Gendered effects of work and participation in collective forest management

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Does Time Burden Affect Collective Forest Management? Analyzing the Gendered Effects of Work and Participation in Northwestern India

Abstract: This paper reports the results of a statistical investigation of the relationship between labor time expended in rural livelihoods, social structure, and community forest management. The object is to understand the impact of labor constraints to collective action. There are three main results. First, increasing time burden of work has a negative impact on collective forest management. Second, the gendered nature of work imposes a high burden on women and hence impedes their ability to participate in collective management even if incentives exist. In addition, lower access to social infrastructure further increases work burdens and decreases ability to participate. Finally, high levels of wealth lead to lower individual participation but this not because of high opportunity of time worked.

1. Introduction

Community management of forests and other natural resources has been the center of important public policy, empirical, and theoretical debates. Two primary questions have been the focus of these discussions. While one line of investigation pertains to the relationship between the rural livelihoods and forests, a second line of investigation aims to understand the factors leading to participation in collective action and co-management programs. These two questions are interdependent since a greater understanding of the well-being of resource users and the social relations within communities promotes an understanding of variations in the outcomes of collective management.

A number of studies have approached these two questions theoretically (e.g. Agarwal, 2000, 2001; Agrawal, 2001; Baland and Platteau, 1996, 1997, 1999, 2003; Bardhan, Ghatak and Karaivanov, 2007; Dayton-Johnson, 2000; Dayton-Johnson and Bardhan, 2002; Johnson, 2004; Ostrom, 1990) and empirically (e.g. Adhikari, 2005; Adhikari, Falco and Lovett, 2004; Agrawal and Chhattre, 2006; Baland et al., 2007; Bardhan and Dayton-Johnson, 2007; Heltberg, 2001; Jodha, 1986; Naidu, 2009). Despite this rich literature, there is a paucity of attention devoted to the issues of time use and its role in collective management. The limited number of studies incorporating time use in their analyses focus on the questions of forest extraction and degradation (Adhikari, 2005; Adhikari, Falco and Lovett, 2004; Baland et al., 2007; Cooke, 1998; Kumar and Hotchkiss, 1988) or engage in a valuation exercise by attempting to calculate the opportunity cost of forest extraction (e.g. WRI, 2005). Although there have been indirect references to time use and its effect on collective management (Baland and Platteau,

2007; Naidu, 2009), this question has not been analyzed thoroughly. Moreover, the parameters of the debate do not adequately address the relationship between the gendered character of time use, access to resources, and the social structure of the community. This fact represents a limitation in the literature insofar as time use is a significant factor affecting collective resource management, especially in economies with labor-intensive production processes.

Participation in collective management typically occurs in the form of labor contributions, monetary contributions, or both. Monetary contributions may be a necessary but not sufficient condition for successful collective resource management since some form of labor time is required to maintain, manage, and protect resources; design institutional rules; and implement politico-institutional decisions. In economies with well-functioning labor markets, monetary contributions may substitute for labor. But in economies with thin labor markets, the inability of individuals to contribute labor time can induce poor collective management outcomes even if incentives are present. Similarly, in communities with low per capita income or low capital endowments, labor may be substituted for monetary contributions in view of its relative abundance. From the perspective of an individual, time is a scarce resource (see Ilahi, 2000) and contributions of time to collective management are constrained by the time required to engage in social reproduction[1] in addition to market and non-market production, which are determined by inter-household and intra-household variables.

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[1] Social reproduction encompasses biological reproduction, reproduction of the labor force and fulfilling provisioning and caring needs (Bakker, 2003). Labor for social reproduction is generally gendered.

This article has two key objectives. First, this article reports the findings of a statistical analysis of the effect of the time burden of work on participation in community forestry utilizing data obtained from field work in the Indian state of Himachal Pradesh. However, it is also important to understand the determinants of variability in time burdens. The second objective is therefore to investigate the effect of social structure on participation in addition to the time burden of work. This two-pronged approach is adopted to clarify the relationship between social structures, time burden of work, and individual participation in collective forest management. The results suggest that gender, wealth, caste, and access to public infrastructure and forests have direct effects on participation in collective management, but gender also has an indirect negative effect on participation because women typically have high work burdens. Further, higher wealth is associated with lower participation but this result may not be attributed to time deficiency since higher wealth also lower work burdens. Finally, decreased access to public infrastructure and forests increases work burden and thus indirectly reduces ability of individuals to participate in collective management. Accordingly, the rest of the paper proceeds as follows. In the next section, I describe the sampling method and provide details about the various variables of interest. In section three, I present and interpret the regression results. Section four concludes.

