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Institution and Cooperation: A Study of Women's Attitudes in Joint Forest  
Management in India  
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## Introduction

Community-based natural resource management is one of the widely practiced paradigms of 'conservation with development' having attracted increasing support from conservation organizations and international development agencies in recent years. This approach emphasizes the need for mutually beneficial comanagement partnerships between rural communities, the state and other stakeholders in place of the antagonistic relations and resource-use conflicts caused by protectionist conservation strategies (Hough, 1988). Hence there has been a proliferation of projects which aim to ensure that rural communities participate in, benefit from, and support the sustainable management of natural resources (Wells and Brandon, 1988; IIED, 1994; Ray and Bhattacharya, 2013). There is, however, an extensive on-going debate as to when and how such integrated projects are likely to achieve effective results (Gibson and Marks, 1995; Mehta and Heinen, 2001; Baral and Heinen, 2007). A growing body of literature focusing on environmental subjectivity suggests that people's attitudes significantly influence the effectiveness of community-based natural resource management programs (Infield, 1988; Mehta and Heinen, 2001; Baral and Heinen, 2007).<sup>1</sup> Since negative attitude entails high transaction costs (Ray and Bhattacharya, 2011), policymakers and conservationists need to find the extent to

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<sup>1</sup> This literature, mainly empirical in nature, argues that individuals make decisions embedded in a social context and their attitudes affect their decisions. It elicits (beyond economics) subjective testimony on feelings, beliefs, values, expectations, plans, attitudes, and behavior. This body of empirics was excluded from the neoclassical economic analysis on the assumption that individual preferences remain unchanged because people's attitudes are fixed, despite the fact that economic theorizing often includes reference to attitudes, beliefs and the like. An important example is the data on stakeholder attitudes towards environment (Infield, 1988).

which local people hold favorable attitudes and support conservation initiatives. A well-administered survey on conservation attitudes can provide guidance for the policy and management decisions involved in the design, implementation and evaluation of co-management (IIED, 1994).<sup>2</sup>

In India, Joint Forest Management (JFM), one of the popular community-based conservation programs, has been implemented in the early 1990s to rectify the human costs associated with the failed forest policy of the State and foster positive conservation attitudes among the locals through empowerment and decentralization. JFM was introduced to address resource-use conflicts and promote cooperation between local communities and forest department for conservation (Ballabh *et al.* 2002). These institutional changes from coercive State-based protection to community-driven conservation are considered as more inclusive and sensitive to local needs since JFM provides local people with access to forest resources and generates forest-based employment to encourage people's participation in forest management. Thus, the counternarrative of development through community-based conservation and sustainable resource use has inevitably displaced the old narrative of 'fortress conservation' (Murphree 2002, p. 2). Because of such popularity of co-management policies, it is indeed "difficult to find a rural conservation project that does not define itself as community-based" Hackel (1999, p. 730).

However, India's experience in JFM is mixed because JFM did not register an all-round improvement in resource users' attitudes as conceived of. The reason may be numerous and multidimensional; for example, in many cases decision-making is vested with the forest department (Poffenberger and McGean, 1996; Ballabh *et al.*, 2002; Mahanty, 2002) and, at the

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<sup>2</sup> This study interchangeably uses the terms: 'co-management', 'community-based natural resource management', and 'common pool resource management' and 'community-based conservation'.

same time, resource-use and other related conflicts have not been properly addressed (Karlsson, 1999; Saigal, 2000). This paper argues that a proper understanding of the determinants of local people's attitudes toward community resource management might help in addressing these conflicts. Therefore, importance of environmental subjectivity—be it value-based attitudes or perceptions—has been documented recently in the commons literature (see Agrawal, 2006) and volume of attitude studies in various conservation and development issues<sup>3</sup> is rapidly growing over time.

Attitude is a human psychological tendency expressed by evaluating a particular object with favor or disfavor (Ajzen and Fishbein, 1980). It consists of beliefs, which are associations people establish between the attitude object and various attributes. For example, in the phrase, '*a wetland is a part of a country's wealth*', '*wetland*' is the attitude object, '*country's wealth*' is an attribute, and '*is a part of*' is a relational term. In our context, it may simply refer to how people like JFM or dislike it. However, attitudes cannot be observed directly and have to be inferred from overt responses.<sup>4</sup> Consequently, one pertinent query arising in the context of natural resource management is whether people's attitudes are actually reflected in their behaviors. While environmental economists (e.g., Shogren and Taylor, 2008) believe that resource conservation is all about "behavior," considerable debate has surfaced long ago in the social psychology literature regarding the attitude-behavior consistency (see Ajzen and Fishbein, 1977). In most cases, these two attributes are not consistent and consistency of attitudes and behaviors

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<sup>3</sup> See, for example, the attitude studies on water saving (Glig and Barr, 2006), solid waste management (Rahardyan et al., 2004), fisheries conservation (Tonder and Jurvelius, 2004), rainwater harvesting (He et al., 2007) and community-based forestry (Ray and Bhattacharya, 2013).

<sup>4</sup> The techniques of attitude measurement can be broadly organized into direct self-report methods (e.g., interviews and questionnaires) and implicit measurement techniques (e.g., observation, priming and response competition measures). Studies measuring environmental attitudes generally use direct self-report methods, and much less frequently implicit techniques.

are conditional (Ajzen and Fishbein, 1977).<sup>5</sup> Some resource economists argue that this attitude-behavior (in)consistency depends on culture and context, and also has a bearing on transaction costs (Ray and Bhattacharya, 2013). In co-management, the relationship between conservation attitudes and collective behavior may not necessarily be positive and may depend on several factors ranging from self or collective interests of resource users to their socio-economic attributes.

In this paper we address the impact of gender, an important social attribute, on conservation attitudes and behavior. It is the assessment of commons workers that women are more altruistic (Folbre, 1994), strict rule-makers (Agarwal, 2009), and their participation in common pool resource management makes it successful (Molinas, 1998; Westerman et al. 2005). This suggests that gender matters in the attitude-behavior consistency debate, at least in community resource conservation because strict rule-makers are more likely to be pro-environmental. However, there is hardly any study that has ever rigorously dealt with the gender differences in conservation attitudes and behaviors in forest co-management.

The motivation of the study comes from the fact that in practice, a community holds most usually gender, economic, social, cultural and political characteristics that give some groups more power, and consequently more claim over resources and over how they are managed and for what purpose, thus *de facto* excluding the women (Guijt and Shah, 1998). Therefore, a vast majority of empirical studies relating to the role of gender in environmental governance (e.g.,

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<sup>5</sup> According to Ajzen and Fishbein (1980), a single behavior such as cooperation for conservation is determined by the intention to cooperate in question. A person's intention is in turn a function of his attitude toward performing the behavior and of his subjective norm. Therefore, it follows that actors' conservation behavior is predictable from their conservation attitudes, provided that there is a high correlation between intention and behavior. We admit that the attitude-behavior link can be even more complex than what Ajzen and Fishbein (1977) suggests (see, for example, Stern 2000). Also, it is certainly important to note that weak attitude-behavior links often can be explained by the correspondence of specificity, that is, more specific attitudes strongly connect to behaviour (see Davidson & Jaccard, 1979). However, examining these issues are beyond the scope of this study and can be good options to pursue in future research.

