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STATUS OF JOINT FOREST MANAGEMENT IN INDIA: SOCIO-ECONOMIC DETERMINANTS OF FOREST PARTICIPATION IN A DYNAMIC OPTIMIZATION SETTING

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Abstract
Protection of forest resources presupposes active participation of forest dependent communities. Active participation in forest conservation activities requires a sense of commitment, attachment and motivation on the part of the forest dwellers. In this paper a dynamic optimization model is employed to focus on the likely socio-economic determinants of participation. On the basis of a case study in a remote rural region in India, index of determinants of participation and actual participation indices are derived and found to be only moderately correlated. Despite the existence of small size, low quality agricultural land and irrigation facilities that encourage participation, poor level of social cohesion, absence of awareness and implementation of forest extension programmes, lack of motivation by forest committees, non-government organizations (NGOs) and Panchayats, fear of eviction from forest land, biased administrative machinery and lack of trust in the unjust efforts of forest department etc. stand in the way of effective participation by villagers and need immediate policy intervention. Grant of permanent tenurial right to forest dependent people, mitigating the fear of eviction, extension of various support facilities and ensuring a cohesive trust between forest department and forest protection committees seem most urgent for ensuring meaningful participation

Keywords: *forest, participation, determinants, trust, eviction, India.*

Introduction

There is no doubt that forest resources in India usually identifiable with the features of common property resources, offer multiple benefits to people in general and rural people in particular, as evident from various market and non- market values associated with its diverse economic, ecological, social and environmental benefits. So it is all the more desirable that such a kind of resource be well managed in a sustainable manner as it is organically linked to contribution towards a substantial volume of rural livelihood, eradication of poverty and inequality, maintenance of ecological stability and biodiversity as well as promotion of socio-cultural cohesion in rural community. The

importance of finding a better management option of forest resources further emanates from the fact that many of its services are irretrievably lost, once they are degraded by untoward human intervention. The search for an ideal management structure of forest resources shorn of its abuses, has undergone evolutionary changes as evinced in the dismantling of erstwhile state and private management regime of such resources. State management is nowadays viewed as beset with several weaknesses as manifest in its failure to contain degradation of about 41% of India's forest. Apart from this, requirements of maintaining a complex chain of bureaucratic link at different stages, emergence of corrupt practices, difficulty in gathering information from forest localities and proclivity of forest guards to take bribes etc. often stand in the way of smooth and efficient state control of forest. Private management is also not warranted as this would engender inequity and social instability in forest society by depriving the marginalized section of forest dwellers of their hitherto enjoyed right to access to forests. So the recent focus has been on the cooperative management of forest based on coordination of actions between forest department and forest dependent communities having the traditional knowledge of forest conservation.

Earlier in the immediate post independence time, forest management in India evolved with a stress on commercial plantation, thus relegating the development and conservation needs of forest communities. It was first in 1972 that the success of the alternative model, based on Arabari experience, triggered the Government of West Bengal to launch on an ambitious programme of regeneration of some 259,000 ha of Sal forests in the Western Circle of the state with the involvement of local people under the institution of joint forest management (Singh 1994). Throughout the 1980s there was a strong wind of forest conservation initiated by the forest conservation act. In West Bengal and in some progressive states, the respective Governments pursued the experimental design of allocating a specific area of forest together with participatory management responsibilities to local communities while pledging a share in the forest revenues and access to non timber forest products (NTFPs). The phenomenal success of Arabari experience and its replication in W.B goaded the Ministry of Environment and Forest, Government of India (GOI) to propagate a policy circular in 1990 in pursuance of the National Forest Policy of 1988, that recognized the need to involve local people in the forest management. Accordingly, in a number of states like West Bengal, Haryana and Gujrat, the forest department introduced the practice of joint forest management (JFM) by bringing the forest people into collaborative participation in matters of sustainable forest management instead of the erstwhile practice of regulating their actions. JFM has now emerged as the most pervading institution of conserving forests throughout India with its operation spread over 27 states, 85,000 forest

protection/village committees and having a coverage of about 17.3 million ha of forest resources. Its objective is to ensure protection and preservation of forested land with possible positive impacts on enhancing rural livelihood. It is devised to serve as an ideal mode of participatory development in developing forestry and watershed in India. Its impact is supposed to be felt in promoting environmental sustainability, economic betterment and socio-political empowerment of the poor rural masses inhabiting in forest fringe areas.

The genesis of the idea of JFM lies in the realization that this new management institution needs to relieve the people in forest region of the hitherto existing authoritative and restrictive role of the state forest department and bring them in its confidence by acting together. JFM involves sharing of responsibilities and rights of local communities and forest department (FD) as primary stakeholders in forest management system. It is also supposed to invoke active participation of local people and application of their traditional wisdom and knowledge in countering ecological and economic vulnerabilities in the form of soil erosion, drought condition, loss of soil productivity and scarcity of timber, fuel wood and NTFPs like food, fodder, plant leaves etc. which are very likely to have a worsening impact on rural peoples' livelihood including the tribal folk. Micro planning of various dimensions in arresting fast depletion of forest land, regeneration of degraded forest and development of watersheds, ensuring conservation of valuable and important species of forest timber and products seem to be of utmost importance in sustaining forest based livelihood. These may be well served in the structure of JFM through community's active involvement coordinated by the efforts of FD.