2. Sampling and Data

The study area is located in Mandi district within the Indian state of Himachal Pradesh. Himachal Pradesh is situated within the western Himalayan region and is quite important from an ecological perspective. The population of Mandi district is primarily

rural and a significant percent of the population engaged in agriculture (see Table 1). Of

the ten development blocks in Mandi district, twelve villages from a particular

development block were purposively chosen, such that six villages were situated within a

specific wildlife sanctuary and six outside although within close proximity to the

sanctuary. A total of 209 households were selected based on stratified random sampling

to reflect the prevailing caste distribution. Respondents were randomly selected from

these households such that the sample consisted of an equal number of males and females

above the age of 18 years. Data on the socioeconomic status of the household; agrarian,

pastoral and forest practices; and time use were collected from two rounds of structured

interviews in 2008. Subsequently, follow-up group interviews were conducted in each

village. Below I discuss the variables analyzed in the regression models.

Table 1: *Characteristics of Mandi district*

Percentage of rural population to total population (2001)	93.23 percent
Population density (2001)	228 persons per square kilometer
Sex ratio (2001)	1,012 females per 1,000 males
Net irrigated area as percent of net sown area (2005-2006)	16.07 percent
Forests as percent of total geographical area (2005-2006)	15.93 percent
Net sown area as percent of total geographical area (2005-2006)	15.86 percent

Source: GoI (2001), GoHP (2011)

    (a) Participation in Forest Management

Forests in India are nationalized and forest policies tend to adopt a 'top-down'

scientific management approach that is often to the detriment of the forests and its

inhabitants. Since the 1980s, however, the Indian state has experimented with the idea of

incorporating forest dwellers in their management plans. These efforts became quite prominent beginning in the 1990s when the state decided to implement community forestry under the aegis of joint forest management (JFM). The central principle of JFM is that forests ought to be managed jointly by local forest communities and the Forest Department[2]. Himachal Pradesh adopted the principles of JFM in 1993 and has since adopted multiple related schemes (see Morrison, 2001 and Vasan, 2003 for a detailed discussion).

Participation in community forestry entails contributing labor time to meetings concerning forest management (*meetings*), engaging in planting trees and fencing off parts of forests (*maintenance*), and monitoring use of forests within the community (*monitoring*), in addition to protecting forests from outsiders and wildfires (*protection*). These are dichotomous variables that take the value "1" if respondents contribute to the activities, and "0" if they do not[3] (see Table 2 for descriptive statistics). These variables are analyzed as surrogates for participation in community forest management in the context of a statistical analysis. All villages selected for this study had community forestry institutions at the time of data collection. It must also be borne in mind that these

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[2] While there are many criticisms of JFM (Sarin, 2001; Sarin et al., 2003; Sundar, 2000; Sundar, Jeffrey and Thin, 2001), this policy at least acknowledged the importance of local forest dwellers in public discourse and the results have been positive in certain cases. Also note that the Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights), was passed in 2006 in order to transfer legal rights of forest management to local communities. However, the provisions of the Act have not yet been implemented.

[33] Time and monetary restrictions did not permit gathering data on the amount time contributed in these activities in a year. Further, in the case of monitoring and protection activities, it would have been hard to calculate time spent because it requires constant vigilance on the part of villagers.

labor contributions are unremunerated and hence may be considered "voluntary"[4]. Since labor markets are thin in Mandi, labor time is not freely traded, nor can these labor contributions be substituted by monetary contributions. Furthermore, none of the respondents contributed monies to community management; the contribution of labor time was the only form of participation.

(b) Time Use

Time is a vital resource and time distribution in work and other activities is of interest because it influences ability and incentive to participate in collective management and forest conservation (Agarwal, 2000, 2007). Being a scarce resource, time available for collective management could compete with household and market production essential for subsistence and household well-being. While it is true that rural households, and especially women are very dependent on forests (Negi, Rana and Sharma, 1997 cited in GoHP, 2002) and have a strong incentive to contribute to collective forest management, time pressure caused by diverse productive and reproductive roles, in conjunction with other ecological, social and cultural factors could reduce a respondent's ability to contribute. In particular, the gendered nature of time worked is worthy of attention because allocation of labor time is typically governed by gender norms and patterns of socialization (Floro, 1995a); this could (at least partly) explain why participation in collective management varies by gender and other socioeconomic factors.