Kant et al., 1991; Hobley, 1996; Sarin, 1998; Agarwal, 2001; Buchy and Subba, 2003; Buchy and Rai, 2008) repeatedly emphasize women's meaningful participation in decision-making for managing commons successfully. Moreover, the evidence that women are still marginalized<sup>6</sup> may also impinge on women's attitudes towards conservation and development. This inevitably leads to the following question pertinent to commons management: How do gender differences in conservation attitudes impinge on the common pool resource management? This is the general issue of the paper. More specifically, the paper tries to address a number of issues that have neglected in the CPR literature: (1) what drive positive attitudes towards conservation? (2) Are conservation attitudes of the locals congruent with their conservation behaviors? (3) If not, who are then more consistent in their conservation attitudes and collective conservation behaviors: men or women? (4) Although women are most vulnerable section in co-management, does women's proportional strength in the decision-making committee matter in improving the overall positive attitudes and behavior of the members of the organization? To find plausible answers to these queries, we conducted a psychometric survey followed by a series of economic experiments in 2009-2010 on 196 forest dependent households comprising members of forest protection committees (FPCs) and non-members villagers of the study sites<sup>7</sup> in West Bengal.<sup>8</sup>

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<sup>6</sup> Agarwal (1986) finds that women of poor rural households bear a disproportionately high share of the burden of poverty, especially in the intra-household distribution of food and health care. Quisumbing et al. (2001) compare poverty measures in 10 developing countries for males and females, and finds that poverty measures are higher for female-headed households and for females compared to males and male-headed households. Moreover, various social norms and restrictions limit women's employment opportunity outside of the family domain (Mammen and Paxson, 2000). These show that women are more vulnerable.

<sup>7</sup> Forest Protection Committee in this study is used in generic sense, and refers to any organization that manages the local forest for conservation.

<sup>8</sup> West Bengal was the first Indian province to initiate joint forest management successfully in the 1990s. Moreover, rich ecological biodiversity, high economic dependency on the local forests and institution-people conflicts characterize this state. Fewer livelihoods options and multiple constraints make it difficult for the forest dependent people of West Bengal to maintain their subsistence livelihoods. These make forest management an integral part of the local rural livelihood in the state (Ray and Bhattacharya, 2011), and, thus, West Bengal is an ideal site for conducting an attitude study.

While psychometric methods capture the attitudes of the forest dependent local people, the economic experiments called trust game measures people's behaviors in this study (details are described in the methodology section).<sup>9</sup> Most importantly, the study finds that conservation attitudes and behavior vary across gender, and women are more consistent in their attitudes and behaviors than men. We suggest understanding resource users' attitudes and behaviors might explain why men and women hold shared and, at times, divided interests in JFM.

The rest of the paper is organized as follows. Next section describes women's socio-economic status in forest dependent rural villages to understand their attitudes in community forestry in India. Data collection and measurement of variables are explained in section three. Fourth section delineates the experimental protocol followed by the results and discussions. Finally, we conclude.

## II. Women's status and attitudes in forest co-management: Relevance for India

In community-driven development programs such as joint forest management biases engrained in community norms and expectations exclude typically the weaker section of society such as the women. Women nominally represent in the Governing Bodies of forestry organizations in India (Sarin, 1998). Male members and forest officials seldom consult with women in regard to designing conservation rules or preparing micro-plans for forest development (Guhathakurata and Roy 2000). Since women are the primary collectors of fuel wood and fodder, they are well aware of which species are of what value. Failing to consult with them actually not only affects

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<sup>9</sup> The idea of considering trust game to measure conservation behaviors comes from the social capital and environmental governance literature (see for example, Pretty and Ward, 2001; Pretty, 2004; Westermann et al., 2005) that suggests people that trust others more and reciprocate people trusting them are more likely to cooperate for conservation. Many other scholars have also used trust game to capture stakeholder pro-social behaviors in commons management (see, for example, Bouma et al 2008 in watershed conservation in India).

their attitudes but also increases cost of regeneration program since their existing ecological knowledge remains utilized for regeneration programs.

Furthermore, in India, exact figure of forest area under women's control is absent. Men often manage large track of natural forested lands. Similarly, in Nepal, some 50% women in aggregate manage small plots of < 10 ha; these lands are mostly barren and need tree plantation. This may adversely affect women's attitudes.

Women's effacement, shyness and soft speech make their participation in male-dominated FPCs more difficult. "Gendered behavioral norms also restrict women by creating subtle hierarchies, such as requiring them to sit on the floor while men (especially older ones) sit on the cots or chairs. Even when every member sits on a level, women (including EC members) sit on one side or at the back of the meeting space where they are less visible. This makes them less effective in raising a point, while issues raised by male members who sit in front receive priority. Moreover, when senior family males are present, women hesitate in attending meetings or speaking up at them, or opposing the men publicly. The hierarchy that marks "respectful" family behavior gets carried into community spaces." (Agarwal, 2001 p. 1639, emphasis in original).

Social perceptions of men about women are also negative. Men often view women's involvement in conservation as useless and tend to downplay their potential contributions. For example, when women answer questions, male members often stop them and answer on their behalf, holding the view that women know less (e.g., Agarwal, 2001). All these subtle social status differences may lead to attitudinal differences between men and women.

The fact that rural women generally do not have considerable amount of personal property and that they are seldom well connected politically significantly reduces their social



status and consequently, weight of their opinions. Women's limited interactions in public forums undermine the effectiveness of their presence in the FPCs. However, these disadvantages can be minimized if the women included are older, married, since they have less socio-cultural restrictions imposed on them and hence are more likely to have better outside interaction, which may earn them leadership qualities, and the self-confidence to speak up (Agarwal, 2010). In many FPCs, the active women members are found to be mostly widows or older married women (Britt, 1993) or have strong social positioning, which, according to Britt (1993), enable them to travel more freely, speak more confidently, and assume the attitude of local leaders.

The class and caste position of the women's households also affect women's bargaining position in the FPC functioning, especially in FPCs which either constitute members from more than one villages with inter village caste heterogeneity or have upper-caste dominance (Hobley, 1996; Sarin 1998). Women from the low caste and poor families fail to influence the socio-economically well-positioned people, which can reduce their bargaining power within the predominantly upper-caste communities.

It is the assessment of Agarwal (2001) that much of what village women do is usually underrated by their families and communities. To enhance women's bargaining power necessary steps would be to change: (1) *how they perceive themselves* and (2) *how their families and communities perceive them*. These two aspects actually are related not only with women's attitudes towards community forestry but also with forest-dependent society's attitudes towards women, and hence expectations about women's performances in public forums.<sup>10</sup> Thus, several factors which lie behind women's marginalization and under-representation in rural community-

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<sup>10</sup> Social psychologists (e.g., See Sell (1997) and the references cited therein) have rigorously shown that society's attitudes towards women is very much negative in general because of their low status compared to men and accordingly, society holds low expectation about women's task performance. Agarwal's study in the context of governing forest commons and women's participation in South Asia (Agarwal, 2001) resonates this.

based conservation and development may also influence women's attitudes towards co-management.