Institutionally there is a sharp difference between JFM and CFM (community-based forest management). The former can be visualized as an institution of supposedly mutual collaboration between the FD as owners and the forest community represented by FPC (forest protection committee) as the users of the forest. The FD plays the role of a facilitator with shared responsibilities and accountabilities and a provision of revenue sharing between them. In the latter system the community is the sole controller and user of the forest with preservation concerns while the state assumes the role of a tacit observer with moral support. The provision of cost sharing, mutual monitoring and provision of inputs for forest regeneration by the FD in the JFM allows it to spread risk and be more cost efficient compared to CFM which entails little financial stake of the Government and the onus of all sorts of burden involving managerial, financial and conservational rests with the community. Although peculiarities of local conditions influence the success of either of these options, an ideally served JFM with flexible and negotiable conditions between the two parties is likely to make forest management

system more resilient compared to CFM where FD is relegated to a minimal role. However, despite the lofty goals expected to be achieved out of this institution, meaningful participation of communities in the micro-planning process is often short of the desired level, with greater heterogeneity across different rural groups and lack of adequacy in the determining factors conducive towards a better participatory attitude. In many cases forest communities still tend to use forests mainly as a safety net during difficult economic condition or for meeting seasonal subsistence needs (such as fuel wood and fodder) rather than tapping the potential of forests as a perennial source of improving rural livelihood through its forward and backward linkages to non-farm occupations. Understanding of the factors influencing the participatory involvement of local people for sustainable forest management seems to be of great importance. In this context it seems imperative to analyse the participatory status of the forest dwellers in a locality dominated by the tribal population most of whom are supposed to be having an organic relation with forest for maintaining their livelihood. The objectives of the paper are (a) to focus on the determinants of forest participation activities, (b) to derive actual participation indices for the considered villages, (c) To analyse the association between the status of determinants and actual participation indices across the villages, and (d) to focus on the factors that may be controllable for enhancing the degree of participation. The paper is organized along the following sections. The second section is devoted to a study of related literature. The third focuses on the study area, data and methodology. The fourth section analyses the factors determining the status of participation. The fifth section is devoted to deriving the forest participation indices in the respective villages. The sixth section analyses the degree of relationship between actual status of determinants and participation indices. Concluding observations and policy suggestions are provided in the seventh section.

Literature Review on Participation

As a general definition Paul (1989) views participation as an active process by which beneficiary/client groups influence the direction and execution of a development activity in order to enhance their well- being in terms of income, personal growth, self-reliance or other values they cherish. Naik (1997) points to the importance of peoples' participation in the success of the implementation of JFM. Using a theoretical model he suggests that the extent of participation depends on a host of factors like expected levels and changes in net earnings to labour from JFM and alternative enterprises, their degree of co-variation, expected share of profit from JFM activities , prevalent interest rate, the degree of risk aversion of the households and total household labour endowment. As determining constituents of these factors,

he focused on the quantity of forest land, yield from forest, development of market including processing facility, good leadership and collective action in the village, provision of sharing of forest produce, etc., relating to profit prospects from forest land. Again, low incomes are likely to induce higher participation in JFM if there is high risk associated with agriculture. Apart from this, the quantity and quality aspect of resource endowment are likely to be major factors influencing participation in JFM. Gupte (2004) finds that cultural plurality, existing caste systems and gender dimensions in India really cause great uncertainties for the success of participatory modes. Strict hierarchical social stratification in traditional rural societies, differences in value system, extreme socio-economic disparity exposed in the form of existence of pockets of affluence amid abysmal poverty and lack of awareness of specific rights and opportunities of different stakeholder groups often result in alienation of some marginalized, weaker section of population from the participatory institutions. Based on an empirical study in Indian villages, she contends that gendered structure in local institutions often stifle the ability of women to effectively participate in policy making and their implementation. While elaborating on the concept of participation, Narayanan (2003) questions the efficacy of this approach in reflecting the degree of interest of marginalized section of people amid the existing skewed type of power relations. He refers to the idea of authentic participation that ensures the effective heeding to the voice and expectations of hitherto excluded group of people for developmental programmes. In order to dismantle the existing power relations detrimental to empowerment of poorer section, the importance of participatory rural appraisal (PRA) in evolving a truly participatory, non discriminating and empowering status among the stakeholders is addressed. However he points out the naivety of PRA tools being universal and neutral to technology, society and polity, that leads to the under-estimation of the complexity and deep-rootedness of local power relations. Apart from the existing mal-distributive power structure caused by the prevalent, sharp socio-economic disparity, the complex web of power-relationship amongst the policy makers, administrators, implementers and the community also exacerbates the malfunctioning in the process of participation. A JFM institution, if intended to be implemented sincerely, needs be preceded by nurturing community participation with a proper reckoning of the socio-economic, political, cultural and ecological variables that influence the JFM (Mukherjee 1998). Participation by villagers across all income classes is conditioned by initiation, motivation and facilitating efforts on the part of forest department officials and a community friendly attitude on their part; also prominent are tact, broad vision and long experience of work involving the different segments in the community. A household's willingness to effectively participate in forest management in the context of