In order to proceed, it is necessary to compute the time burden of work. However, it is insufficient to define the burden of work as the number of hours worked by a forest

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[4] The underlying assumption is that there is no compulsion to cooperate or participate. This assumption does not necessarily obtain.

user. A difficulty emerges insofar as a high work burden induces men and women to not only stretch the working day and reduce leisure time but also exert more effort per unit of time by engaging in overlapping activities (Floro, 1995a; Floro and Pichetpongsa, 2010). Ignoring overlapping work has been acknowledged to be a serious methodological flaw in time-use estimation (Beneria, 1992; Juster and Stafford, 1991; United Nations, 1988, 1990; Floro, 1995a), since women work longer hours in more than one task, i.e., in overlapping or simultaneous tasks (Floro and Pichetpongsa, 2010). Thus, special attention is paid to simultaneous activities in order to differentiate primary and secondary activities in this paper[5].

Respondents were requested to chronologically recall their activities beginning at four o'clock on the previous morning to four o'clock on the day of the interview (see Esquivel et al., 2008; Pichetpongsa, 2004 for a review of time use methods). The subjects described these activities in their own words and provided the approximate duration of these activities. In addition to classifying overlapping work activities as primary or secondary, work was categorized as (a) household work (e.g. cooking, cleaning, and mending or producing clothes); (b) care work (e.g. minding the children and caring for the elderly); (c) subsistence and petty commodity production (e.g. grazing and caring for cattle, extraction and processing of forest goods, and tasks related to agricultural production); (d) casual and non-casual wage work; and (e) market activities such as buying and selling commodities. The summations of the total time expended in all primary activities were computed. Recognizing that multi-tasking may increase the net time available but reduce the quality of work or create production bottlenecks, correction

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[5] With respect to overlapping work, the respondent decided the classification of work as a primary (or main) activity and secondary (or additional) activity.

factors for secondary activities were calculated for all categories of work. Specifically,

time expended in secondary activities were assigned weights of 0.5 (Pichetpongsa, 2004;

Pichetpongsa and Floro, 2007). In this data set, the average work burden was

approximately 12 hours per day (see Table 2).

Table 2: *Descriptive Statistics for Relevant Variables*

Variable	Mean	Standard deviation	Minimum	Maximum
Total household land (acres)	1.85	2.02	0	22.4
Age of respondent (years)	42.41	9.8	21	71
Proportion of dependents to total household size	0.15	0.19	0	0.67
Household size	5.18	2.02	1	12
Total dependents	0.88	1.18	0	6
Total time worked (minutes per day)	724.53	297.82	0	1,612.5
Quantity of biomass (kilograms by household in a season)	886.47	843.03	0	4,200
Total animals	9.35	24.08	0	203
Distance to childcare center (minutes)	13.79	12.25	0	60
Distance to a water source (minutes)	3.12	2.09	0	15

Variable	Proportion
Respondents living within a sanctuary	0.535
Respondents participating in meetings	0.574
Respondents participating in protection	0.568
Respondents participating in monitoring	0.57
Respondents participating in management	0.446
Female-headed households	0.185
Female respondents	0.53
Upper caste respondents	0.81
Respondents with intense work days	0.42

In statistical terms, the argument adduced in this section implies the existence of a

negative correlation between work burden and participation in collective management,

and that work itself might be influenced by gender, wealth and other factors. Thus, the

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social phenomena of time burden and participation in community forestry are analyzed in structural rather than reduced form; participation in collective forest management is regressed on time burden of work and a vector of explanatory factors while time burden is regressed on a vector of regressors.

(c) Wealth and Gender Characteristics

The economy of the field site is dependent on agro-pastoral activities and therefore land and livestock are important assets and indicators of wealth[6]. In India, land especially indicates creditworthiness of the household and its social status, while providing a form of insurance against economic shocks (Agarwal, 1994; Bardhan, 2005; Mearns, 1999). Due to the mountainous terrain, however, landholdings tend to be small and thus the average landholding is 1.85 acres. On average, moreover, each household owns nine animals (see Table 2). One might expect a high correlation between caste, landholdings and livestock holdings, but the correlation is weak in this data set. Correlation between caste and landholdings is 0.222; the correlation between caste and quantity of livestock is 0.12; and correlation between private landholdings and livestock holdings is 0.11. The low correlation coefficients suggest that these variables can be treated separately in the regression analysis. All three variables appear as explanatory

