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A Survey Analysis of Participation in a Community Forest Management in Nepal

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Key Words: Community forestry, Common property, User group, Caste system, Socio economic status, Participation.

Abstract: The main objective of the study is to determine which socio-economic factors affect levels of individual participation in the "Ludi-damgade" community forest. The empirical evidence for participation as a function of social status is obtained by using an ordered probit model. The model also estimates the marginal effects of socio-economic factors on different levels of participation suggesting how per unit change in such socio-economic characters affects the level of participation. Results from the two-stage least squares model also verify that participation in forest management determines the level of benefits received from the community forest. The study suggests that participation in common property resource management is based on the socio-economic profile of an individual and the level of participation is determined by the benefits obtained from the forest. The empirical results are expected to aid policy makers in empowering people of lower socio-economic status to understand the importance of community forest management in order to have equal distribution of benefits accrued by community forest.

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Introduction

In rural Nepal, forests play a vital role in the daily life of almost all-rural based people. There is a heavy dependence on forests for the basic household needs such as fodder, fuel wood and construction timber. Due to heavy dependency on forests for various purposes, forests have been under the threat of depletion throughout the country.

Community forestry has become the most important program to conserve, manage and utilize forest resources in Nepal. Community forestry management was followed by the Master Plan for the Forestry Sector (MPFS) in 1989, which was followed by 'The Forest Act' in 1993 and 'Forest Rules' in 1995 (Ojha and Bhattari, 2000). By early 1996, there were 3000 user groups, managing 200,000 hectares of forestland (Department of Forests, 1996).

The community forestry program was implemented in response to the failure of the government to manage forests after nationalization in 1957 and the increased recognition of people's right and capabilities to manage their forests. In 1970, the focus of community forestry was reforestation of degraded lands, but recently the emphasis is on participatory management and rural development (Baral, 1993).

Participatory approaches to forestry often aim at devolving decision-making rights and benefits in reference to forests to the rural populations, along with responsibilities for forest management. Devolution is based upon prediction of the greater efficiency of local resource management. This efficiency stems from the local indigenous knowledge, lower transaction costs due to the proximity to the forest, and better decision making due to the internalization of social and ecological costs. Devolving control of the

forest benefits to local user groups mobilizes local labor into forest management, which secures the benefit from forest products to the user groups (Ribot, 1995).

The community forest, a common property, is managed by the community. Participation in management, extraction and decision-making within the user group is a key to collective action. However, participation is dependent upon many socio-economic factors as Nepal's social structure is still based on a caste-system, gender, age and wealth with prevalent discrimination. Poor households do not benefit from community forests as much as affluent households because of product distribution decision by influential groups of people and also the opportunity cost of participation, which often yields disinterest in participation. Medium class households benefit the most in comparison to high and lower class households. Upper class households are indifferent in community participation whereas poor people are suffering since they cannot afford to participate. Different levels of participation have been observed in community forest management. In collective action, levels of participation include attending meetings, participating in weeding the forest once a year, and decision-making in relation to forest management. Since Nepal is a patriarchal society, there are currently fewer women than men in the decision-making level of participation even though policy makers have encouraged more participation by women in recent years. However, these assumptions may vary from one community forest to another as community differs in wealth and ethnic composition.

The main objective of this study is, therefore, to examine the source of different levels of participation in community forest management. The specific objectives are:

1. To determine whether different levels of participation in the community forest management is a function of the socio-economic factors;

2. To identify whether benefits from the forest are the function of participation.

The specific hypotheses formulated for analysis are:

1. Individuals with greater landholdings have a higher level of participation in community forest;
2. Men participate more than women in community forestry activities;
3. Higher caste individuals participate more in community forestry than lower caste individuals;
4. Older individuals participate more in decision-making level than younger individuals and;
5. Higher socio-economic level and older men therefore benefit most from community forestry.

