ACTA SCIENTIFIC AGRICULTURE (ISSN: 2581-365X)

Volume 4 Issue 3 March 2020

Research Article

Factors Influencing Farmer's Participation in Highland Bamboo Silvicultural Management Project: The Case of West Part of Oromiya Region

Beliyu Limenih*, Oumer Hinde, Alemayehu Negassa and Yigardu Mulat

Ethiopian Environment and Forest Research Institute, Addis Ababa, Ethiopia

***Corresponding Author:** Beliyu Limenih, Ethiopian Environment and Forest Research Institute, Addis Ababa, Ethiopia.

DOI: 10.31080/ASAG.2020.04.0816

Received: February 18, 2020

Published: February 27, 2020

© All rights are reserved by **Beliyu Limenih., et al.**

Abstract

Participatory sustainable forest management recognizes the critical role farmers play in the success and failure of forest related projects. This study therefore focus on to identify factors, which delimitate farmer's participation in forest project. A multi-stage sampling technique was conducted to collect data from 305 farmers in Dire Inchine district, west part of Oromiya national region state, Ethiopia. The study used binary probit model to identify determinate factors for farmer's participation in HBSMTP. The result of the analysis indicated that sex of household head; marital status, training participation and land holding are factors that significantly determine farmer's participation on forest projects. It appears that farmer's awareness regarding forest projects be able to rise by giving equal chance for both sex on any extension interventions. Moreover, projects should give due attention on group dynamisms specially the active participation of marginalized farmers.

Keywords: Participatory Forest Management; Project Participation; Technology; Farmers; Training

Introduction

Top down approaches has been recognized as unstainable and weak to empower targeted beneficiary for long times ago. Bottom –up approaches that view beneficiaries as partner, utilize local experience and endeavor to empower target beneficiaries have been promoted in the past few decades [1]. FAO (2017), sustainable forest management addresses forest degradation and deforestation, income generation and employment, carbon sequestration and water, soil and biodiversity conservation. Participatory sustainable forest management recognizes the critical role farmers play in the success and failure of forest related projects. According to verchot, 2007, smallholder play an important part responding to climate change and mitigate its impact, especially through forest-related activities. In Ethiopia, Ethiopian environment and Forest research institute (EEFRI) under Ministries of forest, environment and climate change has adopted participatory forest management. In fact, the bottom –up approach to development has arguably been adopted by almost all forest projects in Ethiopia.

In Ethiopia, forestry is one of the four pillars of the Climate Resilience Green Economy (CRGE) strategy where the sector believed to have an abatement potential of 130 Mt CO2e by 2030 [2]. The CRGE forest sector goals will be achieved through protection of existing forests and re-establishment of lost or degraded forest resources. In this strategy, Ethiopia has recognized the need to establish different types of productive forests to reduce pressure on natural forests/woodlands, to satisfy the rising demands of timber and non-timber products as well as to maintain sustainable ecological services. In this regard Bamboo has been given due attention to reclaim degraded lands and CO_2 sequestration. Bamboo's fast-growing and renewable stands sequester carbon in their biomass – at rates comparable to or superior than many tree species [3].

Ethiopia has the largest area of bamboo in Africa; but it has been poorly managed and exploited. Only a small number of people are involved in cultivating and processing bamboo in Ethiopia. The use of bamboo is restricted to the household level. There is only a very limited market for bamboo handicrafts that are not presently being developed (Herald, 2018). Getaneh (1999) mentioned that farmers around Dire Inchine district have less emphasize on protecting and undertake management practice of natural forests. So, overcome this problem both scientific and systematic approached needed. According to GIZ, 2018 report, to alleviate the current forest degradation in Ethiopia, it is vital to participate communities in each interventions. The performance of agriculture related projects highly depend on identifying factors which delaminate farmer's participation in a project [4]. Moreover, Nxumalo and oladel [5] revealed that the role of individual and group participation for self –reliance and better stand of living. And they also mentioned that without stakeholder's participation there would not be development. Farmers can participate in a projects can be nominal, consultative, action-oriented or collegial.

