Developing Country Studies
ISSN 2224-607X (Paper) ISSN 2225-0565 (Online)
Vol.4, No.3, 2014

Forest Management Cooperatives and the Rural Youth

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Abstract
About 1.1 billion people earn less than one dollar per day, and they face daily risks and hardships that determine their very survival, which makes poverty a global problem (source). Ethiopia has a rapidly growing human population of about 80 million, largely dependent on low-productivity and rain-fed agriculture. Ethiopia's economy is based on agriculture which contributes about 85% of employment and 45% of the Gross Domestic products (GDP) (source). The level and distribution of poverty in Ethiopia is extensive. Though there are so many factors which results deep rooted poverty, lack of sustainable natural resource management and deforestation is the main cause of food insecurity and poverty. The relationship between poverty and environment is characterized as a "vicious circle" or a "downward spiral".Forests Cooperatives play an important role in the livelihoods of rural people as a subsistence safety net, and as a source of cash income, a capital asset, and a source of employment.
This study has tried to assess the contribution of forest cooperatives in reducing poverty in woreda Medbay Zana, Northern West of Tigray Zone, Ethiopia. The study also explored constraints faced by rural youth in managing forest resource to sustain their livelihood. A multi-stage stratified random sampling procedure was used to obtain sample households. Qualitative as well as quantitative assessments were used. Propensity score matching method of analysis was used to analyze the data and impact of the forest cooperatives. The result of the study showed that the participation behavior of landless households in forest management cooperative is influenced by economic, institutional, physical and attitudinal factors and the Forest Management cooperative significantly reduces the level of poverty. The study recommended that a policy that ensures security of forest land holding by the landless farmers is vital if the forest management efforts are to be successful.
Key words: Forest management, Cooperatives, Rural youth, Poverty reduction, income, livestock

1. Introduction

Poverty is a global problem that affects citizens around the world. About 1.1 billion people earn less than one dollar per day, and they face daily risks and hardships that determine their very survival. Though the development community, including government agencies, banks, and nongovernmental organizations (NGOs), seeks to improve the livelihoods of impoverished citizens through poverty reduction strategies that address the root causes of poverty and its crippling effect on people trapped in adverse situations, after years of implementing programs, poverty remains a multi-dimensional problem with many faces (United States Agency for International Development [USAID], 2006).
Ethiopia has a rapidly growing human population of about 85 million, largely dependent on low-productivity and rain-fed agriculture.
Agriculture is the back bone of Ethiopian economy. Despite its role, the sector is characterized by traditional farming practice, low productivity and high exposure to risk due to adversely varying environmental conditions (Gutu T. Bezabih E, 2012).
The level and distribution of poverty in Ethiopia is extensive. According to the results obtained from the 1995/96 and the 1999/2000 Household Income, Consumption and Expenditure survey and Welfare Monitoring Survey of the Central Statistical Authority (CSA), about 45 percent of the total populations (45 percent in rural areas and 37 percent in urban areas) were found to be below poverty line (Christiaensen, 2002). A number of factors can explain the problem of poverty in Ethiopia. These include high population growth, diminishing land holding, lack of non-farm technological innovation, land degradation and limited employment opportunities outside agriculture.
However, lack of sustainable natural resource management and deforestation is also the cause of food insecurity and poverty is (Matti .P and Gerardo.M, 1996).
The relationship between poverty and environment is characterized as a "vicious circle" or a "downward spiral". This view states that growing populations as adversely affecting finite natural resources, with technology mitigating the type and degree of impact.
Though poverty can be claimed for resources overexploitation, natural resource plays a special role in the life of the poor. More than 1.3 billion people depend on fisheries, forests, and agriculture for employment close to half of all jobs worldwide. World Bank (2002) pointed out, 90 percent of the world's 1.1 billion poor – those living on less than $1 per day – depend on forests for at least some part of their income.

Therefore, integrated and sustainable management of natural resource (forest) could result a favorable change in sustaining food security and alleviation of poverty through its economic and social benefits.
Poverty reduction has come to reflect an urgent global consensus in development. The Millennium Development Goals adopted in the 1990 provide a framework and specific targets for poverty reduction and the enhancement of well being. Currently, the role of forests in environmental protection and biodiversity became the focus of international and local policy (Subedi, 2006). At the same time, forests' critical role in the livelihoods of the poor became more widely recognized.
Hence, Ethiopia has drafted and implemented different strategies and programs in line with the poverty reduction program. Among these development programs, sustainable forest/natural resources management cooperatives that enables the poor to solve their common economic and social problems has been given attention. Though different studies have been conducted in regard to the role of forests on the physical environment, it has been said that the impact of forest management on poverty reduction and the socio-economic enhancement of the poor farmers is not yet fully understood and documented. In view of this, it would be worthwhile to study the importance and contribution of forest management on reducing poverty.

2. Objectives of the study

The main purpose of this study is to examine if forest management really helps to reduce poverty and has a significant impact on mitigating the socio-economic problems of marginal farmers (landless & small land holders).

