Article can be accessed online at http://www.publishingindia.com

RURAL LAND CERTIFICATION AND CHANGES IN TREE PLANTING PRACTICES

Degsew Melak*, Sisay Yehuala, Abebe Dagnew*****

** Department of Rural Development and Agricultural Extension, University of Gondar, Ethiopia.*
E-mail: degsewm@gmail.com
*** Department of Rural Development and Agricultural Extension, University of Gondar, Ethiopia.*
**** Department of Agricultural Economics, University of Gondar, Ethiopia.*

Abstract *A survey was conducted to identify the early impacts of land certification on tree planting. The data were collected through interview schedule, focus group discussion, and key informant interview. A paired-sample t-test was conducted to evaluate the contribution of land certification on tree planting. The results of the study showed that there was a change in number of tree seedlings planted. However, there was no statistically significant increase in number of trees planted after the land certification programme is operational. Both eucalyptus and indigenous tree planting did not show significant differences after issuance of primary of land holding certificate. Though issuance of land certificate has improved sense of ownership of land, including those of women, it failed to facilitate land related investments in the study areas. Therefore, further actions to strengthen investments on private lands through issuance of secondary book holding, and extension intervention should get due attention.*

Keywords: *Land Certification, Early Impact, Land Related Investments*

INTRODUCTION

Land is the most important asset of the rural population of Ethiopia, whose livelihood basically depends on agriculture (Bogale and Shimelis, 2009). However, this valuable resource is being degraded due to poor management system (Sabita, 2010). In most of the developing countries including Ethiopia, the major factor for land degradation is the improper and unsustainable land management due to land tenure insecurity, population pressure, fragmented farm sizes, limited access to credit and limited education (Desta *et al*., 2000). This situation is assumed to affect productivity of land. Bogale and Shimelis (2009) also noted that the poor structure of land tenure, the lack of proper land ownership as well as lack of improved agricultural technology and changing climatic conditions are the main obstacles in increased agricultural output. Land degradation is considered as a major global issue due to its adverse impact on agricultural productivity and sustainability which is a key source of the poverty trap (Adams *et al*., 1999). It is widely recognised as a challenge for agricultural and rural development in many developing countries. Because of its adverse agronomic, environmental, social, and economic effects, it has attracted considerable attention from scientists and development agencies around the world (Bizoza**,** 2011).

In Ethiopia, available evidence showed that land tenure insecurity has hindered investment in tree planting, and slow progress in land conservation (Holden *et al*., 2009). This is explained by land tenure security, which affects the application of technologies for tree planting practices (Bogale and Shimelis, 2009). Fear of land redistribution, and insecurity over land inheritance have created sense of insecurity. In Ethiopia, situation prior to land redistribution is a case contributing to feeling of tenure insecurity (Gebreselassie, 2005). Particularly, the land redistribution that took place in Amhara region in 1997 reinforced a sense of insecurity among the rural farming communities. Insecurity over inheritance further reinforces perceptions of insecurity over land rights and inhibits migration (Benin & Pender, 2002).

Registration of landholdings and granting land use certificates to land holders have recently become government policies in Ethiopia. Land administration institutions have been established in the Amhara region in 2003 and started formal land registration in the same year (BOFED, 2009; ELTAP, 2007). It has been reported that Amhara region is the first to introduce a more scientific and technically advanced method of land registration in Ethiopia. In the process of land registration, communal lands, forest and grazing areas were also be delineated, registered and certified (Sabita, 2010;

FAO, 2004). The objective of the rural land registration and certification is to improve tenure security through land registration and title certification in order to promote better land management and more investment (Roth & Haase, 1998). Certification of land title in Amhara is implemented to serve two purposes: improving tenure security and encouraging land and natural resources conservation and rehabilitation. Tenure insecurity has been the subject of much discussion, which seems to have convinced the government to develop such measures to improve the situation of land degradation (FAO, 2004; ECA, 2004; IFAD, 2006). The central argument of this study is that land certification improves tenure security which in turn provides incentives to land users to invest in their plot of land. Land titling and legal enforcement of title are fundamental for the widespread adoption and sustainable use of appropriate land related practices (Holden *et al*., 2009).