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[6] Land markets are relatively thin and is mostly inherited. This inheritance, however, is governed by gender norms and women typically do not inherit land. Despite changes in the Hindu Succession (Amendment) Act, 2005, which attempts to correct gender inequities with respect to the division of family property, women in Mandi district typically do not have titles to land. They have some claim to benefits derived from land owned by members of the household though change in marital status, such as widowhood and estrangement, may diminish this claim (see Agarwal, 1994; Ruwanpura, 2007). It should be noted that men, even if they are head of households, also may not possess titles to their land. Land may often be registered in the names of deceased family members. Accordingly, land is viewed as a household asset to which all household members have some claim. The issue of unequal claims is recognized but not dealt with in this paper.

variables in the regression equations for participation and time burden of work. Higher

wealth is expected to increase the incentive to participate but only if the forest commons

are a complementary input into private production (Baland and Platteau, 1996, 1999).

However, if private inputs can be substituted for those available from forests, there is a

lower incentive to participate. Further, wealthy individuals have higher access to

resources, including time. All else constant, this should increase their ability to

contribute. On the other hand, if wealthy individuals face a time deficit due to pressing

demands on their time, they may be unable to contribute to collective management.

Himachal Pradesh, and Mandi district particularly, has a high sex ratio

(proportion of females to males)[7] and a high female literacy rate compared to the national

average (see GoHP, 2002). Gender norms and other forms of socialization nevertheless

dictate that household productive and reproductive work, especially unremunerated work,

is largely, though not solely, carried out by women (Negi, Rana and Sharma, 1997 cited

in GoHP, 2002). Fifty-seven percent of the sampled respondents are females thus

allowing us to compare the work burden of men and women in the region as well as their

participation in collective forest management.

(d) Access to Social Infrastructure and the Forest Commons

Access to social infrastructure may be important in reducing the work burden (see

Lawson, 2007). As the provision of public goods increases, the amount of work is

expected to decrease while the converse holds if there is poor provision of public goods.

To capture this idea, two variables, *water_dist*, and *childcare_dist*, are included in the

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[7] Though child sex ratio in the state has been declining and this is an issue of concern (Premi, 2001).

regression analysis. These variables refer to the distance from place of residence to the nearest water source and childcare facility respectively[8]. Mean time required to travel to the nearest water source is 3.12 minutes and to the nearest childcare facility is 13.79 minutes.

While state policies have generally been restrictive of forest access, due to historical factors, however, most rural households in Himachal Pradesh retain *de jure* rights for *bonafide* personal consumption of forest products (Chhatre, 2003). This provides an incentive to participate in collective management. Thus, the variable, *biomass*, which measures the quantity of biomass (excluding firewood and fodder) that is collected by the respondent's household over six months is included as an explanatory variable in the participation regressions.

The degree of control over forest management is likely to be less within a wildlife sanctuary on account of bureaucratic involvement of the Forest Department and the existence of a thriving illegal timber trade. Residents of the sanctuary are likely to treat their forests as an open access resource rather than a collective good (see Guha, 1990; Gadgil and Guha, 1995). In order to statistically capture this effect, access to forests is proxied by the inclusion of the dummy variable, *sanctuary*, which takes the value unity if the respondent resides within the sanctuary. This variable is included as an explanatory

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[8] Under the Integrated Child Development Services (ICDS) policy, childcare centers (*aanganwadis*) were established to provide nonformal preschool education, supplementary feeding for children, pregnant and nursing mothers, and primary healthcare services. There were 72 projects with 7,354 *aanganwadi* centers in the state (Government of India, 2005).

variable for collective forest management; this variable is expected to have a negative impact on participation in community forestry. Further, in a rural economy such as in Mandi district with its relatively high forest dependence, a reduction in access to forests, as is the case in villages located within the wildlife sanctuary is likely to higher increase time burden of work.

3. Econometric Results

Table 3 presents a brief explanation of the dependent and explanatory variables. Two sets of regressions are presented. The first set presented in Table 4 regresses the four alternative indicators of participation on time burden and other explanatory variables. Since the indicators of participation are binary variables, they are analyzed in the context of a probit model. Table 5 shows the results obtained for the time burden regression equation. Time burden of work is a continuous variable and hence Table 5 presents coefficients of an ordinary least squares regression. Making explicit the relationship between labor time expended in rural livelihoods, social structure and community management will help identify the importance of labor constraints to participation in community forestry. In the following sub-section, I briefly discuss the effect of time burden of work on participation in community forestry. In the remaining sub-sections I explain the effects of various explanatory variables on participation as well as time burden of work, disaggregated by gender, wealth, access to social infrastructure and the forest commons, and other effects. In doing so, I clarify the direct and indirect effects of these explanatory variables on participation.