Literature Review

Community forestry in Nepal has been evolving towards the complete participatory management by user group, where the users utilize and manage forest resources. The initial state was participatory conservation of environment through planting of trees which later developed into institutional development of community forest user groups where the forest management and resource control was undertaken by the user groups. Later the objective of community forestry expanded towards mobilization and empowerment of the user group towards development of the rural community.

Well-defined property rights give users incentives to work on common property (Arnold, 1992). Property rights also give people incentive to adopt technology that increases long-term benefits. This in turn gives resource users an incentive to improve the

resource through management, determining the equality in the accessibility of the resources (IFPRI, 1999). Meizen-Dick, R.; Brown Lynn R.; Feldstein, Hilary Sims; Quisumbling, and Agnes R. (1997) stated that property rights are based on age, gender, class, caste and intrahousehold characteristics. In order to motivate users to participate in the community forestry, users should have a right to extract products from the forest and exclude specific individuals who do not hold the rights.

According to Ostrom, E. (1997), collective action is affected by the size of the regime, dependency on the forest resources, and understanding of the value of the resource by users. Collective action is successful if users see high economic potential by the current activities. Users should have authority to determine harvesting rules and access without external influence.

Baral (1993) stated that the ethnic composition, political ideology and culture within the community could create problems at the user group level. In order to have a successful common property, every individual should have an equal level of participation in decision-making. Within common property resource management, participation of different interest groups is important to minimize the risk of excluding access to certain resource-poor groups of people (McAllister, 1999).

According to the studies done by Ojha and Bhattarai (2000) and Agrawal (2000), poor households do not benefit from community forests as much as affluent households and are not very interested in community participation. Poor households also have a high opportunity cost of participation as the time spent on participation could be used as labor for cash income. Medium class households benefit the most in comparison to high and lower class households. Upper class households are indifferent as they have low

opportunity cost of participating in the management. However, the research done by Ojha and Bhattarai (2000) was based only on qualitative data. Their statistical analysis was general and did not suggest any causal relationship. Another study done by Sharma (2002) suggested that there was no caste and wealth discrimination within the distribution of forest products and that the benefit from the community forests was equally distributed to all user groups.

According to Dick and Knox (2001), all members of the community group need to have equal participation in management in order for economically disadvantaged groups to receive benefits. Equal participation is necessary to create effective and equitable management for collective decision-making, which ensures equal benefits for all user groups. Demand for forest products also affects participation in community forest management. Involvement in community forest management practices is necessary to have access to desired forest products and to bring success to the community forestry project (Devkota, 1998).

It is important to understand the various perspectives involved in order to identify the successful outcomes. Different groups have different views about the outcomes and results from the participatory processes. However, taking account of the primary users of the community forestry is important. In particular, consideration of low-income groups is essential to ensure an equitable outcome (McAllister, 1999). Involving minority groups and women in community forest management can enhance the productivity of the resource. A study done by Pokharel (2002) found that community forestry has been successful in achieving sustainable forest and community, however, gender and equity issues are yet another challenge.

Methodology

To estimate community participation level as a function of social status and benefits received from the forest management, a two-stage model was constructed. First, an ordered probit model is used to determine the effect of socio economic characteristics upon participation (Greene, 2000). Second, a linear regression model is used to identify the relationship between the benefits received from forest products and level of participation from the predicted level of participation.

In the first model, participation is a function of age, caste, gender, and landholding. Level of education was dropped from the equation as it is determined by the caste and gender and is therefore highly correlated with those variables. Highly educated individuals tend to be male and from higher caste groups.

The equation to be estimated therefore is,

$$P_i = ß_1 Age_i + [ß_2 Gender_i + ß_3 Brahmin^2_i + ß_4 Chettri_i + ß_5 Newar_i + ß_6 Magar_i + ß_7 Sarki_i] + ß_8 LH_i + e_i$$

Where, P= participation by individual in attendance, suggestion, discussion, and decision-making coded in an order of 1 for attendance, 2 for suggestion, 3 for discussion and 4 for decision-making. The ordered probit model is appropriate in this context because the levels of participation may be considered an ordinal ranking. This specification avoids treating the differences between levels as uniform, as with least squares regression. The intercept is dropped in this equation to avoid singular matrix error from the dummy variable.