3. Research Methodology

This study was principally conducted to identify the role of forest management on reducing poverty, especially in its economic and social benefits to the poor farmers at the micro-level in the northern-west zone of Tigray.
Medebay Zana is diverse in nature and consists of flat plain, undulating to rolling, some isolated hills and ridges, chain of complex mountains, valleys and gorges in the south east (Haile Silassie ,1998). Based on figures published by the Central Statistical Agency (CSA) in 2005, this Woreda has an estimated total population of 130,895,
There are around 35,109 landless farmers in the Woreda; around 20,000 (57%) landless farmers have been participating in FMP individually and in a group.
The study deals with a limited a number of households and focused on the three dimensions of poverty, which are income poverty, access poverty and power poverty
This means that the study was analyzed the economic and social importance of forest management for the poor farmers.

3.1. Sampling and Data Analysis Methods

The study has applied a two stage sampling procedure (Stratified multistage cluster sampling) was employed to select sample households. At the first stage of sampling, stratified random sampling was employed for selection of the Tabias. There are 18 Tabias in the woreda. For the purpose of this study, these Tabias were stratified into different strata based on by forest endowment, presence of forest area enclosures and forest management program. Accordingly, three Tabias *(Adi-tsemale, Kimalo and Meshil)* were selected.
Both primary data and secondary sources of data are utilized for collection of data for the study.
All the data are organized analyzed and expressed using descriptive as well as econometric analysis.
The study has adopted the most celebrated model, i.e., the propensity score matching (PSM) to address the sample selection associated with the participation in forest management program.
The propensity score is defined by Rosenbaum and Rubin (1983) as the conditional probability of receiving a treatment given pre-treatment characteristics.

$$p(X) \equiv \Pr\{D=1/X_i\} = E\{D/X_i\}$$

Where: $D = \{0,1\}$ the indicator of exposure to treatment. In this paper, it is the binary variable whether a household participates in forest management program (FMP) (participate in forest management program, 1=yes; 0=otherwise) and X_i is the vector of pre-treatment or time-invariant characteristics. The function $p^1(x)$ is the response probability for treatment. Rosenbaum and Rubin (1983) showed that if participation in forest management program is random within cells defined by X ; it is also random with in cells defined by the mono-

[1] $0 < p(X) < 1 \quad \forall X$, i.e. we exclude those that have no chance of being treated and treatment for certainty. In such situations the propensity score reports either dropped due to co linearity or full prediction

dimensional variable $p(X)$. As a result, given a population of units denoted by i, if the propensity score $p(X_i)$ is known; the Average effect of Treatment on the Treated (ATT) or in the case of this study the policy effect of forest management program as antipoverty tool can be estimated in the same way as in Becker and Ichino (2002) as follows:

$$\tau \equiv E\{Y_{1i} - Y_{0i} / D_i = 1\}$$
$$\tau = E\{E\{Y_{1i} - Y_{0i} / D_i = 1, p(X_i)\}\}$$
$$= E\{E\{Y_{1i} / D_i = 1, p(X_i)\} - E\{Y_{0i} / D_i = 0, p(X_i)\} / D_i = 1\}$$

Where i denote the i-th household, Y_{1i} the impact indicators (vectors household per capita yearly expenditures or asset holding) over the distribution of $(p(X_i) / D_i = 1)$ and Y_{0i} is the potential outcomes in the counterfactual situations of no participation.

The following two hypotheses are required to derive the above equations.

Lemma1: Balancing of pre-treatment variables given the propensity scoreif $p(X)$ is the propensity score, then

$$D \perp X \mid p(X)$$ [1]

This implies that given a specific probability of having participation in forest management program, a vector of household characteristics, X_i is orthogonal to (or uncorrelated to) the participation.

Lemma2. Uncompoundedness given the propensity score:

If treatment, (or whether a household participates in forest management program) is uncompounded, That is,

$$Y_{1i,} Y_{0i} \perp D \mid X$$

Then assignment to treatment is uncompounded given the propensity score, i.e.

$$Y_{1i} Y_{0i} \perp D \mid p(X)$$

The propensity score reduces the dimensionality problem of matching treated and control units on the basis of the multidimensional vector X. The probit regression estimates the propensity score and tests the Balancing Hypothesis (Lemma 1) according to the following algorithm (Becker and Ichino, 2002):

Estimate the probit model:

$$pr\{D_i = 1 \mid X_i\} = \Phi(h(X_i))$$

Where: Φ denotes the normal (logistic) c.d.f. and $h(X_i)$ is a starting specification which includes all the covariates as linear terms without interactions or higher order terms.

3.2. Estimation of Average Treatment Effects Based on Propensity Scores

What we have discussed so far is not enough to obtain the desired result. Our interest variable is ATT and estimation of the propensity scores in not the end because the probability of observing two units with exactly the same values of the propensity score is in principle zero since $p(X_i)$ is a continuous variable (Sascha O. Becker and Ichino, 2002).