A number of improved forest technologies has been released and demonstrated the last four decades. Highland Bamboo silvicultural management technology (HBSMP) project was implemented by Ethiopia environment and forest research institute. It was implemented in west part of Ethiopia, Dire Inchine peasant association. The aim of the project was to demonstrate highland bamboo silvicultural management to farmers, and creating bamboo market

linkage among stakeholder. Farmers were selected based on their willingness to participate in the projects. This paper therefore attempts to estimate the factors that determine farmer's participation in forest projects considering specifically the case of HBSMP.

Methodology

Study area

Dire Enchin (Tikure Inchine) woreda is one of the west part of Oromiya National Regional State covering a total area of 53,806 square Km. And found around 165 Km away form a capital city of Ethiopia. According to CSA [6], the district had 71,417 populations and the number of women and men population is almost equal.

Temperature ranges from 6 to 24°C the mean annual rainfall ranges from 2200 and 3023mm. This range of climatic and other conditions explains the diversity of agro ecological zones in the area. The current forest coverage of the area is around 9.4% of the total area of the district. According to zonal planning report (2007), from the current vegetation cover a quarter of land is covered by high forest. And one fifth of and more than one tenth of lands are bush/shrubs and wood land. Indigenous forest trees are mainly found in mountain side and plateaus areas. Bamboo tree, locally known as 'shimelaa' covered the largest area (40%) than other species.

Data and sampling procedures

Before conducting the actually survey, questioner were pretested and administered to bamboo farmers in Dire Inchine district. All project participant (116) and non-participant farmers (189) randomly selected and interviewed. A total of 305 sampled farmers were enumerated in this study.

To analyze the collected data, Binary probit model was used by this study to estimate factors that influence farmer's participation in forest projects using the case of HBSMP. Farmers participation to the project was took as dummy variable. The value of '1' allocated for willing to participate in a project and '0' others.

Assuming a normal distribution of errors and following from Greene [7], the probability of a farmer participation in the HBCMP is given by;

$$\Pr(Y = 1) = \int^{\beta' x} \varphi(t)dt = (\beta' x)^{-\infty} \quad \text{-------(1)}$$

Where$^{\varphi}$ (.) = standard normal distribution, (Y = 1) implies that a farmer is participating in the HBSMP and x represent the exogenous variables likely to have an influence on farmers participation. In addition to estimating the probabilities, the study also estimates the marginal effects which are actually used for the discussion of the results. The marginal effects are more informative and easier to understand and explain. Following from Nyaupane and Gillespie [8], the marginal effects for continuous variables are estimated using equation 2;

$$\partial E\, Y\, x = \varphi(\beta' x)\beta\partial x \quad \text{-----(2)}$$

Marginal effects for dummy variables are however estimated using equation 3;

$$\Pr Y = 1\ x., d = 1 - \Pr Y = 1\ x., d = 0 \quad \text{-----(3)}$$

Where ẍ. refers to the mean values of all the model for estimating the continuous variable. Empirically, determinants of farmer's participation in the HBSMP is specified as;

$$Y = \beta_0 + \sum_{i=1} \beta_i x_i$$

Where β_0 is the constant term or intercept and βi represent the parameters to be estimated. The maximum likelihood estimates of the parameters are generated using the STATA software.

Description of explanatory variable

Being male and female has a positive and negative effect on the decision to participate forest related projects.in many cases female farmers has better social relation than male farmers, more likely to have links with forest projects. On the other hand, male farmers are usually decision maker and access to control resources in the household therefore these favored them to participate in forest projects. Nxumalo and Oladele [5] observed that male farmers are more likely to participate in agricultural projects. Nnadi and Akwiwu [9] did not, however, find any significant relationship between sex and farmers participation in an agricultural project.

A younger farmers most probably participate in forest project because in many cases younger farmers are more risk taker and need to try new ideas. Instead, Farmers appear a higher level of experience can have a better knowledge and evaluate the benefit of participating in a project with better precision. A more experienced farmer may have a lower level of uncertainty about the innovation's performance Tadesse (2008). Oladejo., *et al*. [10] did not however observe any significant relationship between age and participation in agricultural projects.