[2] Bhramin, Chettri, Newar and Magar are the influential caste and Sarki is the untouchable caste.

LH= landholding, where landholding was converted into hectares from the local units such as 'bigha', 'kattha', 'hal ko melo', 'ropani' and 'aana' following the conventional conversion used in Nepal.

Some categories of data were sorted out and set up as dummy variables. For gender dummy variable, 0 denotes female and 1 for male. Similarly, the ethnicity binary values were set to 1 if the individual was in a particular caste, and 0 otherwise.

As mentioned above, the ordered probit model was used because although the dependent variable is discrete, the multinomial logit or probit models would fail to account for the ordinal nature of the dependent variables (Greene, 2000, p. 875). The model is built around the latent regression in the same manner as the binomial probit model. However, the interpretation of the coefficient in the ordered probit model is quite unclear in the literature (Greene, 2000, p. 876).

A two-stage linear model for the demand function was also constructed, which posits forest product benefits as a function of participation. Participation was set as dummy variable of 1 if participating, 0 otherwise at four different levels of predicted participation from the previous ordered probit model. The intercept was dropped to avoid perfect collinearity. Each model was estimated using ordinary least squares regression:

Fodder quantity[3] = *f*(Mag, Dis, Sugg, Des),

Fuel wood quantity = *f*(Mag, Dis, Sugg, Des)

Timber quantity = *f*(Mag, Dis, Sugg, Des)

Where, (Mag= help in management, Dis= Discussion, Sugg = suggestion, Des= decision-making).

[3] The unit of fodder and fuel wood is in load and timber in cubic feet.

Survey data were used for analysis in the two models. A total of 443 households belonging to the community forest were divided into 4 clusters for sampling procedure according to their geographic location in the forest. From each cluster, 10 households were interviewed. A sample size of 10 percent of the sample frame from each cluster is representative of the status of the whole community (Fowler, 1993). An interview was conducted with 10 key informants for the information on overall management practices. The key informants included the present members of users' committee, ex-members of users' committee, old and respected personalities of the community, and the staffs of District Forest Officer. In collecting the survey data, three questionnaires were developed. The questionnaires were developed in Nepalese language for the convenience of the respondents. The study gives strong emphasis to the qualitative and the quantitative aspects of the management condition of the forest by the user groups.

The institutions such as Save the Children (US), Women Development Office (WDO), and local institutions such as District Forest Office have contributed in raising people's awareness and facilitated their participation. These factors could have changed the expected sign of the coefficient from the hypothesis which made the assumption that men participates more than women in community forestry.

In the community forest management, the committee members for decision-making are determined by self-selection. This study cannot generalize the selection process to the whole country, since some areas determine committee members via lottery, open voting or the use of dice.

Empirical Results and Analysis

The empirical results of the ordered probit model are presented in Table1. The coefficient for age has a positive sign as expected and is significant at one percent indicating that older people tend to participate more in the community forestry program. This could be due to the fact that older people are retired and have free time to participate in meetings. The coefficient of gender is significant at five percent with a negative sign, which suggests that women participate more than men across the different level of participation. In this specific area, participation of women in community forest management is enhanced due to the roles of various institutions.

Table 1: Parameter Estimates for the Participation Ordered Probit Model

Variables	Estimates	Standard error	P-value
Age	0.47E-01*	0.21E-01	0.028
Gender	-1.45**	0.51	0.050
Brahmin	-1.048	0.909	0.249
Chettri	-1.857***	1.156	0.108
Newar	-0.809	-0.839	0.40
Magar	-2023	1.394	0.110
Sarki	-2.65**	1.330	0.046
Landholding	0.223*	0.688	0.0012
Log likelihood function	-55.87740	* = Significant at 1%	
Chi-squared	28.77874	** = Significant at 5%	
No. Of observations	45	*** = Significant at 10%	

For ethnicity, Brahmin, Chettri, Newar and Magar were not significantly different from zero, which suggest that caste distinctions were not related to level of participation. This could be due to the fact that those three castes do not vary much with respect to wealth and ethnicity. However, Sarki was significant at five percent with a negative sign as expected. This suggests that as a member of the untouchable caste individuals on average tend to participate less. The reason behind lesser participation of lower caste individual could be due to the time constraints as they can earn money as a labor instead of participating and also, they perceive less benefit from community forestry.