Let Y_1 be the outcome conditional on participation and Y_0 the outcome conditional on non-participation, so that the impact of participation in the program is $\Delta = Y_1 - Y_0$.

For each household, only Y_1 or Y_0 is observed. Let D be an indicator variable equal to 1 if the household participate in FMP and 0 otherwise.

Let Z denote a vector of observed individual characteristics used as conditioning variables. The most common evaluation parameter of interest is the average impact of the treatment on the treated (ATT) given as:

$$ATT = E(\Delta \mid Z, D = 1) = E(Y1 - Y0 \mid Z, D = 1) \qquad (13)$$
$$= E(Y1 \mid Z, D = 1) = E(Y0 \mid Z, D = 1)$$

This parameter estimates the average impact of FMP among participants.

[1] This is called in the literature as strong ignorability-of-treatment assumption: which is basically the orthagonality assumption about $E(v_0 / X_i)$ and $E(v_1 / X_i)$ where v_0 and v_1 are unobserved error terms of the two groups (Wooldridge, 2002, pp. 616).

4. Result and Discussions

4.1. Forest Management Cooperatives as a Source of Livelihoods to Landless Farmers

Forest and the Landless People

Ethiopian economy is dependent on the rain-fed agriculture as a primary source of income. But when this sector fails to generate income to sustain livelihood, the poor people depend on the natural resources as a source of income. Natural (forest) resources are the foundation of social and economic development as they are the source of goods and services for poverty reduction and economic growth. Their mismanagement coupled with their underutilization has so far reduced their contribution to Ethiopia's overall development.

In the study area, farmers are confronted with low availability of productive resources on the one hand and lack of other employment options on the other hand. This has led to a continuous fragmentation participation in income generating activities

Thus, framers especially the landless or farmers with marginalized land seek different alternatives to sustain the life of their own and their families. The alternatives such as migrating to urban areas, engaging in share-cropping or daily laborer but most of them depend on natural resources, especially forests. These alternatives, especially the former alternative has its own negative implication in the socio-economic aspect of the country and others except the natural resource don't generate adequate income to the livelihood of the poor.

Thus, it is vital to give due attention to effective natural resources (forest) management and supplementing the agriculture; in order to make the poor household farmers out of poverty.

Forests play an important role in the livelihoods of rural people not only as a subsistence safety net, but also as a source of income, capital asset and as source of employment (Sunderlin, Angelsen, and Wunder 2003).

In Ethiopia, the practice of forest management has been conducting for the past many years. The social and economic development agenda is being driven by a few approaches and polices. These include the United Nations (UN) Millennium Development Goals (MDGs), World Bank Poverty Reduction Strategy Papers (PRSPs) and a Plan for Accelerated and Sustained Development to End Poverty (PASDEP).

4.2. Disparity in Expenditure of Households and Effect of Forest Income

As the study indicated that there is a clear gap in the total household income of participant and non-participant households. The mean annual total household expenditure of participant households is ETB 2199.362, whereas the non-participant household has ETB 2061.072. It shows great disparity among the mean household expenditure of non-participant household category of expenditure. The household expenditure is the sum of the food and non-food expenditure. The consumption inequality of the household can be shown by drawing of the Lorenz curve and calculating the Gini coefficient[1]. The departure of the line below the line of equality (straight line) in the Lorenz curve shows the inequality (diagonal line) to the household income.

Figure 1 represents the Lorenz curve for household expenditure of participants and non-participants. The inner curve (continuous line) towards the line of equality is the Lorenz curve. The blue line represents the participant's expenditure and the red one represents non-participants expenditure. Likewise in figure 2, the blue Lorenz curve towards the line of equality shows the household income including the total forest products' income and the red curve shows the household income excluding the forest income. Thus, the inequality is lower in the participants than the non-participants.

Insert Figure 1

Insert Figure 2

The Gini coefficient for the sample household income was found 0.25 for participants and 0.38 for the non-participants of FMP.

Insert Table 1

The result is not much different from other studies in the same study area. For instance, the findings of Bedru (2007) in Northern Ethiopia (Tembien) which is the Gini coefficient of 0.265 with income forest and the Gini coefficient of 0.312 without income forest. Other studies, such as Ghimire (2007) in Kavrepalanchok District of Nepal found a Gini coefficient of 0.37 for participants and 0.48 for non-participants. Similarly, Mohan Raj Kafle (2008) in Pokhara,Nepal showed that participants of FMP has Gini coefficient of 0.31 and the non-participants has Gini coefficient of 0.40. Therefore, the study result is consistent with some similar research outputs in Ethiopia and elsewhere in developing countries.

[1] see appendix 2A and 2B for more details

4.3. Forest income and poverty

Using the FGT poverty index formula stated in the methodology part of this study, the study analyzed the effect of forest incomes on landless household's poverty. On the other hand, we computed the total poverty index for the participant and non-participant landless households in the forest management program to see the magnitude and direction of changes in poverty levels. This enables us to evaluate the change in poverty if the forest products are no longer available for various reasons (e.g. due to depletion). It also provides us with an estimate of the magnitude of poverty overestimation if the participants of forest management program does not involve in the program.