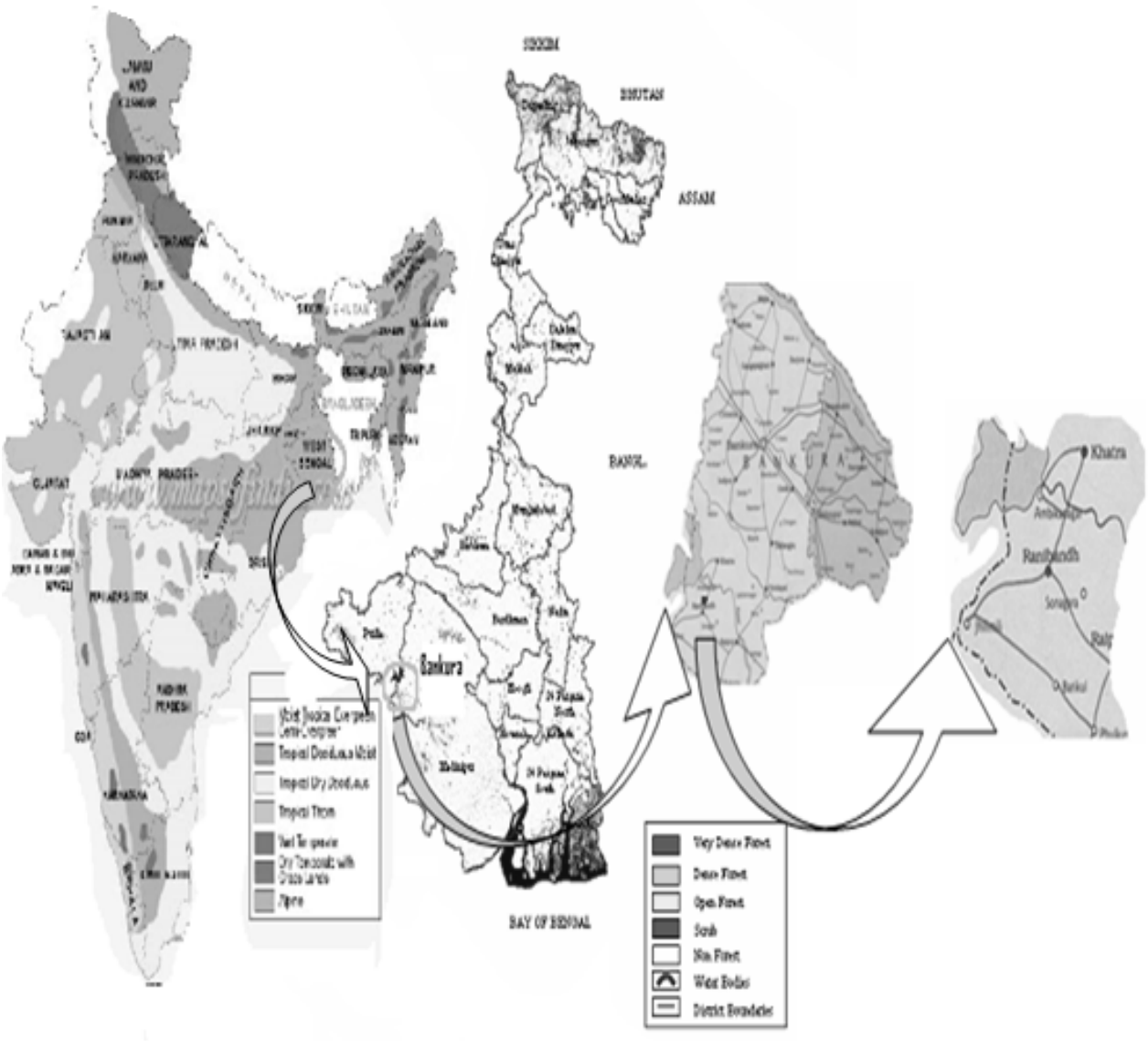
Burkina Faso is analysed by Brannlund *et al.* (2009) through consideration of a multinomial choice model. Participation (or non–participation) in forest management is supposed to be influenced by different household characteristics, perceived security about land use-right and proximity to forest. The variables that emerge important are listed as membership in community based forest management institutions, security of land use right and training. Furthermore the results indicate that improving secured land use right would increase villager's willingness to participate in forest management activities such as community work and forest surveillance. In a study analyzing the factors influencing villagers' motivation for participation in social forestry in west Mazandaran in Iran, Faham *et al.* (2008) observed that level of literacy, extent of participation in extension–education courses, use of mass communication media and attitude towards participation and social interaction have a significant correlation with motivation towards forest participation. Empirical findings in the context of Ludhi-Damgade district in Nepal reveal that participation in community forest management is influenced by socio-economic factors, which in turn determine the level of benefits obtained from forest resources (Maskey *et al.* 2005). Accordingly, disadvantaged groups who suffer from lack of participation remain basically excluded from decision making in product distribution and get less benefits. Hence at policy level focus should be made on empowering lower strata people and promoting their participation so as to ensure equal distribution of community forest benefits.