### **The Study Sites**

Our study villages are located around Buxa Tiger Reserve (BTR) of Jalpaiguri and West Midnapore (WMP) districts in West Bengal (**Figure 1**). The recorded forest area in the State is 11,879 km<sup>2</sup>, which is 13.38% of its geographical area. Of the total forest areas, Reserved, Protected and Unclassed Forests constitute 59.38%, 31.75% and 8.87% respectively. About 85% of the total forest areas lie between 0-499.87 m of altitudes\_(Government of West Bengal, 2011). The State has 4300 JFMCs (used in this paper in generic sense) 4.49 million members managing about 0.63 million ha of forest area. It covers about 53% of the forest area of the State. More than 0.48 million families are involved in this program, of which around 0.11 million families belong to Scheduled Tribes, a category of socio-economically backward tribes in India (Government of West Bengal, 2011). Community-based forest management in India has had its origin in the early 1970s at Arabari forest of WMP (22°15'N to 22.25°N and 87°39'E to 87.65°E). Around 1980s, Forest Protection Committees (FPCs) emerged to manage forests in West Bengal. Following the national norms, Government of West Bengal provides them 25% of the forest benefits as an incentive to conserve the local forests under their respective jurisdictions. These organizations are also referred to as JFMCs.

Agriculture is the mainstay of the villagers of our study sites. Poverty, illiteracy, unemployment and unequal earning opportunities have fostered social disparity and, at some places, constrained the social integration necessary for successful community participation in forest conservation. Population density of the two districts where the study areas are located is

almost equal (Census of India, 2011). In terms of Human Development Index Jalpaiguri is ranked tenth and West Midnapore seventh (Government of West Bengal, 2004).

Because of a poor growth of secondary and tertiary sectors in the Northern part of West Bengal, BTR people have less non-farm and off-farm employment opportunities. Furniture-making firms in the nearby urban areas can absorb only a limited number of literate labor having specific skills (Ray and Bhattacharya, 2011). This forces BTR people to be more forest-dependent. By contrast, WMP people are more exposed to outside opportunities. Nearby, there are several industries like *bidi* (country cigarettes), cement, and food processing. Moreover, round the year a sizable number of WMP people work in the informal sector of the district. Thus, BTR appears to be less developed than WMP (Ray and Bhattacharya, 2011).

Human-elephant conflict adversely affects the local economies of BTR and WMP (Ray and Bhattacharya, 2011). A high degree of forest-dependency underscores the importance of forest conservation for local rural development. Directly and indirectly, above 80% of BTR people and above 70% of WMP people are forest dependent. These figures of forest dependency outstrip the average forest-dependency figure of the State (35%) (Chief Conservator of Forest, personal communication, 2010). In absolute term, forests of WMP alone support .51 million people directly. In contrast, 0.34 million people derive their daily livelihoods from BTR forests (Government of West Bengal, 2009). An important source of livelihood of the study areas is NTFPs. 0.30 million people, on an average, collect NTFPs from the two sites. Thus, forest benefits act as a safety net of the livelihood options of the locals (Das, 2012).

In short, rich biodiversity, high forest dependency and persistent institution-people conflicts characterize the two sites. Fewer livelihood options and multiple constraints make it difficult for many local people to sustain their subsistence livelihoods. These factors affect

conservation attitudes and behaviors of the locals where forest management is an integral part of the local livelihood. Thus, these two sites fit well into the objectives of this study.

### III. Data, Methods and Measurement

#### **Survey**

##### **Selection of Forestry Organization**

Surveys were conducted in three intervals: December, 2009, January-May, 2010 and July-August, 2010. For this purpose, we have collected a list of FPCs based on the gender composition of Executive Committee (EC), the decision making body of the FPCs from the forest rangers in each district to select FPCs. The other selection criteria were: (1) variation in forest conditions, (2) diversity in household characteristics, and (3) variation in size of the forests and FPCs. Altogether, among the FPCs that fulfilled these criteria seven FPCs were randomly selected for survey. Members of these FPCs reside in nine villages. 196 households participated in the survey and experiment. They were either EC members or general members of the FPCs.

##### **Questionnaire Design, Sample and Data Collection**

A pretested semi-structured questionnaire that contained both open and close ended questions on issues relating to attitudes of respondents towards JFM, collective actions (in terms of monitoring etc.), transaction costs of cooperation etc. was used. Every third household from the relatively large FPCs (with >50 members) and every second household from the smaller ones were chosen for survey. We surveyed the heads or the representatives of the sampled households, but not the non-members since they are not concerned with what we examine in this study, i.e., attitudes and pro-social behaviors for forest conservation. Respondents were interviewed in their convenient time in an informal setting. We collected data on their socio-economic characteristics such as age, earnings, land holdings, their perceptions related to comanagement, social

interaction etc. We also used published and unpublished official data and documents to enrich our understanding of the local context and culture.

### **Measurements of Variables**

In this study we consider socio-economic, perception-based, resource-related and game-related variables. Among the socio-economic variables, education is measured by number of years a respondent has attended school/college etc. till the time of survey. Caste is represented as a dummy variable (caste=1 if the participant belongs to general Caste such as Brahmin, Kayastha, Mahisya etc. and =0 if she/he comes from a Scheduled Caste, Scheduled Tribe and other backward class family) according to the Indian caste system.

To measure affluence of households we collected data on Below Poverty Line (BPL) and Above Poverty Line (APL) households from the study areas. BPL households were known as poor. APL households' average landholding was calculated. APL households with the above-average landholdings were defined as Better off while the rest of the APL households were categorized as Middle income. Forest dependency is measured as a share of income from selling forest resources and imputed value of domestic uses of forest resources. Total income of a household comprises non-forest earnings including agricultural incomes, incomes from livestock holdings, and wage incomes from daily works and, forest income. It is measured in INR per annum. Utilizing the market value of their feed intake and expressed in adult cattle unit, we calculate livestock holdings following the conversion rule: One adult cattle/buffalo = Four goats/pigs.

We consider two types of conservation attitudes of the respondents: attitudes of the participants towards JFM or *co-management attitudes* and attitudes towards Forest Department staffs and EC members of FPCs or simply *attitudes towards organization*. We employ Likert

scale (Likert, 1932) to measure these constructs. A set of statements selected on the basis of participatory appraisal was used for each of the two types of attitudes with five response options running from ‘*Strongly Agree*’ anchored at a score of 5 to ‘*Strongly Disagree*’ anchored at a score of 1 (as described in table 3 later).<sup>11</sup> Statement scores of respondents were standardized and added to obtain the scale scores for each participant.<sup>12</sup> Our post-survey analysis of the attitude data revealed that people with positive attitudes towards JFM are more likely to hold positive attitudes towards FPC and Forest Department staffs and their conservation activities (Pearson’s correlation coefficient=0.87,  $p<0.01$ ). Hence we clubbed the two types of attitudes to construct the ‘overall conservation attitudes’ variable by adding the standardized scale scores of respondents.<sup>13</sup> We also calculated Cronbach’s alpha (Cronbach, 1951) to examine reliability and consistency of women’s attitudes. Usually if this alpha exceeds .71, stakeholder attitudes are treated as consistent (see Netemeyer *et al.*, 2003). It is widely used in studies where measuring attitudes is important (see Ray and Bhattacharya (2013) in the context of community forestry in India).