The following table presents the results of the poverty calculations. As stated in the methodology part, we used a poverty line of ETB 1720 per person per year.

Using this poverty line, three variants[1] of FGT indices were calculated for expenditure distribution of participants and non-participants of Forest Management Program. According to the headcount measure of poverty (FGT (0)), nearly 39% of the participant households are classified as poor in expenditure measure, whereas the non-participants headcount poverty is about 43%. The poverty gap (FGT (1)) of participants and non-participants are about 10% and 20% respectively. There is high inequality in the non-participants than the participant of Forest Management Program. The poverty severity (FGT(2)) indices of participants results about 3% and the severity in the non-participants is about 11%.

Insert Table 2

As a result, we can conclude that the participant's poverty level is much better than the non-participants of forest management program as we have seen in the above table.

4.4. Contribution of Forest Management Program to Asset Creation

Asset creation includes policies that support the creation of new and/or the conversion of existing resources into wealth-building opportunities for low- and moderate-income individuals and families. Assets provide a safety net for coping with unanticipated expenses and emergencies that could otherwise cause significant financial hardship. Assets also help families build wealth and plan for the future by, for example, saving for retirement or investing in their children's education. Hence, forests play a significant role in enabling poor households to create and own assets (Haley, D., 2001).

It is inferred that 72.5 percent of the participants sampled respondents could made additional assets. Most of these assets are shown to be in the form of construction of new houses, forests, repairing old ones, livestock purchase like sheep, goat, cow, oxen, donkey, chicken and purchase of household equipment like tape recorders, radio, television, chairs, and some other productive household assets. The rest 27.5 percent of the respondents have not acquired any additional assets. They said the reason for this is their late participation in the forest management program and putting lower effort in making forest production. It can also be observed that the asset creations are lower for women than men.

Majority (41.5 percent) of the participants had an asset worth of more than 2000 Birr. Moreover, 17.9 percent and 19 percent of the participants had an asset worth up to 800 and between 800 and 1500 Birr respectively.

4.5. Contribution of Forest Management Program to Employment Creation

Employment and income from forest management activities are becoming of growing importance in the rural economy of developing countries. In stagnant or slowly growing agricultural areas forest production activities provide employment to surplus labor; in conditions of growing agricultural incomes they contribute to the process of growth, diversification, and the shift to more productive uses of rural resources (Haggblade and Liedholm 1991). Very little is known about alleviating poverty through formal or informal forest sector employment and through indirect benefits such as local multiplier effects or trickle-down effects (Angelsen and Wunder, 2002). In the late 1990s, there were 17.4 million employees worldwide in the formal forestry sector and about 47 million altogether, including formal and informal employment (ILO 2001: 39).

The study result shows that about 79.7 percent of the participants employed only one person on average during the pre-participation period and this figure has reduced to 42.2 percent during the post-participation period. It is found that 18.5 percent of the participants employed 2-4 persons in their activities during the pre-participation period and this figure has moved to 25 percent during the post-participation period. It is further found that 4.8 percent of the petty businesses employed more than 5 persons during the pre-participation period and this figure has moved to 14.8 percent during the post-participation period. Hence, it can be concluded that respondents

[1] Head count measure of poverty (FGT(0)), poverty gap (FGT(1)) and poverty severity (FGT(2))

employed additional employees either in the form of par-timer or full time in their FMP when their participation in forest management and other businesses became strong.

4.6. Statistical Analysis of the Poverty Impact of Forest Management Program

Participation in the forest management program (the dependent variable in the impact assessment analysis) takes a value of 1 if a household participates in the programs and 0 otherwise.

Propensity Score

For the forest management programs, probit models[1] were used to estimate a broad set of control variables to construct propensity scores used to match program participants to non-participants. The model of participation in each program used to create propensity scores for the matching algorithm is presented in Table 3. For the FMP, the control variables chosen include: sex of household *(sex)*, family size *(familysize)*, age of household head *(age)*, literacy of household head *(readwrite)*, martial status *(marriage1)*, whether the household participates as a member in any social group or local association *(membership)*, and whether the household earns non-farm self-employment income *(involvofffarm)*.

Insert Table 3

The result of the probit model showed that the availability of off-farm activities *(involvofffarm)* and household's marital status *(marriage)* are negatively and significantly influence landless households to participate in FMP at 1% and 10% level of significance respectively. This implies that households who have high non-farm employment opportunity participate in the FMP less than those who do not have (less have) the off-farm employment opportunity.

However, household's participation in local associations as a member *(membership)*, family size of the households *(familysize)* and sex of the households *(sex)* are positively affect household's decision to participate in FMP at 1% level of significance.

In this study it was hypothesized that the availability of off-farm activities has inverse relationship with participation in forest management program. This is due to the fact that as the landless households generate good income from the off-farm work and lack time to participate; their incentive to participate in FMP is low. Thus, the hypothesis is accepted. However, regarding the marital status of the households; it was hypothesized that as the household marital status is positively related with participation in FMP. Thus the hypothesis is rejected as the marital status of the households is negatively associated with participation in FMP.

