercialisation of NTFPs are instrumental in creating huge employment opportunities throughout the year for all the participants irrespective of their standard of living. Furthermore, it is found out that the small and marginal farmers also get substantial number of day's employment from the forest related activities. Therefore, it can be concluded that an effective FPC plays a pivotal role in generating ample employment opportunities and income compared to the ineffective FPC in the study area.

TABLE 2. TREND OF AVERAGE EMPLOYMENT GENERATED FROM NTFPS AND MICRO PLAN

(No. of days)

Farmer and labour / Village name (1)	Medium farmers (2)	Small and marginal farmers (3)	Poor and landless (4)
Kurdha Forest Division			
Kusapalla	88	132	168
Kotpalla	90	130	175
Mandal Singh	58	84	104
Angul Forest Division			
Madan Mohanpatana	74	132	184
Baniasahi	52	74	104
Sudhasahi	46	66	110
Baripada Forest Division			
Hatikot	95	144	192
Khasadiha	92	136	180
Budhikhamari	88	130	165
Kalahandi Forest Division			
Bhejapadar	86	112	168
Kandhakhal	78	110	154
Kendumundi	48	62	94

Note: The level of employment from forests under FPC comprises employment from forest-related activities such as collection of forest produces, and wage employment from micro plan in the villages undertaken by the FPC along with forest department.

V

REGRESSION MODEL AND RESULT ANALYSIS

In this section, the objective is to examine the distributional implication of participating in the community-based forest management in the study area. The regression analysis is carried out here to find out the relationship between the appropriation of benefits from the forests and the socio-economic heterogeneity of the members of FPC. In the review of literature, it is evident that the rich households

or large farmers are gaining more from the community-based forest management under JFM in contrast to poor and landless households. With a view to test this view as held by many scholars we have hypothesised that the household level benefits from forests managed by FPC under JFM is positively related with household endowments, i.e., socio-economic status. Therefore the variations between different income groups with respect to the forest product entitlement can be illustrated by their socio-economic status of households who actively participate in the FPC activities. The possible socio-economic variables which play a significant role in appropriating benefits from the forest under JFM can be represented as follows:

FOREST PRODUCT$_{ij}$ $(p \sum_{i=1}^{n} y_{ij})$ = f (household labour$_i$, house landholding $_i$, household livestock unit$_i$, household caste $_i$, household education $_i$, household head age $_i$, house leadership quality $_i$, exit option $_i$, distance between forest and household $_i$, transaction cost $_i$)

Symbolically,

Y = f (HC, HGEN, HAGE, HS, HEY, HLO, HLQ, HTO, H LIVEST, DHHF, TCOST)

Where j = forest products (firewood, small timber and many non-timber forest products) and i = 1,……n observations. The p is the price of forest products collected from forests is the forest products received by the households by participating in the forest resource management. The dependent variable, forest product (p * Y) measures the total income of household obtained from community forests in the form of the collection and selling of fuel wood and NTFPs under FPC.

HC = Caste of the household (Ethnicity). Dummy variable =1, if the households belongs to upper caste, =0 otherwise,

HGEN = Gender of the household head. Dummy variable =1, if household head is male, =0 otherwise,

HAGE = Age of the household head,

HS = Household size measures by the number of persons in workforce. The household labour is denoted by the number of persons in a household who are above six years old,

HEY = Educational level of household head measured as the number of school years,

HLO= Agricultural land owned by the household,

HLQ = Household leadership quality. Dummy variable = 1 if the household head is a member of executive committee of FPC, otherwise =0.

HTO= Number of trees owned by household for timber and fodder purposes,

TCOST = Transaction cost incurred to household in the process of participating in the FPC activities. The transaction cost (TCOST) per year is implicitly derived from the number of days spent by the households on the various obligatory forest activities. The activities include attending monthly FPC general body meeting, management of community funds, and undertaking some official works related to FPC.

DHHF = Distance between household and forests under FPC.