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<sup>11</sup> Our attitude statements are not merely the shallow opinions rather based on *preference-based held values* where values to forest resources and co-management are assigned through human preference as opposed to social obligation (see Manning *et al.*, 1999). Applied to forests, Manning *et al.* (1999) define a *held value* more specifically as “an enduring concept of the good related to forests and forest ecosystems.” In comanagement, this value depicts the value of environmental protection. The real targets of the attitude study presented here are conservation as a principle and the local FPC organizations as the forest managers.

<sup>12</sup> Alternatively, item scores can be directly added if statements are subjected to Tukey’s Test of additivity. The Null hypothesis is that statement scores can be added. In our cases, we used the SPSS 17 and the Null Hypothesis was accepted at 1 and 5 percent levels of significance for the Scales of attitudes towards Co-management and Forest Department respectively.

<sup>13</sup> Tukey’s Test for additivity of the two scale scores also shows that all the statements of the two scales are additive at 5 percent level of significance. Hence scores of each respondent over all the statements can be directly added to construct the ‘overall conservation attitudes’ variable.

We also measure access to forest resources as yes/no type variable, while property rights is a dummy variable measured as protected area management =0 and JFM =1.<sup>14</sup> CPR knowledge of households is defined as more if the household knows the objective and benefits of JFM and the resource condition and use pattern. Otherwise their knowledge is less or nil. Finally, we measure forest condition, forest benefits, and transaction costs of cooperation to examine how the attitudes and behaviors of the forest users influence performance of the organizations. Following Ray and Bhattacharya (2011) we define transaction costs in the context of co-management as the opportunity costs of labor hours spent in establishing common property rights in the sites. Hence it includes costs-related to monitoring and implementation, attendance at the FPC meetings and conflict resolution in terms of number of labor days spent in such activities (1 Labor Day equals eight working hours in West Bengal). For fixed transaction costs we rely on data obtained from the respondents' recall of such costs incurred initially to launch the local JFM. Local foresters verified the authenticity of those figures. These are start-up costs. Total transaction costs are the sum of variable/recurrent transaction costs and start-up costs.<sup>15</sup>

Forest conditions indicate the state of forest stock and trends of change in forest covers (Varughese and Ostrom, 2001; Adhikari and Lovett, 2006b; Ray and Bhattacharya, 2011). To specify the state of forest biomass of the local forest, foresters generally consider crown density index (Ray and Bhattacharya, 2011). The stock of local forest is assigned as *above-average/average/below-average* if the value of that index exceeds/equals/falls below .50. To assess the stock of local forests, we use this categorization obtained from the foresters. We also

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<sup>14</sup> It is important to note that protected area management is practiced in North Bengal such as our study sites in the Buxa tiger reserve while JFM has been implemented mainly in South Bengal including West Midnapore. In our study areas forests in Jalpaiguri districts are managed

<sup>15</sup> The way transaction costs have been measured here follow others (e.g., Adhikari and Lovett, 2006a) and can be treated as a proxy for people's *participation* in co-management like Ray and Bhattacharya (2011) and therefore also for *leadership quality* as in Adhikari and Lovett (2006a). This way of conceptualizing transaction costs are therefore expected to be correlated with attitudes and behaviors reflecting the possibility of endogeneity in (1) and (2).

depend on the perceptions of the locals and the oral histories described by them. Considering these and the foresters' evaluations about the crown density, the relative abundance of forest products, disappearance of tree species and changes in forest area, we define a forest trend as *improving/stable/declining* if vegetation (tree species) and forest cover thus assessed are expanding/unchanged/degrading. During the fieldwork we also hired two local forestry experts to verify the assessed condition and trends of forests. Since it is often found that trends in forests are positively correlated with stock of forest- *above-average* forests are more likely to be *improving forest* over time because growth of forests requires a minimum stock- we consider for the sake of simplicity only the *trends of the local forest* as an indicator of forest condition of the study sites. In the next section we measure the revealed behaviors of the respondents through a group-based trust experiment that follows.

#### *Regression Models of conservation Attitudes and Pro-social Behaviors*

An Econometric model was developed to understand the relationship between conservation-related attitudes of the local people and socioeconomic attributes and other factors such as social capital and institutional issues. It was hypothesized that people's attitudes are associated with household and community attributes. So variation in conservation attitudes among households can be explained by the socio-economic profiles of user-household. This relationship can be represented as:

$$\text{Conservation attitudes}_i (y_i) = f(\text{household access to CPR}_i (X1), \text{land holding}_i (X2), \text{livestock unit}_i (X3), \text{caste}_i (X4), \text{education} (X5), \text{CPR knowledge}_i (X6), \text{gender}_i (X7), \text{Non-forest earnings}_i (X8), \text{household perception about benefit from JFM}_i (X9), \text{distance to forest}_i (X10), \text{forest management regime}_i (X11), \text{distance to nearest market}_i (X12), \text{trust} (X13)) \quad (1)$$



It is important to note that in (1),  $y_i = y_i^*$  if  $\alpha \geq y_i^* > \lambda$  Or,  $y_i = 0$  if  $y_i^* \leq 0$ , where  $y_i^*$  is a latent variable,  $\alpha$  and  $\lambda$  are two limits of values which  $y_i^*$  can take and  $y_i^* = \beta \cdot x_i + u_i$ ,  $u_i \sim N(0, \sigma^2)$ . In our case,  $\alpha$  and  $\lambda$  are 3 and 15 that are the minimum and maximum scores of a scale. Therefore, we employed Tobit regression to find the determinants of conservation-related attitudes of the local people.

We also consider a regression model of the factors affecting pro-social behaviors in equation (2). Here, we assume that attitudes affect behavior. Thus, the model can be represented as:

$$\text{Pro-social behavior}_i (z_i) = f(X_i, y_i) \quad (2)$$

Note that  $X_i$  in (2) are the explanatory variables used in (1) and  $y_i$  is the conservation attitudes of household  $i$ , which is now considered as an explanatory variable in (2).