Likewise, household's membership in local organizations *(membership)*, household's family size and sex of households were found to have significant positive effect at 1% level of significance. The researcher has also hypothesized that these three variables are positively affect the landless household to participate in FMP. This is due to the fact that i) the information they got in the association meeting or ceremony about the benefit of FMP may encourage them to participate. ii) Families with more labor tend to extract more forest resources. As expected, family size was found to be positively associated with FMP participation and statistically significant. The positive coefficient of family size implies that landless households with relatively larger family size had higher probability of participation in FMP. This can be attributed that participation on FMP occupy part of the landlessness as forest products has significant contribution for their survival compared to those land holder farmers. This result is consistent with the findings of Mohan Rajv Kafle (2008) in Nepal. In his comparative analysis of factors in the participation of forest management program responded to family size positively and significantly. That means participation tend to increase as family size increases. iii) Women have burden with home work and rearing children. Moreover, forest management requires high labour power as most of the women lacks this. Thus, the researcher hypothesized that males participate more in FMP than females. As expected, the sex of household head is positively and significantly affects household's decision to participate in FMP. This result is also consistent with the study of Köhlin, G. and Parks, P. J (2001) in Uganda. In their study, the collection of firewood and medicinal plants are joint activities, while cutting building poles is exclusively a man's activity due to high labour intensive. Men are more likely to cope up with the nature of forest production compared with women. Accordingly, these hypothesized ideas are accepted.

4.7. Matching Result

After running the propensity score, the output of the estimation of average treatment effects[2] using stratification method (*atts)*, Radius *(attr)*, Nearest Neighbor (*attnd) and* Kernel matching (*attk)* are presented in table 4 below. The Treatment group contains121 observations, while the control group 60 observations.

[1] see appendix 2B for more details
[2] see appendix 2C For more details

Insert Table 4

Matching result of monthly per capita income: The matching result showed that the stratification method (*atts*) which is computed based on the same stratification procedure indicated that the FMP has enabled the landless participants to earn around ETB. 123 more per month than the non-participant landless framers and this is statistically significant at 1%. The Radius (*attr)*, Nearest Neighbor (*attnd)* and Kernel matching (*attk)* results also showed that the FMP enabled the participants to earn monthly income of around ETB 108, 88 and 94 respectively. All the matching methods are statistically significant at 1%. But overall, the results obtained by attr, attnd, attk, and atts are close to each other, and taken together give evidence of a positive ATT in the range of 123-88 ETB per month is associated with the forest management program participation.

To sum up, the FMP has a significant effect on reducing poverty which will help the poor landless farmers to sustain their lives through the FMP benefits.

Matching result of household's livestock holding in TLU: the matching result in table 4 showed that the participants have more livestock holding than the non-participants. The results obtained by attr, attnd, attk, and atts are quite close to each other and a positive ATT in the range of 4.39 – 4.12 TLU associated with participation of forest management program. The result is statistically significant at the level of 1%. This is due to the fact that the participants earn more income and have a good access to the forge of animals from the forest product than the non-participants. This really contributes to the participant households to own more livestock than the non-participants.

5. Conclusion and Policy Implications

In this study, the important contribution of Forest Management Cooperatives in reducing poverty of the rural youth was analyzed.

One important conclusion is that members' uncertainty about their forest land holdings in the future was an important variable affecting the probability of participants maintaining the forest resource use in sustainable manner. This uncertainty is the result of new members' entrance to the forest cooperative at any time and frequent redistribution of forest land in the past. This implies future benefits from forest management made today will not reaped by participants who made the initial effort or the result of their effort is to be shared by late comers too.

The study findings highlight the relative importance of income from the extraction of forest environmental sources in overall household income. Contrary to the accepted belief that places livestock in the fore front of rural livelihoods in Ethiopia, we found that forest cooperative income occupies the first largest share in average total household income of members and followed by livestock incomes. For the non-participants, non-farm income occupies the first place followed by sharecropping income.

The results from the poverty and inequality analysis show that incorporating forest cooperative incomes in household accounts contribute significantly to the reduction of rural poverty and income inequality. On the basis of our findings, forests cooperatives can be considered as pro-poor and play a vital role in reducing poverty and inequality.

Moreover, the result of the study indicated that the impact of forest coopertaives in women's empowerment is significant. It enabled them to have equal economic opportunities and to participate in leadership role as well as in decision making process in the management of their cooperative society and in their family affairs.

REFERENCES

Abdurahiman Kubsa 1999. Community Participation in natural resource conservation (challenges and recommendations). Field Experience from IFMP Adaba-Dodola. Proceedings of the workshop on problems and options for the conservation of the regional forests in Oromia. 26-27 August 1999.

Angelsen, A., Wunder, S., 2003. Exploring the forest-poverty link: key concepts, issues and research implications. Center for International Forestry research, Occasional Paper No. 40. **ISSN** 0854-9818.