The Study Region, Data and Methodology

The district of Bankura is situated on the western side of the state of West Bengal bordering on the Jharkhand state. According to 2001 census, about 92% of the people in the district live in rural areas. Tribal people constitute about 10.33 % of the district population. Total forest area under legal status in Bankura stands as 1482 sq km (about 21.5%of the district) which is below the national average of 33% forest coverage. This forest area is broadly divided into two divisions: Bankura south (747 sq km) and Bankura north (735 sq km). Recently there has emerged a smaller third division called Panchet. If we compare average number of members per FPC we find that in the northern region there are about 264 members compared to 94 only in southern division, while the absolute number of FPCs are greater in the latter compared to the former. This indirectly indicates that there are comparatively greater degrees of heterogeneity in terms of geographical locations, economic status, social order as well as interest of the members in the southern division and the formation of FPC had to be based keeping in mind the possible homogeneous elements in an otherwise heterogeneous scenario. Involving the villagers' efforts and active participation for forest management with sustainability

goals is a rather challenging proposition under such situation. Participation in the JFM activity is a complex phenomenon and can be ascribed to the interactive influence of a number of factors that can be grouped in any of ecological, economic or social dimensions. In this paper we consider the Ranibundh forest range in the southern forest division of Bankura district for our study. Out of the 30 villages in this range, 7 villages have been selected and from each village 50% of the FPC members have been selected based on convenience sampling for collection of relevant data. The location of the study region is presented in the following map.

Figure 1. The Location of the Study Region



A dynamic optimization model is developed for understanding the qualitative/quantitative aspect of factors supposed to determine the extent of forest participation. A weighted determinants' index has been developed on the basis of classification of the villagers in defined categories corresponding to each considered determinant. A weighted participation index for each village has also been developed on the basis of some considered indicators of participation. Correlation of determinants index and participation index focuses on the degree of relevance of socio-economic features of the villagers to their forest participation activity.

Determinants of Participation

Functioning of the JFM institution in an efficient manner requires the whole- hearted participation of the village households in the management and sustenance of forest resources. Involvement of the locals in regenerating the forest is governed by many socio-economic factors identified in the extent of their dependence on forest resources for subsistence, attention paid to the needs and voices of all sections of forest dwellers in the general meetings, absence of any top-down dictatorial interference in the decision making power of FPCs, mutual trust and social cohesion among the villagers and good relationship between the FPC and forest department officials. Allocations of participatory labour by villagers in different modes are identified for successful establishment of JFM institutions. First, villagers need to invest their labour for forest guarding and monitoring activities. Second, added labour may have to be spent for collecting fuel, food, fodder and other minor forest products from a larger area of the forest in response to restrained access to nearby specific patches of forest in conformity with JFM rules. Third, importance of participatory labour is perceived in plantation and regeneration of high value forest associated with generating increased economic gains on a long term sustained basis. At the poor household level, there arises the problem of trading off participatory forest labour with that of agricultural operations. Since agricultural holdings are generally low in the area producing mostly for one's own consumption, and agricultural work is obtained on a seasonal basis, villagers are often confronted with the problem of deciding about the allocation of their endowed labour hours between agriculture-related work and forest participatory labour that help earn a substantial part of their livelihood. In order to have an understanding of the conditions in which peoples' participation in forest management is likely to be most effective in terms of their outlook and allocation of participatory labour, it is felt imperative to consider the following model (below) of optimal labour hours allocation between forest participation and agricultural activities. There are two aspects of participation in the joint forest management: determinants of participation and actual level of participation. Determinants in case of each

village help focus on the index of requirements realized for participation and index of participation reflects the actual level of participation. The following analysis also throws light on the determinants required for achieving high participation from the forest dwellers.

Theoretical Model

In the absence of alternative job opportunities, rural households usually have the option of allocating their labour in agricultural and allied activities (L_A) as well as participatory labour (L_F) under JFM. So assuming $\underline{L}$ as the endowed labour, we can write

$$\underline{L} = L_A + L_F.$$

Benefits due to agriculture and allied activities at time t, is denoted as $\pi_A (A_t, L_A)$ where A_t is the area under agricultural operation. Joint benefit under JFM is expressed as a function of forest area (F_t), own participatory labour (L_F) and total amount of labour expected to be contributed by all other households (TL_F) in the form $\pi_F (F_t, L_F, TL_F)$. The household receives benefits from JFM activity to the tune of $\theta \pi_F (F_t, L_F, TL_F)$ where θ is assumed to be the share of JFM benefits accruing to the household. In a dynamic setting, it is further assumed that the household maximizes the present value of benefits covering both agriculture and forest participatory activity subject to relevant stock dynamics.