We also note that these equations may suffer from problem of endogeneity and reverse causality due to the possible correlation between explanatory variables and the error term in (1) and (2). For example, trust and attitudes may be correlated: participants with high attitude scores are more likely to trust each other and hence cooperate more for conservation. Similarly, attitudes and behaviors are expected to be negatively correlated with transaction costs. In such a situation, the estimate of the effects of these variables on conservation attitudes would be biased, and therefore, the estimated coefficient would not be reliable. To tackle endogeneity (if any), we first included JFMC-specific fixed effects to remove JFMC-specific unobserved heterogeneity such as institutional and other unobservable JFMC effects. This may reduce the correlation between explanatory variables and the error term and consequently, endogeneity bias may be less severe (see Hsiao, 2003). Second, we used the standard Instrumental Variable (IV) for the equation of pro-social behaviors and IV Tobit estimation methods for the attitude equation. Wu-

Hausman F test of endogeneity in case of equation of pro-social behavior (equation (2)) and Wald Test of exogeneity in case of attitude equation (equation (1)) strongly signal the exogeneity of trust and transaction costs and suggest that there is no need for applying IV estimation method.<sup>16</sup>

### **Examining Attitudes-Behaviors Consistency: an Experiment**

In commons dilemma people tend to free ride. This confirms that success or failure in co-management depends not only on people's attitudes but also on their pro-social behaviors (greater trust, reciprocity and cooperation). These behaviors lead to high collective action for conservation and lack of it ruins co-management institution. To measure respondents' pro-social behaviors and give completeness to this study, we have used the standard trust game as in Berg et al. (1995) in several sessions since it is the most popular paradigm of measuring trust via economic experiment. In this game, senders are given a certain amount of money and decide how much of it to send to receivers and how much to keep. Any positive amount sent is tripled (to make sending socially efficient) before it reaches receivers, who then decide how much of the tripled amount of money received is to be sent back. Fractions sent and fractions returned are treated as measures of individual player's trust and reciprocity respectively.

We extended the above experiment as follows.<sup>17</sup> Our participants played in groups rather than as individuals. Since conservation-friendly decision-making and hence behaviors are affected substantially by bargaining between men and women, proportional strength of women matters in commons management (Agarwal, 2010). However, to examine whether women's

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<sup>16</sup> Results can be available upon request.

<sup>17</sup> Instructions of the experiment are available upon request from the authors.

proportional strength matter in pro-social preferences of the locals<sup>1819</sup>, we employed playing groups with varying proportions of females (0%, 33%, 50%, 67% and 100% respectively). Each group comprises two/three members and the members of each group played as both senders and trustees with prior knowledge about the roles.<sup>20</sup> Based on ex-ante matching, sender groups anonymously paired with the responder groups played the game once. The game was double-blind: neither the experimenter nor the players knew the identity of the groups they were paired with. In community forestry women are often discriminated: they are given less importance, denied from decision-making power etc. Hence we let each group know about the gender composition of its paired group to examine whether the group sends/returns less to its partner group when it knew that the group it was paired with has more female members. The stake size was 50 INR (1USD=48 INR) per member, half day's wage in the study site. To measure cooperation, each group was given 15 minutes to make decisions on the amounts to be sent or returned. It was told that the amount sent and the amount received would be shared equally.

To understand the attitude-behavior consistency, we finally measure the index of pro-social behaviors as the average of the *index of fraction sent plus index of fraction returned plus (1-index of time taken for decision-making)*. Values of all the indexes used are calculated by the formula:  $\{(actual-minimum)/(maximum-minimum)\}$  and then averaged across households to get the average index values for a group or for a JFMC. Index of conservation attitudes is similarly calculated.

### **Theoretical insights on women's attitudes and Working Hypotheses**

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<sup>18</sup> We differ from the existing studies (Bratton and Ray, 2002; Agarwal, 2010) in the sense that we examine the relationship, if any, between women's proportional strength and the experimental results. Thus, this study adds to experimental economics also (see Cardenas and Carpenter, 2008 for an excellent review)

<sup>19</sup> One interesting aspect of our study is that it tries to capture (but not quantify) free-riding behaviors of resource users in a trust game in as much as free-riding tendency is generally detected in public goods experiments.

<sup>20</sup>The objective of 'playing both roles' is to double the experimental data within a given time. Many authors have done this before (see Bouma *et al.*, 2008 in the context of watershed management).

There are a number of related theoretical propositions on women's conservation attitudes and behaviors. The study proceeds on these ideas to construct relevant hypotheses. First, eco-feminists confirm that due to their belongingness to nature, women are more conservation-friendly than men (Agarwal, 1992). On the other hand, feminist environmentalists like Agarwal (1992) and others (e.g., Lise, 2000; Agrawal and Chhatre, 2006) convey that rural women are more dependent on natural resources, and as a result, more likely hold favorable attitudes towards conservation-related issues. Therefore, *women are expected to be more conservationists than the male members of the FPCs* (Hypothesis 1). Second, since psychologists (Ajzen and Fishbein, 1980) argue that attitudes are culture and context-specific, we hypothesize that *people's attitudes towards JFM and local forestry organizations may vary across the study sites and may be culturally determined* (Hypothesis 2). Third, women's presence in the EC may work in either way. Because women are strict rule-makers, overall cooperation should be high (Agarwal, 2009a). But, according to some sociologist (Sell, 1997), males are societally of higher status than females and this status inequality may adversely affect group decisions. Given these we hypothesize that *a critical proportion of women in the EC may encourage the FPC members to hold conservation-friendly attitudes and behave accordingly* (Hypothesis 3). Moreover, since people tend to free ride, respondents' conservation behaviors such as cooperation should differ from their attitudes. Thus, we expect an *attitude-behavior inconsistency in co-management in the study sites* (Hypothesis 4). Because women are close to nature, they are likely to behave more consistently. However, *we expect forest conditions to be improving or stable in FPCs where members' attitudes are conservation-friendly and their behaviors are consistent with these attitudes* (Hypothesis 5). Such consistency actually reduces transaction cost (Ray and Bhattacharya, 2011). Finally, we also expect women's *proportional strength in the EC to*

*influence pro-social behaviors* (Hypothesis 5). It may be due to women's unequal representation and asymmetric power relations or, simply gender differences in social preferences among the members of the FPCs.<sup>21</sup>

## IV. Results and Discussion

### (i) Characteristics of Respondents

Table 1 demonstrates significant socioeconomic differences between men and women as individual resource users, and also between the male-headed and female-headed households in the study areas. Respondents are mostly coming from reserved/low caste households (households belonging to Scheduled Caste and Scheduled Tribes, and Other Backward Class). While average per capita landholdings of men and women are 0.33 acres and 0.19 acres respectively, female-headed households are more poor than the male-headed households on this ground; the latter holds lands more than four times the amount of lands held by the former ( $p=0.037$ ). Interestingly, women being the main collectors of fuelwood and fodder from local forests derive significantly higher annual average per capita earning from forest than males ( $p=0.034$ ). Regarding non-forest incomes, men and male-headed households earn more from outside works such as daily wage labor than women ( $p=0.017$ ) and the female-headed households ( $p=0.025$ ).

Table 1. Socio-demographic break-up of the sampled households differentiated by gender and household type

Variables	Gender		(p value)	Household type		(p value)
	Male	Female		Male-headed	Female-headed	
Education (Avg. School years)	5.5	4.5	0.124	6.5	3	.081
Caste:			0.043			.301
General =26 families	18	8		35	9	
Reserved=170 families	96	74		47	84	
Land holding per capita (Avg. acre)	.33	.19	0.027	.69	.16	.0372
Annual Avg. Forest	2883	3916.36	0.034	2900	2255.50	0.204

<sup>21</sup> For a review of women's social preferences in economic experiments, see (Croson and Buchan, 1999; and, Cardenas and Carpenter, 2008; and for an excellent review of the effect of women's proportional strength in public forums, see Agarwal, 2010; and Bratton and Ray, 2002).