Table 3: Description of Dependent and Explanatory Variables

Variable	Description
Participation indicators – Dependent variable	
meetings	Binary variable where 1 indicates if respondent attends forest related meetings
maintenance	Binary variable where 1 indicates if respondent participates in forest maintenance
monitoring	Binary variable where 1 indicates if respondent participates in monitoring of forest rules
protection	Binary variable where 1 indicates if respondent participates in forest protection
Time burden of work – Dependent variable	
time_burden	Indicates the total time worked in household and market production, and domestic and care work (reproductive work). Standardized around mean and standard error. It is also used as an explanatory variable for the participation regressions apart.
Gender effects	
female_resp	Binary variable where 1 indicates that the respondent is female
female_hh	Binary variable where 1 indicates that the respondent belongs to a female headed household
Access to public infrastructure	
water_dist	Total distance from place of residence to nearest water source. Standardized around the mean and standard error.
childcare_dist	Total distance from place of residence to nearest childcare center (*aanganwadi*). Standardized around the mean and standard error.
Wealth variables	
Land	Total landholdings of the respondent's household. Standardized around the mean and standard error.
livestock	Total livestock that belongs to the respondent's household. Standardized around the mean and standard error.
Forest-related variables	
sanctuary	Binary variable where 1 indicates that the respondent lives within the sanctuary
biomass	Total biomass extracted by the respondent's household in six months. Standardized around the mean and standard error.
Other variables	
age_resp	Age of the respondent. Standardized around the mean and standard error.
wintensity_dummy	Binary variable that takes the value 1 if the work intensity on the day of the interview was above normal.
Caste	Binary variable in which 1 indicates that the respondent is upper caste.
dependents	Proportion of dependents in the respondent's family.
totmembers	Total number of members in the respondent's household. Standardized around the mean and standard error.

Table 4: *Probit Analysis: Four Alternate Indicators of Participation[α]*

	meetings (1)	*maintenance* (2)	*monitoring* (3)	*protection* (4)
intercept	-0.237	-0.466	-0.479	-0.411
	(0.427)	(0.433)	(0.445)	(0.459)
time_burden	-0.321**	-0.26**	-0.325**	-0.205
	(0.132)	(0.127)	(0.129)	(0.129)
female_resp	0.302	0.474*	0.293	0.116
	(0.231)	(0.245)	(0.235)	(0.235)
age_resp	-0.315***	-0.197	-0.303**	-0.29**
	(0.118)	(0.123)	(0.119)	(0.117)
totmembers	0.122	0.023	0.106	0.133
	(0.118)	(0.115)	(0.121)	(0.116)
caste	0.642**	0.764**	0.963***	1.01***
	(0.311)	(0.329)	(0.299)	(0.313)
land	0.049	-0.191*	0.073	0.077
	(0.134)	(0.108)	(0.145)	(0.143)
livestock	-0.124	-0.072	-0.153*	-0.144*
	(0.08)	(0.078)	(0.079)	(0.08)
biomass	0.153	0.383***	0.217**	0.138
	(0.104)	(0.109)	(0.105)	(0.107)
sanctuary	-0.587	-0.703*	-0.66*	-0.701*
	(0.393)	(0.395)	(0.40)	(0.412)
Log likelihood	-102.99	-94.44	-103.68	-104.746
N	204	204	204	204
Area under the ROC curve	0.80	0.84	0.80	0.79

α robust standard errors in parantheses; ***Significant at 1 percent level; **Significant at 5 percent level; *Significant at 10 percent level**.**

(a) Time Use

Time spent in work increases individual and household wellbeing, however, increasing work intensity may reduce this positive effect and begin to negatively affect physical and mental wellbeing (Floro, 1995b; Floro and Pichetpongsa, 2010). In this study, the variable time burden of work not only captures the length of the working day

(i.e., total hours worked) but also captures the time engaged in overlapping or simultaneous work that increases work intensity. The coefficient of this variable has a negative sign across all four specifications presented in Table 4 although it is statistically significant only in the first three. The sign on this coefficient suggests that as the work burden of respondents increased, they were less likely to engage in community forestry related activities. The result is of policy significance because it implies that as rural livelihoods become more demanding of labor time, individuals are less likely to contribute to collective forest management.

