Socio-Economic Characterstices and Dependency on Community Forests: The Case of Humbo District Community Based Forest Management Project, Wolaita Zone, Snnpr, Ethioipia

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Abstract

The current study was conducted at Humbo community forest management project in Wolita zone of Southern Ethiopia with the aim to investigate household socio-economic characteristics and dependency on community forests: specifically it aimed to examine division labor in forest product extraction across household member, to examine the level of dependence of forest user group members on forest- based income, and to identify major socio-economic variables influencing forest and relative forest income. Accordingly, three out of seven CFM co-operatives were purposively selected for the study. This was followed by a stratified random sampling of 150 households (113 male and 37 female) based on gender. Important research data were collected through household survey, key informant interviews and focus group discussions. The data analysis was carried out by using descriptive statistics and econometric analysis. According to household survey regarding division of labor among household members revealed that females were the primary collectors of NTFPs mainly for household consumption. The F-test analysis on forest dependence indicates the presence of significant difference in mean forest and relative forest income (p=0.000) across sex of the household. Unexpectedly, female headed households were found to draw significantly higher forest and relative forest income while male headed households have lower incomes from the forest. Similarly, analysis of forest dependence by wealth category showed that mean forest and relative forest incomes of poorer households were significantly higher than those in medium and rich category (p=0.001).Ordinary least square model of regression analysis provides evidence in favor of the suggestion that socio-economic inequalities within the group are unavoidably associated with the ability of the households in forest and relative forest income generation. In overall, it is evident that household's wealth status (coefficient for wealth = -147; p = 0.000), sex of house hold head (coefficient for sex of household head = +173; p = 0.00), forest visit (coefficient for extension visit = -236; p = 0.05) educational background (coefficient for education level = -70; p=0.08) family size (coefficient =+60; p=0.02) exert a strong influence on appropriating annual income from the forest. On the other hand it is evident that household's wealth status (coefficient for wealth=-11; p=0.000), sex of household head (coefficient for sex of household head=8; p=0.000) put exert a strong influence on household relative forest income generation. The study revealed that gender differences along with other socio economic disparities do affect the income generation of households in forest management activities and decision making. While the heavily forest dependent poorer and female headed households are merely involved in labor and time consuming forestry activities such as planting and NTFPs collection, the richer and male-headed households have taken most of the decision making posts. The study suggests that diversification of livelihood strategies of the women and poor will enable them to have better lives and lower dependence on the forest as well as it reduce 'illegal' forest products harvesting especially by poor males and it increases the potential for women to assert themselves in demanding greater participation in community decision-making.

Keywords: Community Forestry, Dependency, Division of Labor, Forest income, Heterogeneity group

1.   INTRODUCTION

Forests are one of the most important natural resources on earth providing a wide range of economic and environmental benefits to mankind. The most commonly recognized values of forest resources can be generally grouped into direct use values (production and consumption) and indirect use values (ecological functions and environmental protection and regulation services) (Constanz et al., 1997). In developing countries in particular, the direct use values of forests play substantial role in enhancing the economic situations of communities around forests while the protection and regulation functions contribute for ecological betterment and climatic regulations respectively (Adhikari, 2011).

As stated by Alemayehu (2010**),** forest resource provides livelihoods support for hundreds of millions of people worldwide, through production of different products. 1.6 billion People of the world depend on varying degrees on forests for their livelihoods particularly poor people of developing countries (FAO, 2006; World Bank, 2004). Therefore, enhanced forest management needs consideration to the livelihoods of people living in forests because of the links between their livelihoods and the forests (Sunderlin et al., 2005).

When a responsibility of allocating natural resources is delegated to local organizations, communities are expected to consider socioeconomic capacity of individual users in resource use so as to figure out their dependency on the resources. Hence, the subject has become increasingly concerned with challenged roles of

socio-economic difference among users and their dependency on common property resources (Sapkota and Odén, 2008).

There is strong relation between gender and forest management: rural women tend to use the forest for substance whereas, men looks forests more of for commercial value and their potential for income generation from timber and commercial NTFPs (Mustalahti, 2011). And also forest products are highly wealth-sensitive (Adhikari *et al*, 2004). Since, socio-economic heterogeneity has a strong association with quantity of fuel wood collection from the community forest since individual household's fuel-wood dependence varies in relation to their socio-economic attributes (Sapkota and Odén, 2008).