Thus the problem before the representative household is to:

$$\text{Max} \quad \int_0^{\infty} [\pi_A (A_t, L_A) + \theta \pi_F (F_t, L_F, TL_F)] e^{-rt} dt$$

$$\text{Subject to} \quad dF_t/dt = \beta (L_F + TL_F) \text{ and } dA_t/dt = -\beta (L_F + TL_F)$$

Where A_t and F_t are the state or stock variables, L_F is the relevant control variable (L_A being equal to $\underline{L} - L_F$) and r is the rate of discount. Here we implicitly assume that regeneration of forest land is a function of total amount of participatory labour put under forest management activity. For simplicity it is explicitly assumed that regeneration of forest land is proportional to the combined amount of own and other peoples' participatory labour under JFM, the proportionality factor being β. As increase in forest land has a trade-off with that of land area under agriculture and allied operation, the corresponding land dynamics dA_t/dt is expressed as negative of forest land dynamics dF_t/dt .

The corresponding current value Hamiltonian is:

$$H_c = \pi_A (A_t, L_A) + \theta \pi_F (F_t, L_F, TL_F)] + \lambda_1 \beta (L_F + TL_F) - \lambda_2 \beta (L_F + TL_F)$$

Where λ_1 = shadow value of forest land regenerated through participatory labour; λ_2 = shadow value of agricultural land or opportunity cost of forest participatory labour.

If we assume that π_A and π_F are linear functions of L_A and L_F respectively, then applying maximum principle, we have the bang-bang solution:

$$L_F = L_F^{max}, \text{ if } \delta H_c/ \delta L_F > 0 \text{ ---------- (1)}$$
$$L_F = 0, \text{ if } \delta H_c/ \delta L_F < 0 \text{ ---------- (2)}$$
$$L_F = L_F^{*}, \text{ if } \delta H_c/ \delta L_F = 0 \text{ ---------- (3)}$$

From (1) we get $- \pi_{A,LA} + \theta \pi_{F,LF} + \lambda_1\beta - \lambda_2 \beta > 0$. Rearranging it we get: $\theta \pi_{F,LF} / \beta + \lambda_1 > \pi_{A,LA}/ \beta + \lambda_2$. Applying normalization and setting $\beta = 1$, the expression is re-written as

$$\theta \pi_{F,LF} + \lambda_1 > \pi_{A,LA} + \lambda_2 \text{ ---------- (4)}$$

The implication is that if the share of marginal forest related benefit of own participatory labour ($\theta \pi_{F,LF}$) added to shadow value of forest land regenerated through participatory labour (λ_1) exceeds marginal benefit from agriculture due to agricultural labour ($\pi_{A,LA}$) plus shadow value of agricultural land area (λ_2), then forest participatory labour assumes its maximum value L_F^{max}, other wise no amount of participatory labour is allocated in JFM as revealed in (2). Equation (3) reveals the optimal allocation of participatory labour.

From the above framework, it is surmised that the qualitative and quantitative aspect of resource like agricultural land, forest land, sources of irrigation and extent of resource dependence have an impact on forest participation activity. The benefit from agricultural operations is mainly reflected in the high yield which is governed by the quality of agricultural land, efficient irrigation facilities, low family size reflecting high land- person ratio and less burden on agricultural land etc. When the ownership of agricultural land is rather low, it is of poor quality involving severe uncertainty in targeted level of crop output, irrigation facilities are rather poor thereby rendering insecurity in crop output, the value of the expression on the LHS of inequality (4) is likely to exceed that of on the RHS. Under such situation villagers' immediate alternative is to depend heavily on forest resources to meet their basic survival needs and accordingly their participatory labour to maintain forest land is applied most intensively. Similarly, if the forest land is of high quality with great regenerative capacity, villagers have a substantial dependence on forest collection activity for their subsistence and derive great benefit from marginal efforts, the FPC feels highly satisfied about the collaborative work with FD and maintains a cordial

relation with FD officials as well, then the LHS of (4) is most likely to exceed its RHS. Accordingly intensive participation is likely to ensue. Apart from this, participation is expected to be high when alternative employment opportunity in the village is rather low, family size is large, leadership is strong that ensures cohesive and collective action and when the threat of eviction from forest land is rather low.

On the basis of the above analysis, a number of determinant attributes/variables with their qualitative/quantitative requirements for engendering successful participation can be listed as in the table 1 below.

Table1: Desirable Quality/Quantity of Determinants of Good Participation

Determinants	Qualitative/quantitative requirements influencing high degree of participation
Size of agricultural land holding	Low
Quality of agricultural land	Poor
Quality of irrigated land	Low
Quality of forest land	High
Leadership in the village	High
Family size	Large
Employment opportunity	Low
Extent of forest dependence	High
Satisfaction about the work of F.D	High
Perception of threat of eviction	Low

In order to classify the data collected from field survey, relating to the aforesaid determinants into high /medium/low categories, some standard is set for appropriate cases and accordingly an index of requirements as realized for respective villages are developed on the basis of assigning some weights.

For categorizing the quality agricultural land, production @20 qt. of paddy per *bigha* (14400 sq ft.) is considered as good or high quality, land producing between 16 to 20 qt per *bigha* is considered as medium quality while production below the level of 16 qt. per *bigha* is considered as low/poor quality. The land quality of all the considered villages is categorized following this criterion.