Income per capita (in Rs)						
Non-forest Income per capita (in Rs.)	6738.46	3909.09	0.017	7300	1800	0.025
Local interactions (no. of days per month)	6.06	4	0.013	5.13	2.62	0.008
Transaction costs borne (labor days spent annually in participation for co-management)	37	61	0.008	45	53	0.039

N= 151 for the gender-based comparison and N=114 for the household type-based comparison.

We also observe that men interact more than women with the key forestry and *panchayat* (village self government) personnel ( $p=0.013$ ). Men are free to move anywhere since they do not have any social restrictive norms as is often imposed on women, especially the young ones. On the other hand, female-headed households are least interacting with the forest department officers and *Panchayat Pradhans* (Heads of village self government) for local as well as their personal matters. Agarwal (2001) observes that forest officers give least importance to such households' needs and even if they listen to women-run households, they do not fail to verify it. Thus, women and female-headed households in the study sites are more asset-constrained and more dependent on natural resources than males and the male-headed households. Thus, our findings are consistent with others (e.g., Agarwal, 2001)

#### *(ii) Stakeholder Attitudes towards Comanagement and Forestry Organization*

Overall, 49 % and 58% of the respondents hold positive attitude (i.e., above-average score) towards forestry organization and co-management and, in either case, women are more conservationists than men (average attitude scores of females versus males: 3.30 vs. 4.40;  $p<0.01$  and 3.60 vs. 4.5;  $p< 0.05$  respectively in the context of the respondents' attitudes towards co-management and forestry organizations).

To understand the gender differences in conservation-related attitudes, we further disaggregate the data in table 2. We find that more than 75% of women either *strongly agree* or *agree* with the first statement of the JFM Attitude scale: JFM, according to them, is the best

practiced forest management paradigm than other management regimes like the state-led or only community-led management. Almost an equal percentage of women perceive that JFM Program integrates them with their village forests. 75% of the female respondents support JFM programme since “*Only a management system such as JFM can bring government and Forest Department closer to people.*” Values of Cronbach’s alpha for women’s attitudes towards JFM and Forestry Organizations are 0.82 and 0.91 respectively. This suggests that women are consistent in their attitudes than men.

Equally noteworthy are the men’s attitudes towards FPCs and Forest Department. Percentage of male respondents supporting JFM and FPCs is as high as that of female respondents. On average, 53% of them hold positive attitudes towards JFM; while at the most, 59% of them like the local FPC and Forest Department staffs and their conservation-related activities.

Table 2. Gender differences in attitudes towards Joint Forest Management and forestry organizations (in %)

Attitudes Statements of Likert Scale	Strongly Agree	Agree	No Opinion	Disagree	Strongly Disagree
<i>Attitudes towards Joint Forest management</i>					
Statement 1. Joint Management of local forest (JFM) both by the Forest Department and the people of this village is better than forest management either by village community alone or state alone, and also better than keeping it as an open access.	50 (30.77)	28.26 (23.08)	4.35 (5.77)	10.87 (18.27)	6.52 (22.12)
Statement 2. I like JFM Program as it integrates me with our village forests.	47.83 (33.65)	30.43 (19.23)	4.35 (3.85)	6.52 (21.15)	10.87 (22.12)
Statement 3. Only a management system such as JFM can bring government and Forest Department closer to people.	43.48 (38.46)	21.74 (15.38)	2.17 (7.69)	13.04 (17.31)	19.57 (21.15)
<i>Attitudes towards institutions</i>					
Statement 1. FPC and Forest Department officers are managing local forest well.	26.09 (39.42)	43.48 (19.23)	6.52 (3.85)	21.74 (25)	2.17 (12.50)
Statement 2. Efforts of local FPC members and the Forest Department to minimize human-elephant and other resource-related conflicts are really praiseworthy.	28.26 (36.54)	28.26 (21.15)	8.70 (5.77)	17.39 (19.23)	17.39 (17.31)
Statement 3. Members of the local forestry organizations and forest department personnel trust each other very much, which help in local community	30.43 (35.38)	36.96 (20.19)	4.35 (3.85)	15.22 (17.31)	13.04 (23.08)

economic development.

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Numbers of female and male respondents are 92 and 104 respectively. Figures in the parentheses indicate the attitudes of males.

The reasons for women's positive attitudes towards conservation and forestry organization may vary across culture, context, and over time. While Mehta and Heinen (2001) attribute this to imparting training with local women in Nepal, Ray and Bhattacharya (2011) identify actual forest benefits influencing their forest conservation attitudes in India. In our context, table 1 reinforces the ecofeminist argument that women are closer to environment (see the transaction costs data in table 1) and men are closer to culture (see the local interaction data in table 1). Moreover, women also derive forest benefits significantly more than men (see Table 1). This further confirms the feminist environmentalists' argument that women are materially more dependent than men (Agarwal, 1992). A growing body of literature also suggests that forest benefits act as an incentive for participation in conservation (Gillingham and Lee, 1999; Adhikari and Lovett, 2006a; Ray and Bhattacharya, 2011).

However, a couple of things may be noted: first, men also hold positive attitudes towards JFM and FPCs (Table 2) but not as much as women hold. On average 50-60% of men are conservation-friendly, while these figures for women range between 75-80%. Moreover, these are the stated attitudes of the respondents. Therefore, a response bias is obvious because respondents tend to look good with the researchers (see Netemeyer et al., 2003) and they tend to free ride. Thus, we need to understand respondents' behaviors also.

*Pro-social behaviors of resource users: A gender-based comparison*

Table 3 reports the data on conservation-related behaviors obtained from the field experiments in the study sites and also presents the attitude-behavior consistency issue in the last column.



Overall, the indices of pro-social behavior and attitudes reveal that household's attitudes and behaviors are significantly correlated, suggesting that households with positive attitudes are more likely to trust and reciprocate others trusting them and, therefore, cooperate for conservation. This does not however explain why some communities fail to conserve natural resources. Perhaps, resource users' attitudes and behaviors are shaped by their social attributes such as the gender differences as evident in table 3. Unlike men, women are consistent in their attitudes and behaviors (correlation between indices of attitudes and behaviors =0.21,  $p<0.05$ ). Thus, gender matters in conservation attitudes and behaviors.