Bart Muys, 2004. "Forest Rehabilitation through Natural Regeneration in Tigray, Ethiopia: From Fragments to Forests": 56-63

Beck, T. & Nesmith, C. 2001. Building on Poor People's Capacities: The Case of Common Property Resources in India and West Africa. World Development, 29(1): 119-133.

Babulo, B., 2007. Economic valuation and management of common-pool resources: the case of exclosures in the highlands of Tigray, Northern Ethiopia. PhD Thesis. Katholieke Universiteiet Leuven. Belgium. pp213.

Branney P. and K. P. Yadav, 2004. Changes in Community Forests Condition and Management 1994-1998: Analysis of Information from the Forest Resource Assessment Study and Socio-Economic Study in the Koshi Hills. Project Report G/NUKCFP/32. NUKCFP, Kathmandu.

Brocklesby, M.A. 2004. Planning Against Risk: Tools for Analyzing Vulnerability in Remote Rural Areas. Chars Organisational Learning Paper 2. London: DFID.

Cavendish, W., 1998. The complexity of the commons: environmental resource demands in rural Zimbabwe. Centre for the Study of African Economies (CSAE) paper series, paper 92.

Cavendish, W., 2000. Empirical regularities in the poverty-environment relationship of Rural household: evidence from Zimbabwe. World Development 28(11), 1979-2003.

Central Statistics Authority (CSA), 2009. Retrieved December 10, 2009, from http://www.csa.gov.et/text_files/2005_national_statistics.htm

Chesterton, Chris, Revised Calculation of Livestock Units for Higher Level Stewardship Agreements, Technical Advice Note 33 (Second edition), Rural Development Service, 2006 (Table figures for unlisted ruminants calculated from weights given in relevant Wikipedia articles at, http://en.wikipedia.org/wiki/Livestock_Unit.).

Dove M.R. (2003) A revolutionaries View of Tropical Deforestation and Development Environmental conservation Vol.25 (1):17-24, London

Food and Agriculture Organization of the United Nations [FAO], 2007, Women and Food security. Retrieved December 15, 2009, from http://www.fao.org/FOCUS/E/Women/Sustin-e.htm

Fedreal Negarit Gazeta. 2007, Proclamation for the development, conservation and utilization of forests. Proclamation No. 542/2007, p. 3812

Fitsum Hagos, Holden, S., 2003. Rural household poverty dynamics in northern Ethiopia 1997-2000: analysis of determinants of poverty. Paper presented at the international conference on 'Staying poor: chronic poverty and development policy', 7-9 April, Manchester.

FAO. 2005. State of the World Forests 2005. FAO-Rome. ISBN: 92-5-105187-9. 153 pp.

Getachew Mamo, Sjaastad, E., Vedeld, P., 2007. Economic dependence of forest resources: a case from Dendi district, Ethiopia. Forest policy and Ecology 9(8), 916-927.

Ghaffar Ahmed M.Abdel and Wilfred Mlay 1998 (Ed). Environment and Sustainable Development in Eastern and Southern Africa. Some critical Issues. OSSREA, Macmillan Press Ltd, British

Ghimire, G.P. (2007) Contribution of Community Forestry in Community Development and Household Income: A Case Study from Kavrepalanchowk District, Nepal. *M. Sc. Thesis*, Institute of Forestry, Pokhara, Nepal.

Gutu Tesso, Bezabih Emana and Mengistu Ketema (2012). Time series analysis of climate variability and its impact on food production in north Shewa Zone Ethiopia. African Crop Science Journal, ISSN 1021-9730/2012 Vol. 20, Issue Supplement s2, pp. 293-306.

Haley, D. 2001. Community forests: From dream to reality in British Columbia. In *Forests in a changing landscape*, 16th Commonwealth Forestry Conference, April 2001. pp. 217-220. Fremantle, Australia. Forrex Forest Research Extension Society, **ISSN** 1488-4674.

Heckman, James, R. Lalonde, and J. Smith , 1999. the Economics and econometrics of active labor market program. In O. Ashenfelter and D.Card, eds., Handbook of labor economics, vol.III. New Yprk: Elsevier Science Publishing Co.

Hggblade, s., and c. Liedholm. 1991. Agriculture, rural labor markets, and evolution of the rural non-farm economy. Growth and equity through microenterprise investments and institutions (gemini) project working paper 19. bethesda, maryland. **ISSN** 0460-0029.

Köhlin, G. and Parks, P. J. (2001). Spatial variability and disincentives to harvest: Deforestation and fuelwood collection in the South Asia. Land Econ., Univ. of Wisconsin Press, **ISSN** 0023-7639, ZDB-ID 2147415. - Vol. 77.2001, 2, p. 206-218.

Masozera, M. K. and Alavalapati, J. R. R. (2004). Forest dependency and its implications for protected areas management: A case study from Nyungwe Forest Reserve. Scandinavian J. Forestry Res., 19 (4), 85-92.