The question that this result poses is: what factors increase an individual's work burden? It has been argued that work burdens imposed on men and women are different and may be influenced by social norms; further other socioeconomic factors may intensify or mitigate this time burden of work (for example, Agarwal, 2000, 2001, 2007, 2010; Floro, 1995b; Mencher, 1993). Thus, to appreciate what factors might affect work and thereby participation indirectly, time burden of work is subject to further statistical analysis. The results of this regression (see Table 5) are discussed below in conjunction with the results of the participation regressions.

Table 5: *OLS Regression Analysis of Total Time Burden of Work*

	Total time burden of work
intercept	0.807***
	(0.248)
female_resp	1.00***
	(0.122)
age_resp	-0.079
	(0.06)
wintensity_dummy	0.307**
	(0.122)
female_hh	-0.323*
	(0.161)
caste	-0.037
	(0.204)
land	0.005
	(0.06)
livestock	-0.118*
	(0.063)
dependents	0.134
	(0.28)
water_dist	-0.065
	(0.066)
childcare_dist	0.151*
	(0.084)
sanctuary	0.402*
	(0.199)
R sq	0.414
N	207

(b) Gender Effects

The coefficient of the variable, *female_resp*, has a positive and statistically significant sign in regression (2) in Table 4. This means that female respondents are much more likely to participate in maintaining forests. However, this variable is not statistically significant for other participation regressions. Further, the regression in Table 4 suggests that female respondents bear the higher burden of total work. Of all the explanatory variables that time burden of work is regressed on, this variable has the

highest marginal effect. There are two related explanations for this pattern of participation.

First, there is a complementary relationship between enhancing the productivity of the forest ecosystem and women's work (see Agarwal, 1997; 2000; 2001; Beard, 2005) due to the gender division of labor existing in Himachal Pradesh, in which women are primarily responsible for reproductive work, and forest extraction for household production and consumption (Negi, Rana and Sharma, 1997 cited in GoHP, 2002). Combined with lower access to private economic resources and economic opportunities (women are less likely to participate in market-related activities) (GoHP, 2002) means that the forest common is an important economic resource for women. Thus, there is a high incentive for women to participate in community management. However, constraints on women's time could cause them to participate in activities with the highest visible positive effects to them (see Mayoux 1993, 1995); one could argue that this is engaging in maintenance of forests, including its regeneration and fencing off parts of forests, among other aspects.

Second, women's participation is not statistically significant across different activities, only for maintenance activities. It is possible that the social role of caregivers attributed to women allows them to maintain forests but does not offer much space in political decision-making, monitoring and enforcing forest violations, or forest protection (Agarwal, 2001, 2007; Ilahi, 2000; Mayoux, 1993; Moser, 1993). Thus there exists a gender division of labor in community forest management as well where women engage in low skilled work with high labor effort such as forest maintenance but do not or are not allowed to participate in "men's work" such as decision-making, rule enforcement, and

monitoring. This is consistent with Sarin's (1995) observation that women in Nepal were excluded from monitoring and protection activities until it was found to be beneficial in reducing violations by other women without incurring accusations of sexual harassment. Thus, the pattern of female participation in community forestry can be explained using a combination of social and economic factors. Female respondents are unable to participate in community forestry due to heavy work burdens; nevertheless they might be induced or inducted into community work without a reduction in other work responsibilities (Moser, 1993). From the perspective of short-term gains, this bodes well for forest management and conservation. However, it may be associated with negative effects on the wellbeing of female contributors as well as the long-term viability of such projects (see Floro, 1995b for a review of studies that discuss the relationship between work intensity and individual well-being). A high degree of participation despite heavy time burdens increases the inequitable distribution of the costs of providing a public good (i.e. a healthy forest ecosystem).

Lack of access to social infrastructure intensifies the constraints posed by the gender division of labor, what Kabeer (2000, 2008) refers to as "gender-intensified constraints." The burden of caring for children, which is primarily perceived as "women's work", may be mitigated with state intervention, i.e., the provision of adequate child and maternal care, and provision of well-functioning schools, among other things. The coefficient of the variable *childcare*, which measures the distance from place of residence to the nearest child care facility, and is positive and weakly statistically significant which suggests that as this distance increases, the amount of work burden also increases (also see Cavendish, 1999; Ilahi and Grimard, 2000).