Due to this forest-based income and employment opportunities are particularly important to the poor because of the ease of access to them, and the very low thresholds of capital and skill needed to enter and engage in most of them (FAO,1992). Of poor class majority are women whose dependence on common property resources is much greater than men probably the reason is due to inequalities in men's and women's access to private property resources this issue need special recognition (Agarwal, 1997).

Despite their immense economic and environmental benefits however, forests are being depleted at an alarming rate especially in developing countries like Ethiopia (FAO, 2006).

One of the major causes for the continued depletion and degradation of forest resources is related to the inefficient and non-participatory nature of the classical forest management systems that are characterized by loosely defined and unequal property relations (Gobeze *et al.*, 2009). This is because the sustainable management of forest resources particularly those under communal property rights is significantly affected by the nature of the group that manages and uses it (family size, gender, and wealth differentiation...) (Agrawal, 2001).

Therefore, prime aim of this study was to investigate household socio-economic characteristics and dependency on community forests: specifically it aimed to examine division labor in forest product extraction across household member, to examine the level of dependence of forest user group members on forest- based income, and to identify major socio-economic variables influencing forest and relative forest income. In this paper the researcher seek to provide answers to the following question: is there a difference between men's and women's participation in community forest management activities, what demographic and socio-economic variables affect the participation of community members in the CFM activities?, is there any labor division based on gender related to participation in community forest management activity?

2. STUDY SITE, DATA COLLECTION, SAMPLING AND ANALYSIS METHODS

This study was undertaken in in Humbo district, Wolaita zone, Southern Nations Nationalities and Peoples Region (SNNPR), South Western Ethiopia. Both primary and secondary data were used for this study. The primary data collection started with a preliminary survey followed by a key informant interview, focus group discussions, and household survey with questionnaires. Primary data collected from household include; demographic and socio-economic characteristics, level of both male and female participation in CFM activities, socioeconomic factors related to participation, demographic and socio-economic factors related to forest income. The structured questionnaires were prepared for the household survey based on the information elicited through key informant interviews, focus group discussions. Then it was pre tested by six households in each co-operative. Two stage sampling technique was employed to select household. In the first stage three co-operative (Abela-longena, Bolla wanche, Bossa wanche) were selected purposively out of the seven local level co-operative by virtue of the representativeness of gender. In the second stage the household within the selected cooperative were stratified in to two groups based on sex (male and female) in order to create opportunity of entering female user group in to sample. Finally, 150 households (113 male and 37 female) were randomly selected from the total of 2,378 households found in the three co-operatives and then the sample was distributed proportionally across the selected cooperatives and sample households were selected using simple random sampling.

The qualitative and quantitative data collected was first carefully checked for existence of incomplete questionaire and possible no responses. The data was then analyzed by using relevant descriptive, economic valuation and econometric analysis. The total income in this study includes both subsistence and cash incomes.

Ordinary least square model of regression analysis were used in order to find out the relationship between the dependent (forest and relative forest income) and independent variables (sex, wealth, age, education status, frequency of extension worker contact, credit source usage, distance from forest and family size).

According to Gujarati (2004), the multiple regression models took the following formula;

$$Yi = \beta Xi + \varepsilon i$$

Where: Yi = i[th] respondent's size of annual income from forest product (dependent variable).

X_i= Observable attributes of the respondent income from forest factors (independent variables)

β = a coefficient for independent variables (factors of forest product income)

εi = unobservable random component distributed N (0, ε)

Sex of household head: This is a dummy variable, (1= female, 0=male)

Age of household head: It is a continuous variable representing age of a household head.

Family size: It is a continuous variable that refers number of people in work force.

Education level of household: Is a continuous variable; which reveals that level of formal schooling completed by the household.

Wealth Status: a desecrate variable (1= poor, 2= medium, 3= rich)

Use of credit source: It is a dummy variable, (1= yes, 0=no).

Extension worker visiting frequency: Is a discrete variable and it refers to the frequency of extension workers contact with farmers.

Distance from forest: Is a continuous variable. It refers to how far the households are away from the forest.

3.   RESULTS AND DISCUSSION

3.1. Characteristics of sampled households

The respondents of this study include either male or female from the households which mostly involve in the CFM activities. Among the respondents 75% are male and 25% are female. This implies that majority of the CFUG are male member. Regarding to the educational status more than half, 54% of female headed households were illiterate in comparison to 25.7% of respondents considered from male. At graduate complete level there were no female. The mean land owned size by the respondents is 0.91 ha and this is smaller than the country average land holding size of 1ha per household (Degefe and Nega, 1999 cited in Beyen, 2008). The maximum and minimum tropical livestock unit (TLU) owned by the respondent is 8.05 and 1.13 respectively in the study area and on average it is 3.75 TLU.