Previous studies have come up with quite different results about tenure security (Holden *et al*., 2009). This makes it difficult to draw clear cut conclusion about the contribution of land certification on improved land management practices. Analysis of land tenure issues in relation to land certification is, therefore, very essential. Berhanu *et al*. (2005) have conducted survey research in few areas of Amhara region to see the political and legislative frameworks that govern the land registration process, the demand for registration, actors involved in registration and its implication for environmental conservation, agricultural development, and land markets. In Ethiopia, studies done showed that rural land certification ensured land tenure security among farmers which motivate them to make different kinds of Sustainable Land Management practices. But no study has been done which justifies the contribution of rural land certification for sustainable tree planting practices in the context of North Gondar. It is, therefore, necessary to know whether land certification has really influential role in improving tenure security among farmers and investments on their plot of land. In view of this fact, this study was carried out in selected districts of North Gondar Administrative zone to understand the role of the land certification programme on tree planting and see the actual investments made by farmers. Specifically, this research tried to address the following research questions:

1. What were the factors that affect farmers' tree planting practices on their plot of land?
2. What was the change in the number of tree planting practices brought after land certification

Methodology

Except the low land districts of North Gondar, land registration and certification is functional in almost all districts. Geographical location is not assumed to cause variation in the implementation of the certification programme. In fact the behaviour of the farmer varies across the different localities. Thus the study was carried out in two different districts: Dembia and Dabat, which are located in North Gondar Administrative zone of Amhara region. These two study areas were selected because Rural Land Registration and Certification Programme have been implemented in these districts since 2004 and they represent the mid-altitude and high altitude areas. In the lowland areas of the zone the programme is not still completed and singled out from the selection of the study area.

A multistage sampling procedure was applied to identify the required number of sample farmers. In the first stage, described above, districts were stratified into mid-land and highland agro ecology and two districts were selected purposively from each agro ecology, taking into consideration accessibility, which makes the data collection process easy. Secondly, random selection of three kebele[1] administrations was undertaken, from which land registration and certification is completed. The list of the landholders mentioned in the kebele registry was taken as sampling frame. So with the help of the development agents and land administration experts three kebeles were selected representing each district. From each sample kebele, 30 households were selected proportional to sample size so that they represent the whole kebele. In each district, a total of 90 households were selected considering resource and time limitation.

Semi-structured questionnaire with some open-ended questions was used to collect the primary data from the sampled households. Pretesting of the questionnaire was conducted before conducting a real survey in order to check its reliability and validity and to introduce the questionnaire to local enumerators. Moreover, two focus group discussions and key informant interview were conducted. Similarly, secondary data were collected from relevant literature: study reports, manuals, survey reports, officially published data, and other related published papers.

Econometric Model

The model developed by Holden *et al*. (2009) revealed that the well-known interrelationship between tenure security and investments on land. The assumption is that tenure security may enhance investments, which may enhance tenure security as well. It is assumed that land and labour are the two most important endowments for small household farmer. The land endowments consist of a number of plots, each with specific land quality characteristics (Qp) that are important for the productivity of the land coupled with

[1]In Ethiopia, Amhara Region, Kebele is the lowest administrative hierarchy next to district.

available technologies. The land quality was defined to include sample specific investments (planting of trees) made on the given household farm plots. Therefore the dependent variable is a vector of the number of trees planted on the plot. The other assumption is that households maximise utility of income (U) which is subject to their land entitlements (land availability and land rights), their expectations about and preferences for the future of resource endowments. Income is generated through land-based production by combining land and labour resources on the various plots of land. The labour endowment may also be used for investment on the plots (L*pt*) to enhance tree planting practices. Tenure security is captured by the probability of keeping the plots in the future (Pfl) and is assumed to depend on whether the household has a land certificate for the plot (*Cpt*), the plot characteristics (*Qpt)*, investments on the plot (*Ipt),* and production activity on the plot (Ppt).

$$(\text{Pfl}) = f(Cpt, ,Qpt, \text{Ppt})$$

It was assumed that the tenure security is enhanced by having a certificate, by favourable land characteristics, investments on the land and by using the land for production purpose, given other factors constant. Therefore these factors affect the expected tenure security and thereby improvement in tree planting practices. Landholders were asked the number of trees planted after certification. Changes in the number of trees planted were used as a dependent variable, and proportional odds (ordered probit) were identified as an appropriate model for analysis of this dependent variable.