Married farmers able to share ideas with their spouse and may therefore be more likely to participate in forest projects compared to a farmer who is not married. Nnadi and Akwiwu [9] noted that marriage increases a farmer's concern for household welfare and food security which is therefore likely to have a positive effect on their decision to participate in an agricultural project. Oladejo., *et al.* [10]. However found a negative relationship between marriage and farmers participation in agricultural projects.

It was assumed that a better educated farmer can understand the information very easily and internalize the information transferred from development agents, researchers, NGOs and other development stakeholders the less educated farmers.

It was assumed that farmers who has more family size are likely participate in forest related projects. Because in forest activities by nature demand more labor. Economically, many farmers couldn't able to afford for labor as they needed, therefore this limited them to participate on a project.

Access to credit is significantly affect the participation of farmers in forest related project. This financial institution support the

farmers to have a credit and liaisons efficiently utilize their money. Moreover, farmers who have access to credit are more risk taker than those who don't have.

Contact with development agents is expected to have a positive effect on farmer's decision to participate in forest projects. Many project undertake with a consultation of development agents hence the likelihood of a farmer being informed and primed to participate in a project increase with contact with an extension agent.

Land is an important resource for forest development. Farmers who have large land size could show the possibility of an individual farmer to participate in forest projects. This also indicated that farmers can easily diversify and change land use patter in his own field than farmers owned lesser size of land.

Variable	Measurement	Hypothesis
Sex	Dunmmy, 1 = men,0 = Female	+/-
Age	Continues	+/-
Marital status	Dunmmy, 1 = married, 2 = single, 3 = divorced, 4 = widowed, 5 = widowed (men), 6 = 2&5, 7 = 3&4	+/-
Education	Dunmmy, 1 = illiterate, 2 = pre-school, 3 = 1-8 grade, 4 = 9-10 grade, 5 = 10+1, 6 = 10+2, 7 = Diploma	+
Household size	continues	+
Received credit	Dunmmy, 1 = yes, 0 = No	+
Received extension service	Dunmmy, 1 = yes, 0 = No	+
Farm size	continues	+

Table 1: Exogenouse variables considered for probit model.

Result and Discussion

Socio demographic characteristics of respondents

As shown in table 2, farmers who are willing to participate in HBSMP were participated in more trainings than non- participated farmers. Moreover, majority of project participant farmers have large family size and land holding than non-participant farmers.

About two fifth of participant are married. Married farmers are more likely to take a longer time to reach a decision as compared to unmarried farmers. Married farmers may have to either consult or reach a consensus with their spouses before making decision such as participating in an agricultural project.

Approximately 34.1% of participant farmers were participated in different kinds of capacity building trainings whereas only 14.1% of non-participants have got trainings. On the other hand, participant farmers have slightly large land holding (1.9ha) than non-participants (1.4ha). Even if number of family size were significant among the two groups, they have on average 7 family members per household and it is still higher than the national family size (5.1).

Generally, even though participant and non-participant farmers significantly differ by access to training, family size, marital status and family size, there is no any significant difference regarding access to credit, age, and educational status among the groups.

Characteristics		Percent		
		Willing to participate	Unwilling to participate	Overall
Sex	Female	2.3	3.9	6.2
	Male	35.7	58	93.8
Married		37.4*	18*	95.4
credit		17.4	8.5	25.9
Training		34.1***	14.1***	48.2
Mean				
Age		45	43	44
Education		3	3	3
Total family size		7**	6**	7
Total land holding		1.9***	1.4***	1.6

Table 2: Demographic characteristics of the sample.

*, ** and *** represent statistically significance at 10%, 5% and 1% respectively

Determinants of farmers participation in forest projects

As indicated in table 3, the maximum likelihood estimated logs indicate that high significant value that means with predictors is to be preferred over the model without predictors. Sex of households, age of respondent, marital status, number of years in a school, number of family member, access to credit, training participation, and total land holding are selected factors that determine framers participation on forest related project Dire Inchine district.

The marginal effects of sex on probability and intensity of participating in forest related projects was -80% and 42% respectively. In the other word, male headed households have better probability to participate in forest related projects than female counterparts. Hence, mainly men farmers are frequently travel to the city and able to get new and updated information from their friends and development agents.