3.2. Forest product use pattern and level of dependency on forest income

3.2.1. Labor division for forest product harvesting

3.2.1.1. Fuel wood collection

The community forest management institution of the area allows none timber forest product to be collected free of cost as one intermediary benefit to villagers under Joint forest management. Most of the products extracted from community forest are for consumption purpose and also they are more of less valued product due to the existing product harvesting rules. In this CF, two kinds of firewood produced from the forest, one from management regime (i.e thinning and pruning) and another from dried standing tree. The collected fuel wood in this case is mostly for household consumption, according to labor allocation based on higher proportion, 75% of women followed by 15% of men were involving in fuel wood collection (Fig. 1). Similarly, Agarwal (2009); Godbole (2012); and Sarkar (2011) Mugittu (2001), reported that women are the primary collectors of non-woody product from the forest particularly, fuel wood for household consumption.

3.2.1.2. Pole or construction material

Of total participated household member 100% were male members, while none of females were involved in this activity (Fig. 1). Study conducted by Agarwal (2009), in parts of India and Nepal showed that men's dependence is typically for products such as pole which are needed occasionally and can also be purchased. Generally, pole is kind of woody product which is dominantly harvested by male member of household in the study area.

3.2.1.3. Fodder extraction

Fodder is also another free of cost resource to be used by the community from the CF. It is the most frequently extracted product similar to fuel wood (Fig. 1) and mainly harvested by women (59%). The reason might be as result of the excited culture in the area less valued forest products are extracted by female that is why their involvement is higher relative to other. The result is fairly comparable with finding by Okunade and Yekinni (2007), who concluded that 68% of women collect fodder for animal use. Similarly, Agarwal (2009) ; Sarkar (2011), who suggested that forest products such as, fodder fall mainly in women's domain also have a shorter gestation period and greater potential for extraction than timber which falls mainly in men's domain.
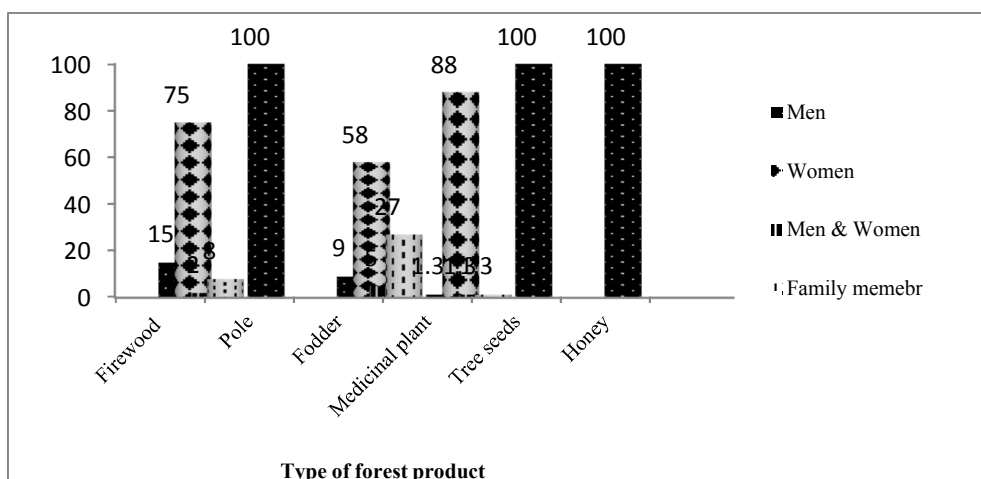
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Figure 1: Division of labor with in household member for forest product collection

3.2.1.4. Medicinal plant harvesting

Harvesting forest plant for medicinal purpose is another benefit that the communities gain from the community forest management for free of cost. In this regards 88% of women and only 1.3% of male in the household were more involved in the harvesting activities of medicinal plant (Fig. 1). This finding is in agreement with Manfre and Rubin (2012), who describe that women's priorities for forest use are often considered to stem from their household responsibilities, such as collecting firewood for cooking or forest plants for medicinal use.

3.2.1.5. Tree seeds harvesting

Tree seeds are also another benefit type used by the community for cost free which more or less high valued product as compared to other product type, due to these 100% of male were gathered seed with none of female were involving (Fig.3). Godbole (2012), found opposite result to present finding and who was reported that women are the key gatherers of NTFPs including tree seeds.