From primary data, it is observed that in case of land size exceeding 16 *bigha*, shallow is usually bought or utilised on hire services by the farmers for better irrigation purposes. Moderate irrigation facilities are provided through well, hand pump etc. for land size 10 – 16 *bigha* while for land area less than 10 *bigha* irrigation facilities are recorded as poor. The percentages of irrigated

land in each category for all the considered villages are considered for developing the determinant index.

Size of agricultural land holding is considered as low in case it is less than 10 *bigha*. Medium size is considered to be in the range of 10 to 16 *bigha* while land area exceeding 16 *bigha* is considered as relatively big in size.

Quality of forest land is judged on the basis of data of income from NTFPs. For individuals earning Rs 12000 per annum from forest based products, quality of forest is considered as high value while for individuals earning less than Rs. 6000 per annum it is classified as low value. In case of earning in the range of Rs. 6000 to Rs. 12000 per annum, it is perceived as medium type.

Leadership quality in each respective village is judged on the basis of responses of the respective village households perceived as high, medium or low type.

Again, attributes like perception of threat of future degradation and satisfaction about the work of the forest department as perceived by the villagers are classified into high and low categories.

Families finding job for longer than 8 months a year are classified as enjoying high employment opportunity, while employment for less than 6 months a year is considered as low opportunity. In case of families availing jobs between 6 to 8 months, medium opportunity is considered to be the respective type.

Degree of forest dependence of respective families is considered by calculating the percentage of income earned from forest resources. In case of earning above 60 % of income, there is considered to be high level of forest dependence. If income earned from forest be within the range of 30 % to 60 %, it is considered as medium level of dependence, while low dependence is assigned for less than 30% of income generated from forest.

The possessional and perceptive feature of all the surveyed families in each of the seven villages have been classified in either of low, average or high category in the following table according to the aforesaid considered determinants of forest participation. In order to ascertain the extent of qualitative impact of the determinants on the degree of forest participation, a determinants' index is derived for each village by assigning suitable weights of value of 1.00 to the most desired category for each respective determinant, while 0.5 to the medium and 0.25 to the least desirable category. Accordingly the weights assigned for the various categories corresponding to each respective determinant stand as revealed in the following Table 2.

The forest dwellers in each of the surveyed villages are classified in terms of the aforesaid three categories (low, medium and high) with respect to their possession/qualitative access/perception corresponding to each of the considered determinants. This classification in terms of percentages for each

respective village is presented in the Table 3 below. Realized percentage values in each of the three categories are multiplied by their respective weights, summed up over all the determinants and then divided by their number to result in the determinants' index for each individual village.

Table 2. Weighting of the Desirable Quality/Quantity of Determinants

Determinants	Low	Medium	High
Size of agricultural land holding	1	0.5	0.25
Quality of agricultural land	1	0.5	0.25
irrigated land	1	0.5	0.25
Quality of forest land	0.25	0.5	1
Leadership in the village	0.25	0.5	1
Family size	0.25	0.5	1
Employment opportunity	1	0.5	0.25
Extent of forest dependence	0.25	0.5	1
Satisfaction about the work of F.D	0.25	0.5	1
Perception of threat of Eviction	1	0.5	0.25

Table 3. Percentage -Wise Classification of Villagers According to Three Categories Corresponding to Each Determinant

Determinants	Katiam			Buriam		
	Low	Medium	High	Low	Medium	High
Quality of agricultural land	100	0	0	100	0	0
Percentage of irrigated land	89.55	2.99	7.46	87.23	10.64	2.12
Size of agricultural land holding	89.55	7.46	2.98	87.23	10.64	2.12
Quality of forest land	58.21	35.82	6.25	72.34	17.02	10.64
Leadership in the village	37.31	25.37	37.31	10.64	34.04	55.32
Perception of threat of Eviction	19.4	0	80.59	31.91	0	68.08
Family size	53.73	34.33	11.94	34.04	57.45	8.51
Employment opportunity	74.63	19.4	5.97	51.06	39.91	17.02
Extent of forest dependence	31.34	58.21	10.45	42.55	0	57.45
Satisfaction about the work of FD	44.78	0	55.22	55.32	29.79	14.89

Determinants	Kelia Pathar			Bhurkura		
	Low	Medium	High	Low	Medium	High
Quality of agricultural land	98.27	1.73	0	100	0	0
Percentage of irrigated land	98.27	1.73	0	97.14	2.86	0
Size of agricultural land holding	98.27	1.73	0	97.14	2.86	0
Quality of forest land	93.1	6.9	0	68.57	25.71	5.71
Leadership in the village	60.34	6.9	32.76	8.57	65.71	25.71
Perception of threat of Eviction	56.9	0	43.1	20	0	80
Family size	56.9	37.93	37.93	54.28	40	5.72
Employment opportunity	24.14	37.93	37.93	74.28	17.14	8.57
Extent of forest dependence	62.07	37.93	0	20	57.14	22.86
Satisfaction about the work of FD	62.07	0	37.93	28.57	0	71.43