Furthermore this model was expanded by including an interaction term for the years with which land holders receive a certificate for his plot of land. Alternative formulations of this model was tested and found the proportional odds random-coefficient model to be appropriate (Rabe-Hesketh & Skrondal, 2005). This model contains both a random intercept and a random slope coefficient for households in relation to the years with certificate variable. The model was formulated as follows:

$$I_{hpt} = \alpha_0 + \alpha_1 Q_{hpt} + \alpha_3 I_{hpt} + \alpha_4 Z_{ht} + (\alpha_6 + \zeta_{2h})\psi_{hpt} + \zeta_{1h} + e_{hpt}$$

where:

$(\alpha_6 + \zeta_{2h})$ captures the household-specific random slope effect of years after certification,

Ihpt is private investment on plot of household in period t,

Qhpt is a vector of plot, household and time specific biophysical characteristics,

Ihpt is public investment on plot of households h in period t,

Zht is a vector of household characteristics,

ψ_{hpt} is years with certificate,

ζ_{1h} is a time-invariant household specific unobservable error component ehpt is the transitory error component,

In order to see the changes in number of trees planted, T test was carried out. T-test is appropriate statistical test when there are two groups' data (Pallant, 2011). The study has used two sets of data (before and after) to compare the mean number of trees planted. Independent paired sample t-test was used since our interest is to test mean score achievements from two different (independent) groups of times (2003 and 2011). In this case, two sets of data were collected from the same sample household in one occasion.

Results and Discussions

Results

In this section distinction was made whether perception of farmers has really any role in making investments related to tree planting practices. Essentially, one of the major products of land certification is tenure security. Since, the land tenure security concern has been hot issue of discussion. All efforts made to improve tree planting practices are directly dependent on land tenure security. Cognizant to this, current land registration system was assumed to improve tenure security and tree planting practices. In this section, whether the issuance of land certificate had any contribution in tree planting practices was investigated. In order to see the link between the possession of land certificate and tree planting practices was investigated. The achievement in type of trees, number of participants and the number of trees planted in 2011 as compare to the base year (2004) was assessed and the result presented in Table 1.

Eucalyptus tree and indigenous tree planting showed an increment in both number of participants and number of seedlings planted, while live fence practice showed decreased trend in both participants and volume of work (Table 1). Of the major trees planted, eucalyptus tree planting takes the dominant shares over indigenous trees tree species. On an average each respondent has planted 198 and 277 eucalyptus trees in 2004 and 2011, respectively that shows an increment in the number of trees by 40%. However, the changes brought in eucalyptus and indigenous tree planting after land certification is not statistically significant. Thus, issuance of land certificate has little/ no positive contribution to eucalyptus tree planting by individual land holders, whereas planting of indigenous tree and live fence practice showed decreased trends. The reasons might be attributed to uncontrolled (open) grazing problem. Some focus group discussants have explained that uncontrolled grazing was the bottle neck to the planting of trees outside backyards, except eucalyptus tree. Normally eucalyptus tree was not palatable to domestic animals.

Table 1: Changes in Tree Planting Practices (N =200)

Tree planting Practices	2004			2011			t
	Mean	Sd	N	Mean	S D	N	
Eucalyptus tree planted in number	221.94	582.6	116	276.965	503.65	137	0.293
Indigenous tree planted in number	13.517	88.87	70	8.0647	19.51	92	0.393
Live fence in km	6.6269	71.89	14	1.3259	14.23	11	0.288

* = significant difference at 0.05

Determinants of the Probability of Tree Planting

Ordered probit regression was performed to assess the determinant factors on the likelihood that farmers would report that they had a problem of tree planting with their own land. The original assumption was that land certificate enhances the confidence of land holders to plant trees where necessary as it has ensured tenure security to properly manage plot of land through tree planting investments. The model contained independent variables such as socioeconomic variables, plot characteristics, plot related investments, and land productivity. The full model containing all predictors was statistically significant since the chi-square value is 84.62 with 49 degrees of freedom, $p < .001$, indicating that the model was able to distinguish between respondents who reported and did not report tree planting problem. As shown in Table 2, only four of the independent variables made a unique statistically significant contribution to the model (sex, family size, SWC practices, and soil type). The strongest predictor of tree planting was Soil and Water Conservation practices, with odds ratio of 0.5985. This indicated that respondents who had exercised tree planting were about 60 percent more likely to plant tree species than those who did not have planting trees, controlling for all other factors in the model. Male households are better aware and capable of the importance of tree planting after land certification than before. Similarly family size has explained changes in tree planting, particularly eucalyptus tree in study sites. Households with relatively more family size are likely to responsibly plant eucalyptus tree on their parcels of land. Considering the relative yield advantage, households' decision to the allocation of land to commercial tree planting depends on productive potential of crop and the need to soil conservation structures. Under such circumstance, households might be forced to integrate SWC practices with biological tree planting.