Married farmers able to share ideas with their spouse. Therefore be more likely to participate in forest projects compared to a unmarried farmers. Similar to that, probability of married farmers on participating forest related projects was -51.9% than single. That means married households mainly willing invest for long term return than shortly gained benefits.

A farmer who has access to training is about 2 times more likely to participate in forest project. Farmers mainly participate on trainings were held by Ministries of Agriculture (MOA). Even if, many of trainings are geared towards crop, it raised farmer's awareness and perception on improved technologies (forest).

Large land size holder farmers are more likely participate in forest projects than those who have lesser. The probability and intensity of participating in forest related projects was about 16% and

Participation	Coef.	Std. Err.	P>z
Sex	-.8031894**	.4201445	0.056
Age	-.0019972	.0074761	0.789
Marital	-.5199061**	.2361622	0.028
Education	-.0550942	.0810936	0.497
Family size	-.0023098	.0378238	0.951
Credit	-.2531391	.2035609	0.214
Training	2.008499***	.1952338	0.000
Land	.1578747*	.0858882	0.066
Number of observation	305		
LR chi2 (9)	154.68		
Prob > chi^2	0.000		
Pseudo R^2	0.3818		
Log likelihood	-125.24749		

Table 3: Marginal effect estimation of the probit model.

*, ** and *** represent statistically significance at 10%, 5% and 1% respectively.

8.5% respectively. That indicated that farmers who owned large land size have a probability of readiness to change land use pattern, in order to raise profit and avoid uncertainties.

Conclusion

The study used the binary probit model to identify and estimate the probability of farmer's participation in forest related projects in the case of HBSMTP. Sex of households, marital status, training participation, and total land holding were significantly affecting the participation of farmers in forest related projects in Dire Inchin district of west part of Ethiopia. Large sized land owned farmers has 16% probability of participating in forest related project. A farmer who has access to training is about 2 times more likely to participate in forest project. Similar to that, probability of married farmers on participating forest related projects was -51.9% than single. Male headed households have 80% probability to participate in forest related projects than female counterparts.

In order to raise farmer's participation in forest related projects, there is a need to make gender balance. Women are less exposed for new information because of that there participation on forest projects not as much of men. In addition to that, in order to increase group dynamism, marginal farmers should be targeted in any project intervention.

Bibliography

1. Chambers R., *et al*. "Rural development: Putting the last first". Essex. Addison Wesley Longman Limited (1983).
2. Climate Resilient Green Economy (CRGE) Strategy Document (2011).
3. INBAR (2018).
4. Farid K., *et al*. "Nature and Extent of Rural Women's Participation in Agricultural and Non-Agricultural Activities". *Agricultural Science Digest* 29.4 (2008): 254-259.
5. Nxumalo K., *et al*. "Factors Affecting Farmers' Participation in Agricultural Programme in Zululand District, Kwazulu Natal Province, South Africa". *Journal of Social Science* 34 (2013): 83-88.
6. CSA. "Population and housing census of Ethiopia". Results for oromiya Region. Statistical report on population size and characteristics, Vol. I: part I. June (2008).
7. Greene H., *et al*. "Econometric Analysis". 5th Edition, Pearson Education, Inc., Upper Saddle River, New Jersey, USA (2003).
8. Nyaupane N., *et al*. "Factors Influencing Producers' Marketing Decisions in the Louisiana Crawfish Industry". *Journal of Food Distribution Research* 42 (2011): 1-11.
9. Nnadi F., *et al*. "Determinants of Youths' Participation in Rural Agriculture in Imo State, Nigeria". *Journal of Applied Sciences* 8 (2008): 328-333.
10. Oladejo J., *et al*. "Analysis of Women Participation in Agricultural Production in Egbedore Local Government Area of Osun State, Nigeria". *International Journal of Agricultural Economics and Rural Development* 4 (2011): 1-11.

Assets from publication with us

- Prompt Acknowledgement after receiving the article
- Thorough Double blinded peer review
- Rapid Publication
- Issue of Publication Certificate
- High visibility of your Published work

Website: www.actascientific.com/
Submit Article: www.actascientific.com/submission.php
Email us: editor@actascientific.com
Contact us: +91 9182824667