Matti Palo and Gerardo Mery . Sustainable Forestry Challenges for Developing Countries. Kluwer Academic Publishers. 1996, Volume 10, ISBN-13: 978-94-010-7211-3 DOl: 10.1007/978-94-009-1588-6, e-ISBN-13: 978-94-009-1588-6.

Mohan Raj Kafle, 2007. Contribution of Community Forestry to Users' Household Income:A Financial Analysis. **ISSN** 0378-1127

Noronha, R. & Spears, J.S. 1985. Sociological variables in forestry project design. *In* M. Cernea, ed. *Putting people first: Sociological variables in rural development*. Oxford, World Bank/OUP.

Sascha O. Becker & Andrea Ichino, 2002. "Estimation of average treatment effects based on propensity scores," Stata Journal, StataCorp LP, vol. 2(4), pages 358-377, November, ISSN 1536-8734.

Skutsch, M.M**.** 1994. Social forestry as sustainable development: Comparative strategies in Sri Lanka. Thesis Enschede - ISBN 90-9007229-2.

Subedi, B.P., 2006. Linking Plant-Based Enterprises and Local Communities to Biodiversity Conservation in Nepal Himalaya. New Delhi: Adroit Publishers. pp 244. ISBN: 81-87392-70-3.

Sunderlin, W.D.; Angelsen, A.; Belcher, B.; Burgers, P.; Nasi, R.; Santoso, L. & Wunder, S. 2005. Livelihoods, Forests and Conservation in Developing Countries: An Overview. World Development, 33(9): 1383-1402. doi:10.1016/j.worlddev.2004.10.004.

Surry, D. 1997. Diffusion theory and instructional technology. Paper presented at the Annual Conference of the Association for educational Communication and Technology (AECT), Albuquerque, New Mexico. Retrieved January 8, 2010, from www.gus.edu/~wwwitr/docs/diffusion

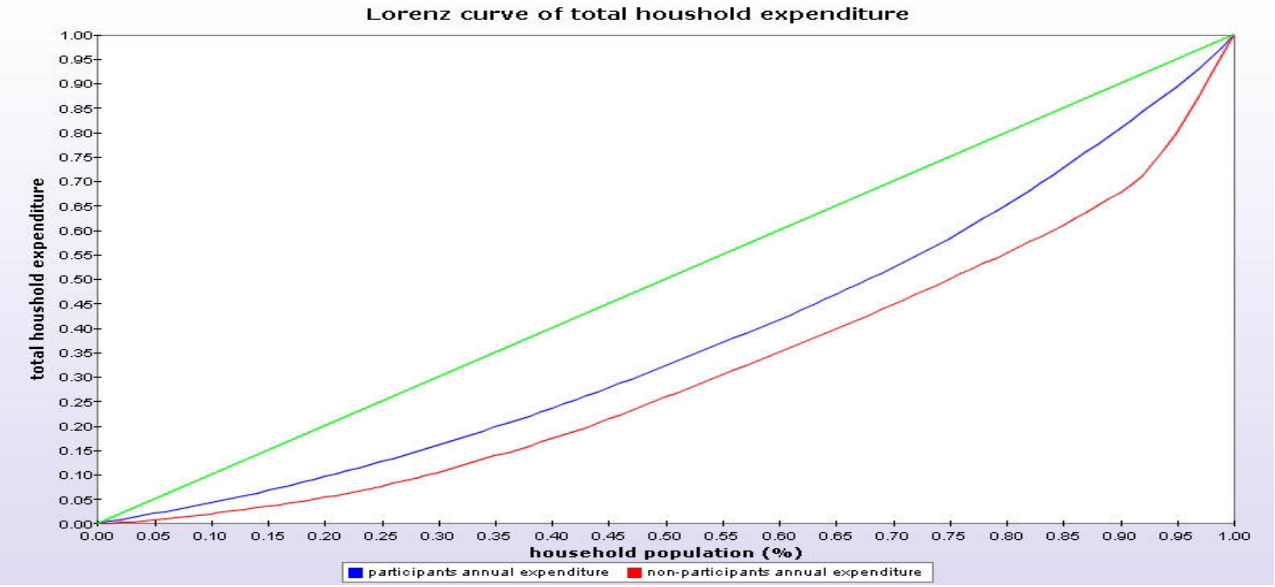
Teferi Regassa 1999. Environmental problems and policies in Ethiopia. A Survey in Tegegn and et al (Ed.). Aspects of Development Issues in Ethiopia. Proceedings of a workshop on the 25th Anniversary of the Institute of Development Research IDR, Nov., 26-28, 1998

United Nations Development Program; United Nations Environment Program; The World Bank and World Resources Institute. 2003. World Resources 2002-2004: Decisions for the Earth – Balance, Voice and Power. Washington DC: WRI.

World Resources Institute; United National Development Program; United Nations Environment Program and The World Bank. 2005. World Resources 2005: The Wealth of the Poor – Managing Ecosystems to Fight Poverty. Washington DC: WRI.