3.2.1.6. Forest honey

Forest honey at the study site is higher valued forest product relatively the overall 100% honey production were dominantly performed by the male member of the household with none of females were involving (Fig. 1). These implies that regarding with forest product extraction women are engaged in less valued forest product, that is why women involvement in low valued product is higher than that of higher valued product.

This observation is in agreement with the study conducted by Mugittu (2001), who reported that honey is liked a lot but it's only men who can harvest it due to several reasons including lack of courage and skills among women. Also FAO (1992), reported that honey production from the forest tend to be more the role of men than women.

3.3. Forest income dependency

All income source (i.e. agriculture, animal rearing, community forest, other source income) estimated are both consumed and soled income. Accordingly, higher proportion 50.3% of relative income and 1.3052×10^4 of mean income were obtained from the agricultural products, while only 22% of relative income and 5.0381×10^3 mean annual household income were generated from the forest based product. This shows that forest and relative forest mean income as compared to agricultural income is small but still communities around there are dependent on the forest around their relatively to 22% of total annual source. Yemiru (2011), in his side study which was conducted at Oromia region in the district of Dodola, southern Ethiopia report that 34% of total household income of forest user groups in the area is obtained from forest product which is higher figure relative to the present study. And also Fisher (2004), stated that forest income accounted for about 30% of household income on average in Southern Malawi which is comparable with the present study finding. Here CF income implies the income derived from the use and sell of forest product like timber, fuel-wood, fodder, forest honey from CF. The F-test analysis indicates the presence of significant difference in mean forest income (p=0.000) across sex of the household.

The result shows that community forest supports 22% in the total household income at the study area. The result confirmed the existence of significant mean difference in relative forest income via sex of household (p=0.000).

On the other hand the relative forest income for lower economic category was higher relative to better wealth class. So that poor receiving 28%, medium receiving 15%, and rich receiving 3% as share income of annual household income. Moreover, the F- test analysis indicates the existence of significant variation in relative forest income (p=0.001) across wealth category. This implies that the poor households are more depend on community forest than both medium and rich households in the study area.

Study which was carried out in India by Reddy &Chakravarty (1999), found that poor generated more than 22% of their gross income from forests which is in line with the present finding. And also Kamanga *et al*.(2008), found fairly comparable result in his finding who concluded that dependence as the share of income from forest resources is higher among poor and medium households (22%) compared to better off (9%).

Table 1: Forest and relative forest income of the respondents across gender and wealth category

Total forest and relative forest income (ETB)			
Forest income	Min	Max	Mean
Total forest income	943.75	7990	5.0381×10^3
Relative forest income	2.4	50	22.2
Forest income in ETB across gender			
Sex	N	Mean	Std error	F
Male	113	4.4471×10^3	1.5882×10^2	70***
Female	37	6.8429×10^3	1.1244×10^2	
Relative forest income in ETB across gender			
Sex	N	Mean	Std error	F
Male	113	19	0.78	78***
Female	37	32.5	1.2	
Forest income across wealth category			
Wealth category	N	Mean	Std error	F
Poor	97	6.1695E3	76.4	340***
Medium	38	3.6152E3	1.5361E2	
Rich	15	1.3258E3	59	
Relative forest income across wealth category			
Wealth category	N	Mean	Std error	F
Poor	97	28	0.6	184**
Medium	38	15	0.7	
Rich	15	3	0.13	

Source household survey, 2015
*Note: ** & *** significant at p< 0.05 & p< 0.01 respectively*

3.4. Household socio-economic characteristics and forest income

In this section factors that influence forest income of the user group is presented. Accordingly, Table below shows the result of maximum likelihood estimate of the multiple regression model specified to explain factors affecting the forest income of the user group. In fact the forest income of the user group is associated with differences in household characters, farming characters and institutional factors that jointly determine the dependence level of individual household on forest income. In this study eight explanatory variables (sex of household head, age of the respondents, educational status, family size, wealth status, use of credit source, frequency of extension worker contact and distance from forest) are considered as influential variables that affect the forest income of the household.

The econometric result in table below shows among the eight hypothesized determinant factors to forest income, five variables were found to have significant influence. These were sex, family size, education status, wealth status and frequency of extension contact. Of this education, wealth and frequency of extension contact were analyzed as significant factors with negative sign.