Table 3. Pro-social behaviors of the resource users differentiated by gender and gendercomposition

Variables	Pro-social behaviors of respondents				Index of conservation attitudes (all scales taken together)	Attitude-behavior correlation
	Trust (% of stake sent)	Reciprocity (% of the amount sent back)	Cooperation (in minutes)	Index of Pro-social Behaviors		
<i>Gender</i>						
Men (n=104)	46.54	47.47	11.10	0.41	.61	0.16
Women (n=92)	50.22	46.13	10.25	0.53	.73	0.21**
<i>Gender Composition</i>						
All-men group (n=50)	44	35.14	12.05	0.42	0.59	.23
Mixed group (n=110)	47.08	47.71	10.02	0.50	0.57	.34***
All-women group (n=36)	58.33	48.89	10.50	0.54	0.74	.32**
<i>Overall</i> (n=196)	48.27	44.96	10.79	0.51	0.66	0.14**

Note: \*\*\* and \*\* represent significance levels at 1% and 5% respectively.

For further understanding, we examine the role of gender composition on pro-social behaviors of the sampled households. Interestingly, all women groups appear as the most trusting, reciprocating and cooperative groups compared to all men groups and mixed groups.

Such groups send 58% of their stake money as senders and return 49 percent of the money received to their respective partners. Accordingly, this group's pro-social behavior index is 0.74 out of 1, the highest of all groups. Scholars argue that in all women groups, women's identity gets activated due to homogeneity that makes them more pro-environmental and strict rule-makers (Agarwal, 2009). However, some observations need attention. . First, all-men groups' attitudes and behaviors are not correlated reflecting that men tend to free ride more. Second, mixed groups are the most consistent (correlation coefficient = 0.34,  $p < 0.01$ ). Though mixed groups perpetuate female subordination and restrict female participation in collective actions, men and women in mixed groups often interact effectively because women enter masculine social spaces and establish contacts, and capture some of the male resources that help them to access information and help in need as compared to the all-women and all-men groups (Gotschi et al., 2009). If women are more conservationists than men and gender composition also matters, does these findings imply in a more general way that determinants of attitudes and behaviors are also gendered? The next table provides a plausible answer to this query.

*(iv) Gender differences in determinants of conservation attitudes and behaviors*

In Table 4 we have used a three-stage modeling technique. First, we use all sample to find the factors affecting the aggregate conservation-related attitudes and behaviors of the households. In the second stage, we use only the significant determinants of the all-sample model and examine whether these determinants are gender-sensitive or not. Thus, in stage two and three we use all-men and all-women samples. We see several interesting results. First, institutional factors do matter in conservation attitudes and behaviors. For example, property right does matter here: households in the protected areas of Jalpaiguri districts hold negative attitudes in aggregate towards forest conservation. This is expected as in protected area restrictions in forest

use are more stringent resulting in conflicts between the locals and the forest departments (Mehta and Heinen, 1999). Similarly transaction costs have the greatest impact on both attitudes and behaviors. Since this indicates people's participation in co-management, it is likely to promote positive attitudes and behaviors among the local households. Access to forest resources also positively affects attitudes and behaviors. Due to low outside employment opportunities, access to resources actually makes local people more conservation-friendly. Transaction costs and access to resources also promote equity that further improves conservation attitudes.

Second, trust is another important factor. It promotes positive behavior. This is expected as trust reduces cost of cooperation. Third, households' positive perception about the benefits of JFM also shapes people's attitudes and behaviors. Fourth, determinants of attitudes and behaviors are almost similar as evident from the last column of table 4.

Most importantly, the determinants of conservation attitudes and behaviors are very much gender-sensitive. Table 4 suggests that men's attitudes and behaviors are influenced by those factors that belong to men, such as legal land holdings. In India women hardly have any legal landholding, while men hold most of the lands (Agarwal, 1994). In this study, landed households are more conservation-friendly and pro-social. One reason might be that the better-off people in the study sites are deriving larger forest benefits (Ray and Bhattacharya, 2011), or it might be that this class of people enjoys exercising decision-making power on JFM. Account of a village woman in West Midnapore District is worth mentioning:

*“We like to take part actively in decision-making for forest management. We have repeatedly told the Beat Officer and the male members of EC, but in vein. They do not listen to us saying that we should first learn from them about how to make unanimous right decision for the benefits of the local people and forest. Further, male members of EC who take decisions are coming from relatively rich families, for which they ignore us. Most often they say that if women start taking decisions who will manage household activities such as kid upbringing, cooking etc.”*

Agarwal (2009b) also comes across similar phenomena in Indian villages.

Similarly, access to resources and transaction costs matter more to women. Greater access improves women's conservation attitudes. Similarly, women bear greater burden of transaction costs that actually make them more pro-social. CPR knowledge also motivates women rather than men to hold positive attitudes and participate in collective action for conservation. Studies suggest that these three factors actually characterize women than men (See Agarwal, 1992; 2001). Hence they are more important to women.

Table 4. Determinants of conservation attitudes and pro-social behaviors

Explanatory Variables	Determinants of conservation attitudes: Tobit model			Determinants of pro-social behaviors: OLS Model		
	All Sample (n=196)	Male (n=104)	Female (92)	All Sample (n=196)	Male (n=104)	Female (92)
<b>Socio-demographic variables</b>						
Gender (female=1, male=0)	0.283 (0.109)***			0.412 (0.112)		
Education (number of school years)	0.014 (.032)			0.002 (.018)		
Caste (General=1, reserved=0)	0.248 (.271)			0.261* (.192)		
Landholdings (ha)	0.310 (.127)***	0.355 (.182)**	0.0002 (0.003)	-0.203 (.107)**	0.355 (.182)**	0.0008 (0.0013)
Non-forest earnings (log transformed)	-0.167 (.109)			-0.003(0.002)		
<b>Social Capital</b>						
Trust (proportion of money sent)	0.248 (.123)**	0.109 (.063)**	1.200 (.092)**		0.109 (.063)**	1.203 (.095)**
Reciprocity (proportion of money sent back)	0.231 (.146)			0.501(.442)		
Local interaction (days spent in establishing contacts for local development and co-management)	0.738 (0.652)					
<b>Institutional variables</b>						
Forest management regime (protected area management=0, JFM=1)	0.499 (.244)*			0.429 (.208)**		
Household access to forest (Yes)	0.891 (.422)**	0.0172 (0.231)	1.33** (.715)	2.23** (1.14)	0.007 (0.236)	2.13*** (.674)
Transaction costs (days spent in participation)	1.53(0.72)**	2.01(2.09)	2.33(1.08)**	1.75** (1.02)	1.09(2.07)	2.43** (1.28)
<b>Perception-related variables</b>						
Household perception about JFM benefit (Positive)	0.622 (.225)***	0.773 (.225)***	0.912 (.325)***	0.0003(0.0004)	0.813 (.223)***	1.12 (.381)***
CPR Knowledge (More=1, less=0)	0.009** (.005)	0.03(0.21)	0.112(0.06)**	0.0023* (0.00127)	0.005(0.22)	0.117(0.06)**
<b>Market Pressure and other variables</b>						
Distance to the nearest market (km)	-0.305 (.295)			-1.143* (.858)		
Distance to forest (km)				-0.305* (.207)		
Conservation attitude (all scales scores of respondent)	6.416 (.908)***	13.03* (10.01)	-5.66(5.12)	6.77*** (2.54)	11.54*** (5.23)	-6.57* (4.01)
Constant						

Note: Standard error of the coefficients are in the parentheses \*\*\*, \*\*, and \* represent level of statistical significance at 1, 5 and 0% respectively.