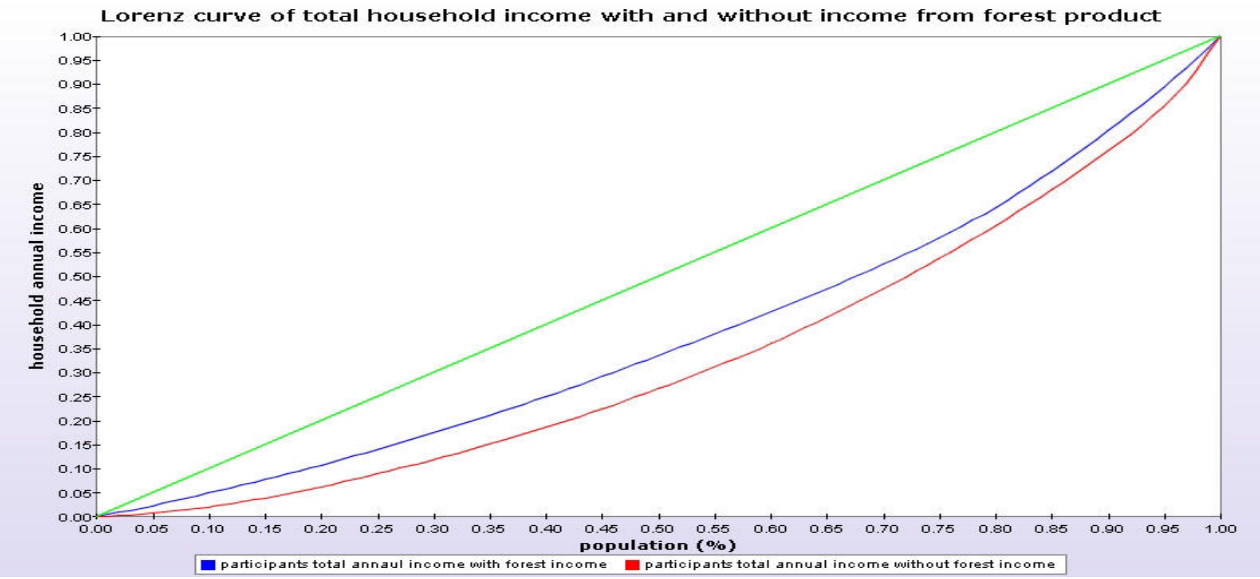
List of Tables and Figures

Figure 1: Lorenz Curve of household expenditure for participants and non-participants



Source: Primary data collected through field survey

Figure 2: Lorenz Curve of household income (With and without forest income)



Source: Primary data collected through field survey

Table 1. Gini coefficient of respondents

Type of respondents	Estimated value	Standard error	Parameter	Confidence Level in (%)
Participant	0.252	0.014	2.0	95.00
Non-participant	0.381	0.043	2.0	95.00

Source: Primary data collected through field survey

Table 2: FGT poverty index of participants and non-participants

	Participants		Non-participants	
	Estimate	standard error	Estimate	standard error
FGT(0)	0.3884	0.0445	0.4333	0.0645
FGT(1)	0.0991	0.0145	0.1951	0.0360
FGT(2)	0.0349	0.0062	0.1144	0.0261

Source: Primary data collected through field survey

Table 3: Probit estimates for participation in FMP.

Probit regression	Number of obs	= 181
	LR chi2(6)	= 98.95
	Prob > chi2	= 0.0000
Log likelihood = -65.503677	Pseudo R2	= 0.4303

type	Coef.	Std. Err.	Z	P>|z|	[95% Conf. Interval]	
sex	1.108	.407	2.72***	0.007	.310	1.906
familysize	.587	.151	3.88***	0.000	.291	.884
age	-.009	.034	-0.28	0.782	-.076	.057
marriage1	-.765	.396	-1.93*	0.053	-1.541	.010
readwrite	.259	.497	0.52	0.603	-.716	1.234
membership	1.402	.257	5.45***	0.000	.898	1.906
involvofffarm	-1.094	.265	-4.13***	0.000	-1.614	-.574
_cons	-1.972	1.052	-1.87	0.061	-4.034	.090

Source: Primary data collected through field survey
Note: * significant at 10% level; *** significant at 1% level

Table 4: ATT estimation of matching result

Variables	Matching estimators	o.par	No. contr	ATT	Std. Err.	t-ratio
Monthly per capital income	Stratification	21	60	**123.42**	20.195	6.11***
	Radius	21	55	**107.92**	22.136	4.88***
	Nearest Neighbor	21	25	**87.730**	21.045	4.17***
	Kernel matching	21	60	**93.709**	25.766	3.64***
Livestock holding in TLU	Stratification	21	60	**4.119**	0.264	15.58***
	Radius	21	55	**4.271**	0.199	21.45***
	Nearest Neighbor	21	25	**4.293**	0.319	13.46***
	Kernel matching	21	60	**4.385**	0.256	17.15***

Source: Primary data collected through field survey
Note: *** statistically significant at 1%