Similarly, the coefficient for the dummy variable *sanctuary*, which measures whether the respondent lives within the sanctuary area, has a positive and weakly statistically significant effect on time burden of work. While one cannot claim that female respondents are the sole users of forests, decreased access associated with living in a sanctuary area might restrict opportunities for women. Women from Mandi district enjoy greater freedom and mobility compared to women elsewhere in northern India (PROBE Team, 1999), but they do not necessarily enjoy equal status and are also less able to access opportunities arising from higher market presence (GoHP, 2002). Household production, of which forests form a major component, offers them their primary source of productive work. Living in a sanctuary with its higher legal restrictions or at least the threat of conflict with Forest Department officials might not just restrict their mobility and their access to economic opportunities, but also imposes the need for higher time and effort levels in trying to find alternate sources of products extracted from their forests. Reduced access to social infrastructure and to forests thus increases work burden and thereby indirectly decreases a respondent's ability to participate in community management.

(c) Wealth Effects

The variables, *land* and *livestock*, which respectively describe land and livestock holdings of households that respondents belong to, are wealth indicators. While *land* has a negative, weakly significant coefficient in specification (2), the coefficient for *livestock* is negative with weak statistical significance in specifications (3) and (4) of Table 4. The signs of their coefficients suggest that higher wealth is likely to lead to lower

participation in community forest management. This is contrary to results obtained by

(Bardasi & Wodon, 2006; Lawson, 2007). In order to interpret the signs, it would be

useful to direct attention to the degree of complementarity between the private production

process and the forest commons. Households with high landholdings can substitute

private land for commonly held forestland and thus may not engage in significant forest

extraction (Balasubramanian and Selvaraj, 2003; Boyce, 2003; Cavendish, 2000; Fisher,

2004; Jodha, 1995, 2001; Reddy and Chakravarthy, 1999). Fodder for livestock,

fuelwood and other forms of biomass may be extracted from private land and used in the

private production of agricultural products and the maintenance of livestock, two

important economic activities in the study area. In other words, the degree of

complementarity is low when land owned is high, thus decreasing contributions to

maintenance of the forest resource, which would have yielded the forest products that

rich land owners are uninterested in.

High holdings of livestock also has a negative impact on participation; in this case

though, it affects participation in monitoring and forest protection. Two differing reasons

might explain this effect. First, those who hold a high stock of animals engage in

traditional animal husbandry. Thus, it is possible that needs of their livestock are

primarily met through transhumant grazing; forests close to their place of residence

(which was the focus of this study) may not constitute a significant portion of inputs into

livestock production. Second, forest policies in India view the utilization of forests as

grazing grounds as undesirable and have actively worked toward its restriction and

possible elimination. Thus, understandably livestock owners may be reluctant to

participate in community forestry initiated by forest officials especially in activities such as monitoring and forest protection which would reduce access to their forests.

In any case, what is clear from the regression in Table 5 that higher land and livestock holdings do not represent a high opportunity cost of time; land holdings do not have any impact on work burdens and an increase livestock decreases the amount of time that an individual engages in work. Combining the results in both tables, it is clear that wealth is associated with lower incentives to participate owing to low degree of complementarity between private endowments and the forest commons or due to dominant discourses in forest policies that seek to exclude some forest users.

(d) Other Significant Factors

The dummy variable, *sanctuary*, has a negative weakly significant effect on all participation variables except for meetings. This means that those respondents living within the sanctuary area are less likely to participate in community management. Living within the sanctuary is still fraught with reduced access to forests, increased surveillance by the Forest Department, and lower decision making abilities vis-à-vis forest communities living in non-sanctuary areas. This is particularly relevant in the context of the conflictual relationship between forest dwellers and the Forest Department in India (Guha, 1990; Sundar, Jeffrey and Thin, 2001). However, whereas in non-sanctuary areas, villagers were able to negotiate forest issues with the Forest Department on equal footing, in sanctuary villages, this was not observed. Further, the sanctuary area is rife with illegal timber extraction. The economic and political clout of the beneficiaries of the booming timber trade provide a disincentive or at least reduced capacity for villagers to maintain,

monitor or protect their forests. The positive effect of this variable suggests that respondents living within the sanctuary, spend more time working than those living outside of it, thereby pointing to the effect that access to forests have on work burdens. The indirect effect of this variable in increasing time burden magnifies its direct effect on participation in collective management.