Landholding was positive and statistically significant at one percent significant level as expected which supports the hypothesis that wealthy people are more likely to participate in higher levels of management. The assumption is that wealthier people has to maintain their influential status and perceive higher benefit with less opportunity cost of participation. These results, therefore, suggest that socio-economic profile including age, gender, ethnicity, and wealth affects participation.

The marginal effects of significant continuous explanatory variables on different levels of participation are presented in Table 2. Older people are involved in a higher level of decision-making and are less likely to involve in basic levels of attendance and discussion. Per year increase in age will decrease the general participation by 0.6 percent and discussion by 1.2 percent. Per unit increases in age, however increased in participation at suggestion and decision-making level by 1.4 percent and 0.4 percent, respectively.

Table 2: Marginal Effects of the Ordered Probit Model

Variable	Attendance	Discussion	Suggestion	Decision-making
Age	-0.006	-0.012	0.014	0.004
Landholding	-0.026	-0.059	0.064	0.021

Individuals with less landholding participated in lower levels of participation such as attendance and discussion, but larger landholders participated more in suggestion and decision. In other words, per-hectare increases in land holdings increased participation in suggestion by 6.4 percent and decision-making by 2.1 percent, but decreases in general participation by 2.6 percent and in discussion by 5.9 percent. The model did not give the precise marginal effect for ethnicity and gender because this approach is not appropriate for dummy variables (Greene, pp. 675, 1993). However, this analysis documented the expected marginal effects of age and landholding. Older individuals tended to participate in higher level of decision-making and same trend was seen for individuals with higher landholdings.

The prediction of ordered probit model is illustrated in Table 3.

Table 3: Prediction of the Ordered Probit Model (Per level of participation)

	Predicted				
Actual	**Attendance**	**Discussion**	**Suggestion**	**Decision-making**	**Total**
Attendance	3	3	1	0	7
Discussion	4	2	6	0	12
Suggestion	0	2	18	1	24
Decision-making	0	0	4	1	5
Total	7	7	29	2	45

The model predicts 53 percent of the cases correctly. For attendance, 7 were predicted correctly out of 7, for discussion, 7 were predicted out of 12, for suggestion, 29 were predicted correctly out of 24 which is over prediction and for decision-making 2 were predicted correct out of 5 which is under predicted.

The parameter estimates for the second–stage of the two-stage model are presented in Table 4. The parameter estimates for the fodder consumption were significant and positive for all levels of participation. Therefore, the fodder consumption increases with the increasing level of participation. Similarly, fuel wood consumption was positive and significant, suggesting that consumption and participation are positively related. For timber consumption, the coefficients were statistically significant for suggestion but were insignificant for remaining participation level. This suggests that the equation could not explain the relationship between timber benefits from the community forest and participation at lowest and highest level. Since timber is the most expensive forest product and the distribution is not normally distributed, the relationship could not explained.

The model for fodder and fuel wood benefits have a high F-value compared to the critical F- value, suggesting that the explanatory variables also jointly account for variation of the dependent variables. The model also showed that the explanatory variables had significant individual effects on dependent variable. Therefore, this model also satisfies the hypothesis that the fodder and fuel wood benefit from the forest is a factor of participation. However, the model could not explain timber benefit as a function of participation.