Determinants	Mahadebsinan - Barudi			Jamdaha			Barapucha		
	L	M	H	L	M	H	L	M	H
Quality of agricultural land	100	0	0	100	0	0	100	0	0
Percentage of irrigated land	95	5	0	94.74	0	5.26	100	0	0
Size of agricultural land holding	95	5	0	94.74	0	5.26	100	0	0
Quality of forest land	55	35	10	0	0	100	69.44	27.78	2.78
Leadership in the village	55	35	10	84.21	10.53	5.26	80.56	13.89	5.55
Perception of threat of Eviction	20	0	80	68.42	0	31.58	25	0	75
Family size	30	65	5	26.31	63.16	10.53	44.44	50	5.56
Employment opportunity	95	0	5	47.37	26.31	31.58	47.22	50	2.78
Extent of forest dependence	55	0	45	0	0	100	27.78	52.78	19.44
Satisfaction about the work of FD	10	50	40	5.26	26.32	68.42	5.56	0	94.44

Note: L = Low, M = Medium, H = High
Source: Compiled from Field Survey Data, 2010

Table 4. Index of Participation Determinants

Villages	Katium	Burium	Kelia-pathar	Bhurkura	Mahadebsinan-Barudi	Jamdaha	Barapucha
Determinants' index	66.69	68.01	65.47	69.28	68.12	80.00	67.36

Source: Compiled from Field Survey Data, 2010

The efficacy of JFM reflected in the intensity of participation is supposed to be determined by the interaction of the aforesaid socio-economic and cultural determinants captured by the determinants' index. Unless these factors are properly reckoned with, the success of any long term planning for evolving participatory management is likely to be in doubt. The interaction of such factors can promote or protract community participation and it seems important to identify the weakness in village specific determinant factors so as to introduce policy measures for operationalising an effective JFM system

Derivation of Participation Indices

Joint forest management is theoretically supposed to serve many benefits. These arise in the form of (a) risk spreading, (b) economy of joint decision in the form of information sharing, low transaction cost involved in the channeling of local traditional knowledge/wisdom along with modern conservation strategy or technology, (c) better market access in the form of possibility of having a better selling price of forest based items in the presence of cooperatives arranged by FD, (d) assurance of a steady return for all members from the revenue of timber sale at certain intervals, (e) qualitative enhancements through extension of improved technology to FPCs by FD, and (f) possible eco-tourism values etc. While the communities would continue to enjoy subsistence benefit from forests, many could evolve higher level value-added activities that generate even greater returns. It is said that in West Bengal JFM has come out relatively more successfully (Pattanaik *et al.* 1997) than in other states because of genuine efforts and coordination made by FD as well as FPCs. Mutually interacting operation of these two parties on the same tract of land with an element of peoples' participation is likely to generate more output than would be available if the forestland were managed separately by the two parties without participation. Management through participation is a dynamic group process in which all members of a group contribute to the attainment of group objectives, share the benefits from group

activities, exchanging information and experiences of common interest and flow of rules, regulations and other decisions made by the group.

The sample villages located in and around Ranibundh forest range derive diverse benefits from it in the form of not only timber, fuel, fodder and leaves, but also livelihood and job opportunities. It seems, therefore, imperative to assume that people in these villages indulge in participatory forest development activities which also cater to their livelihood to a very great extent. Elements of participation are of various types, viz. co-operation, attendance in group meetings, information sharing, decision making, labour sharing, implementation, motivating, monitoring and supervision. In order to have an idea of the degree of peoples' participation and reflect it in an index, we consider seven villages that are considered important from the point of view of forest dependence.

There is no universally accepted measure or index that can be used to address a developmental programme in terms of people's participation. In the present context, the method used by Singh (1992) has been adopted to compute the people's participation (PPI) index.

The sample villagers were asked a set of eight questions that were framed as to have either a yes (1) or no (0), or an always (1),sometimes (0.5) or never (0) answer. Out of eight questions, four followed a particular pattern and the remaining four another pattern. Each of the questions was assigned a weight showing its relative importance as a measure of participation. The sum of the weights added up to 100. The weights were determined in consultation with the panchayat members. Following this method , we computed a participation score for each of the sample respondents and all the score thus computed were added and then divided by the number of sample respondents in each of the sample villages to compute a PPI for each village (as given in the Table 5 below).

Table 5. Participation Index for Villages in Ranibandh Beat

Indicator	Wts	Katiam	Buriam	Kelia pathar	Bhurkura	Mahadebsin an-Barudi	Jamdaha	Barapucha
Participate in the activity of the JFM	15	502.5	510	315	307.5	217.5	247.5	472.5
Participate in the Meetings of FPC	10	355	335	200	180	150	160	300
Opinion paid attention or not	10	235.0	235.0	230.0	115.0	45.0	185.0	270.0

Participate in the election of FPC member	10	430	370	215	285	135	155	335
Monitoring activity in JFM	15	525	517.5	292.5	367.5	157.5	217.5	472.5
Responsibility to the JFM	15	892.5	667.5	510	525	277.5	255	525
Motivation to the other people	15	712.5	547.5	322.5	480	180	225	465
Villagers can manage CPR alone or not	10	350	210	210	65	75	130	245
Total	100	4002.5	3392.5	2295	2325	1237.5	1575	3085
Total no of villagers	Nil	67	47	58	35	20	19	36
Participation Index	Nil	59.7	72.2	39.6	66.4	61.9	82.9	85.7