Sex of the respondents: sex of the respondents is positively and significantly related with forest income which is opposite to hypothesized. Furthermore the computed marginal effect indicates that female headed household is 173 times get more income from forest compared to base category (households headed with male) at p<0.05 level (Table 2). Opposite to this finding Adhikari (2004), reported that male headed households gain more from forest relative to female headed households. The possible explanation for the observed opposite finding of this study may be because male headed households are less interested than female headed household on non-timber forest product. Since the existing rules of community forest management of the area doesn't allow to extract timber product from the forest.

On the other hand this result is in line with Aguilar *et al.* (2011), who suggested that women gain more from non-timber forest product for their household expenses.

Family size: as expected this variable is positively and significantly related with forest product income at p<0.05 level (Table 2). A household with large family size have got 60 times more income from the forest product in comparison to base category households (i.e. households who have small numbers of family size). The possible explanation to this is that households with higher number of family size mean that the household has more number

of productive labor force and the increases their income from forest products than that of the respondents with small family size. Similar to this finding of Adhikari (2002), reported that a family with a larger labor force can mobilize household labor in collecting more dry woody materials and forest extraction activities than households with a smaller labor force.

Education status: As hypothesized the respondents with good achievements in educational status are negatively associated with the forest income. Accordingly, households who have better achievements in school enrolment have got 70 times less income from the forest product in comparison to the base category (i.e. illiterate households) this is significant at $p<0.05$ level (Table 2). The result is in agreement with the work done by Adhikari (2004); Adhikari (2002), and Gunatilake (1998), they reported that household with higher levels of education seem to have lower forest incomes because they have alternative sources of employment or income.

Wealth class of respondents: the variable is negatively related with forest income. The computed marginal effect indicates that the households who are relatively resource endowed are by 147 times less motivated to collect forest product and generate income from forest than the poor household in the area at $p<0.05$ level (Table 2). This could be due to those relatively better-off household has more alternative income generating source than the poor household (i.e. from their productive farm activities, off-farm activities). This result is in agreement to Adhikary and Ghimire (2003), were concluded that poor people heavily depend upon forest resources to fulfill their basic (subsistence) needs for fuel-wood, forage, timber, medicines as they do not have own private forests or adequate agricultural land the finding is similar with that of my study result.

Extension worker visiting frequency: the frequency of household contact with extension agent is negatively associated with forest product income as hypostatized. The result shows that households who are frequently visited by extension worker are 236 times got less forest income compared to households who are rarely visited by extension worker and this is significant at $p<0.05$ level (Table 2). This implies that as contact frequency by extension worker increased by unit the tendency of respondents to generate income from the forest based product is will be reduced by the mentioned figure. The result is comparable with Onoja and Unaeze (2009), who reported that the more frequently visited household by extension worker diversify their income source and their dependency on forest will decrease so that the pressure on it will decreased.

Table 2**:** Household socio economic characteristics and forest income

Variables	B	Std. Error	T	p-value
Sex	173***	95	10	0.000
Age of respondent	80	79	1	0.3
Family size	60***	27	2	0.02
Education status	-70*	40	-2	0.08
Wealth	-147***	60	-33	0.000
Use of credit source	-39	118	-0.3	0.7
Extension worker visiting frequency	-236***	121	-2	0.05
Distance from forest	59	58	1	0.3
Constant	6728	508	13	000

Source Household survey, 2014

*Note: * & *** significant at $p<0.1$ & $p<0.01$ respectively*

Base category: Male, poor, illiterate, rarely visited by extension worker, households with small family size, households with young age, households who are not use the credit service and households who is far away from the forest $F=180$, $DF=10$, $R^2=0.83$ with adjusted $R^2=0.81$

Conclusion

Community forest is one of the major sources of fodder, fuel wood, pole, farm implements, leaf litter, tree seeds, forest honey, and medicinal plant, to the users. Female headed and poor households are more depend on community forest than male headed household, medium, and rich households in the study area. It appears that households with female heads, in relatively poor economic status, with little or no education but better access to extension service are involved in routinely time taking and laborious activities such as collecting NTFPs. This study has revealed that the forest income of the user group members in the Humbo CFM is significantly affected by some key socio-economic characteristics of the households. Among the eight hypothesized determinant factors to forest income, five variables were found to have significant influence. These were sex, family size, education status, wealth status and frequency of extension contact. Of this education, wealth and frequency of extension contact were analyzed as significant factors with negative sign.

challenging world. The last but not the least, I would like to thank, from bottom of my heart, my Father Paulos Summamo and my mother Elina Kebamo and also all my brothers and sisters especially Amate Mariam Paulos for their support and Pray in their everyday life and my best friends.

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