Discussion

The econometrics probit model results indicate that eucalyptus tree planting after land certification was significantly elucidated by sex, family size, soil type and SWC practices (Table 2). A male household with relatively much holding size seems to be responsible to plant eucalyptus tree on wider scale to their pieces of land. On the other hand, regarding household participation in eucalyptus tree planting where the productivity plot of land is decreased, land holders are rationally maximising relatively higher advantage to their plot of land. This might be the reason that farmers are shifting crop lands to eucalyptus tree farming. The decision of shift from crop land to tree farming is intentionally made considering the comparative advantage allocation of crop land to commercial tree farming (eucalyptus) depending on productive potential of crop and the need to soil conservation structures.

From our observation and discussions, shortage of wood and forest products such as charcoal, become incentives to peri-urban land holders to plant eucalyptus tree. One of the most promising responses to the problem of wood and woody products depletion was the planting of eucalyptus, which is fast growing. This tree performs better than other indigenous forest tree species. The sale of eucalyptus poles and products has substantial potential to increase livelihood incomes, reduce poverty, increase food security, and diversify smallholder farming systems, even in less favoured areas of North Gondar.

Currently farmers are trying to make land use decisions based on socio-economic criteria to plant eucalyptus tree on their plot of land. Important consideration by land holders to the economic conditions has facilitated eucalyptus tree planting. The potential negative ecological implication was not taken into consideration. Focus group discussants indicated the areas where eucalyptus tree planted has to be selective. They recommend that the areas best suited to eucalyptus plantation were areas with low agricultural potential. In the same token, some peri-urban farmers were not the direct beneficiaries with promotion of eucalyptus tree planting. They were selling their plot of land in the name of renting to the better off individuals.

The extent of the problem of land degradation in all aspects including tree felling is well known, but the problem was to get people to implement the solutions. Some argue for a role of the state with top-down and coercive measures and land

Table 2: Effect of Land Certification on Tree Planting: Ordered Probit Regression

variables	Coef.	Std. Err.	z	P>|z|	[95% Conf. Interval]	
Sex	-.231986	.4824783	-0.48	0.049	-1.177626.	713654
Age	.0196922	.0099979	1.97	0.631	.0000967	.0392877
Marital status	.1179463	.4830994	0.24	0.8071	.064804	.8289111
Education level	.2686449	.2696216.	1.00	0.319	2598037	.970935
Family size	.1675208	.0669285	2.50	0.0012	.0363434	.2121988
Wealth status	-.2581916	.2399995	-1.08	0.282	-.7285819	.2121988
Total land holding size	.2719381	.2076472	1.31	0.190	-.1350429	.678919
Number of parcels	-.6511045	.4307432	-1.51	0.131	-1.495346	.1931366
Distance from village	-.0350166	.1124646	-0.31	0.756	-.2554431	.1854099
Slope	.3252005	.5715923	0.57	0.569	-.7950998 1	.445501
Soil quality	.3743075	.4678474	0.80	0.424	-.5426566 1	.291272
Soil type	.4930346	.2469095	2.00	0.046	.009101	.9769682
Certification year	.0261188	.0936543	0.28	0.780	-.1574404	.2096779
Trust in certification	.1370488	.4474153	0.31	0.759	-.7398691 1	.013967
SWC practice	-.5985	.2765989	-2.16	0.030	-1.140624	-.0563761
Sense of ownership of land	.4616367	.2552244	1.81	0.070	-.038594	.9618673
Tree planting practice	-.8993219	.5343816	-1.68	0.092	-1.946691	.1480468
Land productivity	-.0265203	.1173184	-0.23	0.821	-.2564601	.2034196

Note: Number of observations = 195; LR chi2(19) =70.16; Prob > chi2 = 0.00; Log likelihood = -73.74513; Pseudo R2 =0.3223

resource was public resource and once lost it was not only the landholder harm but also the public in general would not escape from its negative consequences. This may direct to design land use development plan and exercise planting of trees where necessary: for home consumption and conservation purpose. The question was what motivation systems the government has to implement and make every land holder intervene in integrated land conservation and tree planting practices where feasible.