Table 4: Parameter Estimates for Received Benefits from Participation

Variables	Fodder quantity	Fuel wood quantity	Timber quantity
Forest management	1.125	21.6	14.25
Standard Error	(0.550)	(10.571)	(28.338)
P-value	(0.047)*	(0.047)*	(0.61)
Discussion	1.5	21.5	4.83
Standard Error	(.635)	(12.21)	(32.72)
P-value	(0.023)*	(0.086)***	(0.88)
Suggestion	2.21	33.9	39.93
Standard Error	(0.289)	5.55	(14.88)
P-value	(0.00)*	(0.00)*	(0.01)*
Decision-making	2.00	47.5	77.5
Standard Error	(1.099)	(21.14)	(56.68)
P-value	(0.076)***	(0.030)**	(0.179)
R- Square	64%	55%	19%
F-Value (4, 41)	17.87	12.42	2.34

* = Significant at 1%

** = Significant at 5%

*** = Significant at 10%

The result indicates that gender, landholding, age, and ethnicity were related to participation. It also shows that lower income individuals participated primarily in lower level activities and did not get as much benefit as individuals from the affluent groups.

According to findings from table 4, the second stage model identified that forest benefits were dependent upon participation level. Benefits increased with higher level of participation. Therefore, most of the rich individuals from higher castes received most of

the advantages from the forest. Lower caste and resource poor groups only received basic forest supplies of fuel wood and fodder, as they became more involved in basic levels of participation. Overall, the result showed that fodder and fuel wood benefits were not equally distributed among the users, and one of the reasons was different level of participation.

Conclusions

Several conclusions about the factors affecting participation in common property management of forests are drawn from this study. The statistical results specified that age, gender, and household income had significant effects on participation in community forest management. Wealthy households are more likely to participate in higher levels of forest management whereas poorer households participated less. Individuals with higher landholdings are involved in a higher level of decision-making whereas individuals with less landholding participated in lower levels of participation. Women are more involved in community forestry management than men. Lower caste individuals participated more in lower level of participation as opposed to higher caste individuals who participated in a higher level of decision-making.

The user right was not equally distributed among different socio-economic groups. As such, community forestry in this region did not enable the lower income groups to increase their economic level despite the lower cost of forest products. The disinterest of lower income and lower caste group can be resolved by allowing them to participate at higher level of participation and relieving them of those basic level duties. Emphasizing participation of resource poor groups in this way can result in an increased benefit for the future of community forestry, as the lower caste can being to improve their

socio-economic condition. Equal participation is necessary to create effective and equitable management for collective decision-making, which ensures equal benefits for all user groups.

Community forestry policy has been effective in providing rural society's basic subsistence needs in Nepal. To achieve the level of poverty alleviation and desired economic development, high-income generating activities have to be implemented by empowering users of the forest. The results showed that poor and lower caste groups are still excluded from the decision-making level. Although this community forest seems to be successful in its management practices, there is not an equal distribution of property rights and benefits among different ethnic and wealth groups.

Implications for Future Research

Future research should focus on the distribution of the most expensive forest product, timber, and try to resolve the conflicts that could be brought by the timber benefits. Since the model did not explain timber benefits with respect to participation, future research should identify other factors such as regulation of inspection, income and price as a function of timber benefits. Gender participation shows that women are participating more but at which level of participation is yet to be identified, as marginal effect could not calculate gender. In order to alleviate poverty and achieve success in economic activities, there must be equitable distribution of property rights among all user groups regardless of their gender, ethnicity and economic profile.

This study was conducted at only one community forest in the mid hills of Nepal and during a limited time period. As such, the results are constrained by the small sample

size and lack of survey data from other forest communities. The small sample size may not reflect the variability in the other Nepalese community forests.

In addition, the interviews may also have had some anchoring effect. One anchoring effect may be the gender of the interviewer (female). Respondents may present participation of women as greater than it is because the interviewer is female. Another anchoring effect may be the social status of the interviewer (student, not from untouchable caste) or the region of the interviewer's home. It is difficult to determine the accuracy and reliability of respondent's answers. Alternatively, respondents may present the outcomes of the community forestry as satisfactory to give the interviewer a positive impression of this region.

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