Source: Compiled from Field Survey Data, 2010

Participation index appears to be on a lower side in Kelia-pathar, moderate in case of Bhurkura, Mahadebsinan--Barudi and Katium, moderately high in case of Burium, while rather high in case of Barapucha and Jamdaha village. Probable reason for this is that villagers in Kelia-pathar attended the meetings very casually as they felt that they were denied their due importance by forest officials regarding expressing their opinions, expectations and priorities in the decision making process and so stayed relatively passive and inactive. This is also vindicated by the relatively low score in case of components like participation in meetings, monitoring activity etc. Here, the villagers are divided into three categories viz. Santal, Bhumiz and general. Many of them expressed their dissatisfaction over political favouritism and unequal access to FPC activity. Despite having Rs 2800/- per family in recent times as their share of forest revenue from the forest department., they do not feel encouraged to participate in FPC activity. There is lack of mutual trust and social cohesion among the villagers of FPC, poor participation in election of FPC members as well as monitoring of activity in JFM. For the moderately participation scoring villages, dominant weaknesses were observed in case of issues like 'participation in meetings of FPC', 'opinions paid attention to', 'monitoring activity in JFM', 'villagers' confidence in managing the resources by themselves' etc. Absence of transparency in case of election of FPC management committee members as well as unilateral forest related financial decisions by the forest officials (by alienating the ordinary member villagers) often incite peoples' apathy and distrust towards participatory benefits. And this also accentuates lower degree of participation in specific cases. The FPC in Jamdaha village is well coordinated with the FD. Forest felling here occurs at regular interval and the FPC members are assured of the stipulated percentage of forest revenue. The

villagers here are well tied in the knot of mutual trust and cohesion. There is observed an intense level of forest dependence here, which is mostly reflected in the form of collection of NTFPs from *Mahua* plants the flower of which is used for extracting liquor while the fruit is used for extracting oil. The attachment of the villagers with the forest and their intense dependence on forest resources have motivated them to take active drive in forest conservation activities.

Correlation between Determinants and Participation Indices

Having derived the indices of determinants as well as that of participation for the considered villages, it is observed that the correlation coefficient between the determinants and participation indices for the respective villages come out to be 0.563. (significant at 18.8 percent). This is only a very moderate degree implying that the components in the determinants indices often do not assume desirable pattern of values and villagers' participatory responses sometimes transcend (in either way) what would conform to the index of determinants. Quality of forest land as well extent of forest dependence is on a lower or moderate side in the villages like Keliapathar, Bhurkura, Katium and Mahabaru. Leadership quality is also perceived to be of very poor type in these villages. Again, as already stated the percentage of highly dissatisfied villagers about the works of forest department is rather high in Keliapathar and Burium. Moreover excepting Jamdaha, in all the other villages there is observed a dominance of perceived high threat of eviction. According to the desirable status of determinants, all these factors account for an untoward bias towards the mood of participation on the part of the rural stakeholders.

Concluding Observations and Recommendations

Active participation in forest conservation activities presupposes a sense of commitment, attachment and motivation on the part of the forest dwellers. Economic constraints, like impediments to have better agricultural income due to low quality and small land-size as well as poor irrigation facilities, are likely to explain their inclination to depend on forest and provide their best participatory effort to preserve it for their sustainable livelihood. But some other socio-cultural factors might be operative to prevent the potential of participation from being fully realized. Individual or group decision by the villagers to tap the forest resources while also ensuring its conservation requires some degree of social cohesion, motivated by the actions of some leading agent. The members of FPC managing committee, or NGOs or even Panchayat cannot deny their leading role required for resuscitating the motivational spirit of the villagers, which has been truly imperceptible in many of the villages. In many cases the villagers have been apathetic to participation because of their dissatisfaction with the attitude of the forest

department officials. Sometimes the collusive tendency of forest department with some of the affluent section of the villagers in taking unilateral decision regarding choice of forest felling site and time and way of calling tender for its disposal, with ordinary masses in the dark, has invoked peoples' non-cooperation and disenchantment in forest participation activities. Administrative machinery has to be sincere, neutral, and establish its attitudinal honesty for evolving forest preservative participation. The elements of trust among all the stakeholders need immediate restoration. The quality of forest land, although often thought to be naturally endowed, may be revived for the better with an element of participatory efforts. For this purpose whole hearted socio-psychological and economic support by the forest department as well as motivational impetus by Non-Government agents seem to be most essential. In this context, implementing more of forestry extension education courses, use of mass communication media as well as ensuring increased social interaction among the villagers through the efforts of the aforesaid agents might pave the way for enhanced motivation for their participation. Due to the existing risk of eviction and loss of customary right to access the forest resources, villagers often do not feel motivated to protect the forest with a feeling of alienation of their traditional property right. Therefore, grants of permanent tenurial rights to forest dependent people, mitigating the fear of eviction, extension of various support facilities and ensuring a cohesive trust between forest department and forest protection committee seem most urgent for ensuring meaningful participation.

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