The *caste* variable has a positive and statistically significant impact on all forms of participation. It also has the largest marginal effect on participation. This variable is a dummy that takes the value one if a respondent belongs to the upper caste. The positive sign on the coefficient across regressions in Table 4 indicates that upper caste respondents are more likely to participate in collective management (also see Adhikari, 2005; Adhikari and Lovett, 2006). Since upper castes are socially and numerically dominant in the study area, one might be tempted to draw the conclusion that socially homogenous communities are desirable for the provision of the collective good (e.g. Alesina & La Ferrara, 2000; Baland et al., 2007; Bardhan and Dayton-Johnson, 2007). However, there is insufficient evidence to support this claim in this study. The result merely implies that upper caste individuals are more inclined to participate and this might be due to the ease with which they can interact with other caste members. Given accounts of discrimination against lower caste individuals recounted during focus group interviews and casual interviews, it might also point to their exclusion from political and decision-making processes.

4. Conclusion

In the past few decades, collective resource management has become part of the mainstream discourse in resource management. However, the issue of work burden of resource users and its impact on collective management has received little or no attention. This is unfortunate because it does not allow for a complete understanding of the full extent of the incentives, costs and abilities of resource users to participate in community activities. Time is an important yet limited resource. Understanding total amount of work engaged in rural livelihoods is useful from a policy perspective since it allows for understanding the relationship between time expended in rural livelihoods and collective forest management. Demands on an individual's time, among other things, determine whether an individual participates in collective activities. This issue is of particular interest from a gender perspective since the extent of work time and the nature of work are governed by gender and other social norms.

This article has four main findings. First, the results suggest that time burden of work indeed has a negative impact on participation; respondents with a heavy work burdens are unable to contribute their labor to collective management, even if they have the incentive to do so. Thus, heavy work burdens are an impediment to collective action with respect to forest commons. Second, it is known that in the Indian context women are discouraged from taking an active role in the public sphere, including in decision-making on issues that have an impact on their wellbeing. Forest management is no exception to this rule as Sarin (1995) and Agarwal (2010) argue. Additionally, because the cost of engaging in productive and reproductive work may be non-substitutable and binding (See Vickerey, 1977; Antonopolous and Memis, 2007), it may prevent women from

participating even if they have the incentive to do so. When women participate despite heavy work burdens, it is not in decision-making or administrative activities but in forest maintenance activities that requires significant labor effort. Whether this participation is voluntary, or motivated by the persuasion (or coercion) of family members, or forest officials, women are undertaking the triple burden of productive, reproductive and voluntary community work (Moser, 1993). Thus, women occupy a disadvantaged position and possibly experience a reduction in their wellbeing (Floro, 1995b; Floro and Pichetpongsa, 2010). At the same time, this triple burden leads to the provision and maintenance not only of the local commons but the global commons. Ignoring the work burdens of rural livelihoods, structured by social relations, only serves to ignore the inequitable distribution of costs and benefits of providing the public good and the inability of certain groups to participate in collective activities.

Third, higher levels of wealth are associated with lower participation in collective management. However, lower participation by wealthier respondents is not due to a high opportunity cost of time, since time worked decreases with an increase in wealth. Instead, higher wealth lowers the demand for forest products and thus decreases the economic interest in the upkeep of the forest commons. As a corollary, the demand for forest products is higher if wealth is low due to the precarious nature of the livelihoods of the rural poor in India (Cavendish, 2000; Fisher, 2004; Jodha, 1986; Reddy and Chakravarty, 1999). Thus, it is essential to ensure that they are indeed well represented in forest-related decision making. Fourth, access to social infrastructure plays an important role in the livelihoods of resource users. A reduction in access to forests and childcare induces an increase in the expenditure of time and the costs of engaging in productive and

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reproductive work. This has an indirect negative impact on participation in community activities. Ensuring adequate access to essential social infrastructure is relatively easier to remedy in policy terms. The provision of such access is not only beneficial to economic and social wellbeing, but benefits forest management and conservation.

It is important that the results of this paper be understood in the social and economic context in which work is subject to gender and other social norms, forests are used for "low-return" activities and do not require high capital inputs, and labor and land markets are thin. Additionally, capital and labor inputs in forest management are not substitutable; the Forest Department provides capital inputs and technical expertise and forest dwellers are expected to provide labor inputs. An important caveat of this study is that it does not incorporate the role of external institutions such as the Forest Department, non-governmental organizations and external aid agencies in its analysis; it also does not investigate the difference between voluntary contributions and those made as a result of implicit or explicit coercion. With these qualifications, the evidence suggests that factors affecting time use and time allocation within the household and the community are important to successful collective management of forests. Thus, it is insufficient to discuss participatory management as an ostensible pathway out of poverty without according due attention to gender and other social norms that operate within participatory institutions.

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