(iii) *Forest Attributes, Women's Presence in FPC and Their Co-management Attitudes*

In Table 5, we have clubbed all FPC villages in three categories based on their forest condition. Four FPCs have *improving forests*, while one has *declining forest*. The rest are assigned to have *stable forest*. Improving forests appear to be associated with relatively small forest size per FPC household than stable forest. However, we expected declining forests to be the larger ones, since according the commons literature (Olson, 1965; Ostrom, 1990; Adhikari and Lovett, 2006b) larger forests are more likely to suffer from well-coordinated management because more technical and physical resources are required to conserve such forests. Therefore, local people can easily overexploit forest resources leading to declining trend of the forest concerned. Here, we notice that the largest forest patches are stable forests. One possible explanation may be given from Ostrom (2003): larger forests entail high transaction costs in terms of monitoring and collective actions, simultaneously, they produce more forest products, which benefits the stakeholders more. The net benefit from conservation of such forests therefore depends upon the relative strength of the two opposing effects. In our context may be that the larger forests provide more benefits than the cost of

**Table 5.** Associating Conservation attitudes with Women's Presence in EC and forest-related attributes

Forest Trends	Number of FPCs	Area of forest per household (ha)	Annual Transaction Costs (in labor days)	Share of forest income	of Women's Presence in EC (Avg.)	Aggregate Attitude Score of Women (Avg.)
Improving	4	2.98	21	0.50	2.25	13.50
Stable	2	3.56	27.50	0.40	1.50	10
Declining	1	1.20	30	0.68	0	8.50

N= number of FPCs=7

conservation, thereby leading to successful conservation in those villages where these forests are located. In fact, some authors find no one-to-one relationship between forest condition and forest size in commons management (e.g., Varughese and Ostrom, 2001; Ray and Bhattacharya, 2011).

Moreover, it is expected that in forest areas where cooperation among the users is less self-enforcing, transaction costs (i.e., costs of establishing common property rights) will be high. Consequently, Table 5 reveals that transaction costs are highest (30 labor days) in the FPC with declining forest. In the FPCs where women hold more favorable attitudes towards JFM transaction costs are also low (21 labor days with aggregate attitude score of 13.50, on average). Hence forest condition will be more likely to be improving there. Thus, we get a positive relationship between women's aggregate attitude scores and forest conditions. Adhikari (2008) finds similar results.

Regarding the role of women's presence in the EC on the forest condition in the study sites, Table 5 shows that FPCs where number of women in the EC is around one-third (on average, 2.25 out of 6 FPC members), i.e., where proportional strength of women is around 33%, forest conditions are improving. It may be noted that under JFM in West Bengal, one-third of the elected EC members in FPCs must be women as per the West Bengal Government's Resolution in 2004. Here in this study we find a positive relationship between women's proportional strength and forest condition (correlation coefficient = 0.99,  $p=0.00$ ). Perhaps, more women in the EC may have greater bargaining power which may have improved cooperation for forest conservation. Our argument is consistent with Agarwal (2010). Finally, we see that organizations where share of forest benefits/incomes of FPC members are higher, forests are improving. Perhaps forest benefits encourage the local people to hold positive attitudes towards co-management. There is a growing body of literature in this subject which supports that people attitude towards natural resource management depends on perceived incentives of tangible benefits and costs (see, e.g., Ostrom, 1990; Adhikari et al., 2004; Adhikari and Lovett, 2006).

It is to be noted that we conducted a small N study (N being the number of FPCs). Since organizations are important than individual households we prefer to make an

organization-level study here. However, it does not mean that households are less important in the study; rather it is the households who bear transaction costs by spending their time for building cooperation for conservation and therefore can be considered the backbone of forestry organizations' efforts reflected in the transaction cost figures of table 5. Thus, this paper has dealt with institutional analysis at the root of which lie FPC households.

## Conclusions

In an attempt to understand the attitudes of the local people, especially women, we have conducted field surveys in seven FPCs of West Bengal, India in 2010. Interestingly, we find that: (1) women are more conservation-friendly than men; (2) in FPC, where stakeholders hold positive attitudes in aggregate and one-third seats of the Executive Committees of FPCs are reserved for women, trends in forests conditions are found improving; (3) respondents residing near protected areas hold less positive attitudes towards co-management and forest management organizations; (4) trust affect people's attitudes towards co-management and FPCs positively; (5) determinants of attitudes and behaviors are do not vary significantly; (6) However, these determinants are gender-sensitive. Regarding the experimental results we see that: (7) women are more pro-social, and, (8) mixed groups are most consistent in their attitudes and behaviors.

These findings may reflect some of the policy implications for joint forest management in India. Policymakers must understand the mentalities of the local people because such mentalities may prove cost-effective for co-management (Agrawal, 2006). Since low status stakeholders such as women and tribal people appear to depend more on local forests, including them in the decision-making process may achieve empowerment and social equity, both of which further encourage meaningful participation of stakeholders in community forestry. Since women are found to hold positive attitudes towards conservation-related issues in the study sites, and their determinants are totally different from men's, we



must attach to these female resources such as CPR knowledge, access to resources and distribution of transaction costs. To ensure equity in these issues we should ensure that some of the decision-makers in community forestry be women. The threshold of women's proportional strength may be set on the basis of local context.

The socioeconomic implications of the study are also noteworthy: landed households are getting more forest benefits, which result from unequal distribution of access and use rights and which result in village-level heterogeneity. Hence net benefits of the poor and women due to collective action in joint forest management are almost negligible. Thus, apart from exogenous seclusion of women and the poor from JFM, the inequitable benefits of conservation also endogenously seclude them. This demands attention.

In this context, findings of attitude studies conducted in other developing countries (cited earlier) show that perceptions of the locals often matters more in successful natural resource management. Given the dynamics of community forestry, socioeconomic as well as perceptual issues often bear significant implications for JFM. While policy for promoting stakeholder attitudes may appear to be site-specific, we argue that some common issues across different settings may be considered. For examples, in community forestry in developing countries like Nepal and India, women are found to be marginal and voiceless, while rich people are seen to enjoy most of the benefits of conservation. In several ways, we may promote positive attitudes among the stakeholders. Organizing forest-based festivals, for instance, may enhance local social interactions of the so-called secluded section of people. This may strengthen their bargaining power. Whatever the initiatives are undertaken, that must be compatible with the needs of the locals.

However, we do not claim that these findings are generalizable. Given that the socioeconomic dimensions and dynamic interactions of the community forestry actors in developing countries, especially in South Asia, are more or less similar as various studies

reveal, we may conclude that understanding and improving the forestry-related attitudes of and behaviors of the local people assume significant importance inasmuch as in conservation-friendly forest villages, at the least seclusion and marginalization of women would likely decline, and benefits of JFM may flow to the poor. After all, the motto of community forestry is ‘*conservation with development*’.

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**Figure 1. Map of the study areas in West Bengal, India**