In the beginning of the analysis a simple regression analysis had been adopted to establish a relationship between the income received from the forest resources and socio-economic status of the households, but it was found that most of the coefficients were robust. To rule out spurious results, double log regression model (Gujurati, 2003) has been used to unearth the distributional implication of income obtained from various households from FPC managed forest resources. By taking log of both sides of equation we will have,

$$\ln (p \sum_{i=1}^{n} y_{ij}) = \beta_0 + \beta_1 HC + \beta_2 HGEN + \beta_3 \ln HAGE + \beta_4 \ln HS + \beta_5 \ln HEY + \beta_6 \ln HLO + \beta_7 HLQ + \beta_8 \ln HTO + \beta_9 \ln H LIVEST + \beta_{10} \ln DHHF + \beta_{11} \ln TCOST + u$$

Where, u = Error term.

The coefficients (βs) measure the elasticity of the explained variables with respect to the explanatory variables except some dummy variables which are used in the above regression model. Each coefficient of the above equation implies that a percentage change in explained variable with respect to 1 per cent change in the explanatory variables.

The estimated equation is as follows:

$$\ln p \sum_{i=1}^{n} y_{ij} = 9.535 - 0.979 HC + 0.002 HGEN - 0.329 HAGE + 0.570 HS - 0.128 \beta_5 HEY - 0.248 HLO + 0.052 HLQ + 0.045 HTO + 0.0229 \ln H LIVEST - 0.377 DHHF - 0.021 TCOST$$

The results for the determinants of household income from community managed forests is provided in Table 3. The R square is moderate i.e., 46 per cent and the adjusted R square is 44 per cent which explains 44 per cent variation in the income level received by different households (which is acceptable in the cross section data). A perusal of the above table reveals that most of the variables such as caste of the households, education, household labour, household landholding, and livestock are significant apart from constant, but these do not have expected signs except household labour, education level and livestock. An interesting finding of this

estimation is that household level income from the community forests is negatively related to the amount of land owned, caste, age, trees owned, years of education of the head of the household, distance between forests and household, transaction cost days spent by households in various FPCs management related activities and obligations. The size of landholding (HLO) and livestock (HLIVEST) are significantly related to household income from FPCs forest resources. However, the HLO has negative sign which is unexpected, and states that rich farmers get less benefits vis-à-vis poor. Further, HLIVEST has positive sign which is expected and entails that those who own more livestock get higher benefits from the forest under JFM in the form of fodder. It can be established that differences and variations in the benefits from FPCs managed forests is strongly correlated with the differences in agricultural assets. Furthermore, lower caste households gain more benefits from the FPCs managed forests than the higher caste households. This view can be illustrated by the observation that the poor and landless people who engage themselves in the community forest activities throughout the year because they do not have private land or assets to depend upon to meet their livelihood requirements. It is also found in the study area that the poor and landless also have larger livestock than the rich farmers. The income from livestock constitutes one of the important sources of income of the poor households in the forest region because the rearing can be easy due to the availability of fodder in the forests. In addition, the poor and landless farmers have surplus labour and opportunity cost of labour is lower compared to the rich households. Therefore they spend more time in forest related activities and get more

TABLE 3. ESTIMATED RESULTS OF DOUBLE LOG LINEAR REGRESSION MODEL

Independent variable (1)	Income from forests (Y)			
	Coefficient (2)	Standard Error (3)	t-ratio (4)	P-value (5)
Constant	9.535	0.773	12.330	0.000
HC*	-0.979	0.132	-7.410	0.000
HGEN	0.002	0.186	0.010	0.989
HAGE***	-0.329	0.180	-1.830	0.069
HEY***	-0.128	0.070	-1.820	0.071
HS*	0.570	0.153	3.720	0.000
HLO*	-0.248	0.093	-2.670	0.008
HLQ	0.052	0.181	0.290	0.774
HTO	0.045	0.430	1.050	0.290
H LIVEST*	0.229	0.093	2.460	0.014
DHHF*	-0.377	0.023	-8.640	0.000
TCOST	-0.021	0.023	-0.860	0.389
R^2 = 0.466, Adjusted R^2 = 0.443				
F(11,253) = 20.40				
Number of observations =270				

Note: *, and *** indicate level of significance at 1, and 10 per cent level, respectively.

benefits from the FPCs forests compared to the rich and medium farmers who primarily depend upon their cultivable land to meet the substantial livelihood requirement and have very high opportunity cost of labour. The household size is positively related to income from FPCs forests and it turns out to be significant. This finding implies that the higher family size, which has large amount of surplus labour, derive larger benefits from the forests.