Conclusions

The empirical results this study indicate the limited importance of land certification programme in significantly stimulating private investment on tree planting. The results obtained in this study indicated that considerable considerations are worth mentioning. The findings have important implications for agriculture and natural resources management in the region, since the inception of implementation of rural land registration and certification in North Gondar. Based on the findings of this study, further actions (incentives) to strengthening investment on tree planting practices are recommended. The issuance of primary book of holding may not be sufficient to bring the intended objectives of land certification with respect to land related investments. Issuance of secondary book holding, effective intervention through the existing extension has to be put in place to create synergy between different development actors. The low performance of growing indigenous trees necessitates designing appropriate incentive mechanisms to help land holders implement on their holdings. Among other things, strengthening tenure security through issuance of secondary of book of holdings is one policy inceptive.

References

Adams, M., Cousins, B., & Manona, S. (1999). Land tenure and economic development in rural South Africa: Constraints and opportunities. Overseas Development Institute Working paper 125.

Benin, S., & Pender, J. (2002). Impacts of land redistribution on land management and productivity in the Ethiopian highlands. Socio-economics and Policy Research Working Paper 43. ILRI (International Livestock Research Institute), Nairobi, Kenya.

Berhanu, G., Pender, J., & Ehui, S. Land tenure and land management in the highlands of Northern Ethiopia.

Bizoza, A. R. (2011). Farmers, institutions and land conservation: Institutional economic analysis of bench terraces. PhD dissertation, Wageningen University, Wageningen

BOFED (2009). Five year strategic plan of Amhara Region. Bureau of Finance and Economic Development, Bahir Dar.

Bogale, A., & Shimelis, A. (2009). Household level determinants of food insecurity in rural areas of dire dawa, eastern Ethiopia. *African Journal of Food Agriculture Nutrition and Development*, 9(9), 1914-1926.

Economic Commission for Africa (2004). Land Tenure Systems and their Impacts on Food Security and Sustainable Development in Africa. ECA Print shop in Addis Ababa.

ELTAP. (Ethiopia Land Tenure and Administration Programme) (2007). Ethiopia: land tenure and administration program. Viewed from: http://eltap.net

FAO. (2004). Ethiopia land policy and administration assessment. *Final Report.*

IFAD (2006). Land Tenure Security for Poverty Reduction in Eastern and Southern Africa. Workshop Report, Kampala, 27-29 June 2006.

Gebreselassie Samuel (2005). Recent Experiences in Land Rental Markets in Ethiopia: Impact on Equity, Efficiency and Poverty. Paper Presented on Symposium on Land and Sustainable Development in Ethiopia Organized by the FSS, EEA and AESE on August 5, 2005.Addis Abeba.

Holden, S. T., Deininger, K., & Ghebru, H. (2009). Impacts of Low-cost Land Certification on Investment and Productivity. *American Journal of Agricultural Economics*, 91(2),359 -373.

Desta, L., Kassie, M., Benin, S., & Pender, J. (2000). Land degradation and strategies for sustainable development in the Ethiopian highlands: Amhara Region. Socio economics and Policy Research Working Paper 32. ILRI (International Livestock Research Institute), Nairobi, Kenya.

Pallant, J. (2011). SPSS Survival Manual: step by step guide to data analysis using SPSS. 4th edition, Allen & Unwin, Australia.

Rabe-Hasketh, S., & Sckrondal, A. (2005). *Multilevel and longitudinal modeling using stata*. Stat Press.

Roth, & Haase, D. (1998). Land tenure security and agricultural performance in Southern Africa. Brodcasting Access and Strengthening Input market.

Giri, S. (2010). The effect of rural land registration and certification programme on farmers investments in soil conservation and land management in the central rift valley of Ethiopia. MSc Thesis, Wageningen University.

Giri, S. (2010). The Effect of Rural Land Registration and Certification Programme on Farmers' Investments in Soil Conservation and Land Management In The Central Rift Valley of Ethiopia. *Master thesis Land Degradation and Development Group.*

Tenaw, S., Islam, K. M. Z., & Parviainen, T. (2009). Effects of land tenure and property rights on agricultural productivity in Ethiopia, Namibia and Bangladesh. University of Helsinki Department of Economics and Management Discussion Papers no 33.