Though the gender sign comes out positive as it was expected, implying that household headed by male has a positive relationship with the income level from forests, there is no significant relationship between these two. It is also observed that the women have little influence on the decision making of the FPC. The regression result shows an inverse relationship between age of the household head and income from FPC forests. Households headed by aged persons benefit less from the forests than those with younger ones. The coefficient of the age variable is statistically significant at 10 per cent level. Education level of the household is negatively related to forest income. It implies that better educated households may have better income earning opportunity outside the FPC managed forests and forest extraction related activities may be less attractive for those households. The leadership quality of the households has no significant relation with the income from forests though both share a positive relationship. It is also interesting note that the number of trees in private land "an exit option variable" is positively related to forest incomes received by households but the relationship is not significant one. However, this result indicates that households rely on forest products from FPC managed forests whether or not they have trees on their private land. Thus demonstrates that households who enjoy 'exit option' opportunities are deriving benefits equally from community managed forest resources.

There is a positive and significant relationship between livestock ownership and income derived from the forests. It is observed that the poor and landless households, who have larger animal wealth, derive more benefits in terms of fodder and leaves from the forests. Since they have easy availability and access to fodder, they prefer to own more livestock as an important source of income. Regarding the distance variable, it is assumed that distance involves walking and carrying the forest products which is obviously difficult with increasing resource scarcity. The distance variable turns out to be negative and significant as it was expected before. This implies that the income from forests increases when the distance from households to forests is less and vice versa. The transaction cost variable (TCOST) shows a negative relation to the benefits derived from the forests under FPC management and but turns out to be statistically insignificant and can therefore be ignored.

Interestingly the findings of the study show that the poor and landless and lower caste households derive larger income and benefits from the forest resources under the management of FPC in our study area. The findings do not support the hypothesis that rich and higher caste households are getting more benefits in terms of income

from fuel wood and NTFPs from the FPC managed forest resources under the aegis of joint forest management policy.

VI

CONCLUSION AND POLICY IMPLICATION

The results of the study are very interesting and have significant policy implications. In this study, we examined the relationship between the socio-economic characteristics of our sample households with income from the JFM managed forest. It is found that the poor and landless households derive larger benefits from the commercial exploitation of NTFPs in contrast to the rich households. Further, the larger number of employment opportunities generated from community forest goes to the poor and marginal groups.

The results relating to the distributive outcomes of forest management by FPCs suggest that the impact of inequity in land holdings tends to get reduced by access to community forest resources. The size of the landholding has negative effect on the income accrued from JFM, whereas the livestock ownership has positive effect. The higher the size of landholding, the less would be the income accrued from JFM. Similarly, the more educated tend to have less income from forests under FPCs, and lower caste households tend to have more income from forests.

It can be concluded from the findings of the double log regression model that the distribution pattern of benefits from the FPC managed forest resources under JFM policy framework is socio-economically equitable in our study area. The distribution pattern is pro poor, in favour of the under privileged sections of the society who heavily depend on the CPR such as forest for their livelihood requirements and maintain a symbiotic relation with it.

The important policy implication of this exercise is that both the state and central government should encourage the stakeholders to form community based management institutions like FPCs under JFM policy for proper and effective utilisation of CPRs by adopting participatory approach in the rural area. The governments should integrate this JFM policy with our ongoing poverty alleviation programmes in the forested area by providing both financial and logistic support for the effective management of the forest resources to accomplish the sustainable development goals in the forthcoming years. Further, it should vigorously implement JFM policy in the tribal and poverty-ridden forest areas with a view to generate additional income and employment base of the rural economy. JFM should be encouraged in the tribal areas of India to empower them and more and more FPCs should be formed to participate in the management of CPRs, such as forests, whereby both physical as well as socio-economic environment will improve significantly.

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