Communal Land Utilization in the Highlands of Northern Ethiopia: Evidence of Transaction Costs

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In rural areas of the Ethiopian highlands, tree planting on communal land has been increasing because of active implementation of various sustainable land management projects. Tree planting requires negotiation or coordination among the users of communal land because it may exclude other activities, namely grazing of livestock. This study empirically shows that the transaction costs to reach agreement among land users deter the expansion of tree planting. In other words, tree-planting projects tend to be placed in communities with lower transaction costs. The result implies that tree planting will expand if public policy is directed toward coordinating diversified opinions among community members.

Key words: communal land, transaction cost, Ethiopia

1. Introduction

In mountainous areas in developing countries, where land is generally unfavorable for use in agricultural production, poor people rarely make it out of poverty because an increase in agricultural productivity is difficult to achieve. In steep hillside areas, introduction of high-yield crop varieties, machinery, and development of irrigation systems are more costly and technically more difficult to implement than the same innovations are in flat areas. On the other hand, vast communal land, although not suitable for agriculture, is available in these hillside areas. Thus, how to generate income by utilizing the communal resources is an important policy issue.

In the highlands of Ethiopia, large areas of communal land exist in the mountainous regions. Gebremedhin et al. [4] conducted studies on communal land utilization, showing a wide difference in the efficiency of land management depending on various factors such as the size of the decision-making body responsible for communal resource management. Hagos and Holden [6] suggest that poor farmers with little resources are not willing to invest in land conservation, making them unable to improve their economic situations. Oniki and Gebremichael [9] argue that considerable excess labor exists in the dry season in northern Ethiopia. Although this surplus labor is available to support additional economic activities on communal land, few activities have been available except for grazing. However, recently, due to concerns about the depletion of tree resources, the number of tree-planting projects has been increasing.

Grazing and tree planting can coexist on the same communal land, but the negative externality each activity exerts on the other results in only one being chosen as the exclusive land utilization for a piece of communal land. Our concern is that the land use may not be optimally chosen due to the transaction costs required to reach agreement among people with different interests in how communal resources should be used. In the case of private resources, some researchers argue that high transaction costs in coordination among stakeholders or negotiation for use of related property rights result in underutilization (Michelman [8], Deibel [3], Buckley and Kalarickal [2]). However, the effects of transaction costs on utilization of communal resources have been rarely investigated.

Considering that tree planting is a new activity on communal land where grazing used to be prevalent, the conversion of land use from grazing to tree planting should require a lot of negotiation and, hence, be difficult. Thus, we posit a hypothesis that transaction costs for negotiation or coordination hinder the utilization of communal land for tree-planting projects in rural areas of the Ethiopian highlands. The objective of this paper is to empirically test this hypothesis in order to identify policy implications for more efficient utilization of communal land in the highland area of Ethiopia.

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2. Communal land management in Ethiopia

Ethiopia transformed from a socialist economy to a market-oriented economy in the early 1990s. While the country maintained state ownership of land, it distributed farmland to each farm household. Local communities (small, natural villages called *gots* in the local Tigrinya language) or village (also known as a Peasant Association (PA))[1] offices managed most communal resources in rural areas. Later, responsibility for the management of many communal lands was transferred from village offices to local communities. Villages are frequently too large for a central office to manage all the details of communal land; therefore, smaller administrative units can often manage communal land more sustainably (Gebremedhin et al. [5]).

After the devolution of administrative powers to local communities was complete, most communities made their own rules and regulations for communal land utilization. It is interesting to note that although local communities manage communal land, district government offices also play an important role in communal land management. In this respect, communal land is not regarded as purely common property of the local community. Jagger et al. [7] argue that local administration (*i.e.*, village (PA)) has excessive power over forest management in Ethiopia.

Northern Ethiopia's Tigray Region experienced both civil war and international conflict until the early 1990s. Continuous civil wars during the communist regime, as well as high demand for firewood, contributed to deforestation in the region.

Since the economic and political reform of the early 1990s, the government has emphasized rehabilitation of communal land through various measures such as reforestation, protection of the land from animal grazing, and soil and water conservation. Cutting trees in communal land is strictly prohibited.

Despite remarkable improvement of vegetation on communal land after the reform, it is not fully known how the land contributes to improved livelihood for its inhabitants. Wood [11] argues that overprotection of forestry in developing countries undermines local people's livelihoods. However, there exists insufficient evidence to determine the effectiveness of current communal land management practices in increasing the economic wellbeing of community members.

[1] Peasant Association (PA) in a village is called *kebele* in Amharic, the Ethiopian common language, and *tabia* in Tigrinya.

3. Data

In order to investigate local management of communal land, we conducted surveys of communities in the Emba Alaje *woreda* (district) in the Tigray Region of northern Ethiopia. Five villages (PAs) with similar geographic conditions were selected (Figure 1). Intensive surveys were conducted in the village of Keyih Tekli. All communities (*gots*) in each village (PA), except in the case of Simret, are included in the sample. The number of communities in the village of Simret is much larger than in other villages, so those communities were selected for the survey by a random sampling method. The total sample size was 113. Two or more executives from each community, including a community leader, participated in an interview and answered questions.

Communal land in Emba Alaje may be classified as "forest," "pasture," or "bare land." Pasture includes close grazing land and open pasture. This study employs the classifications used by the local inhabitants, as it is based on their perceptions and closely reflects actual land utilization.

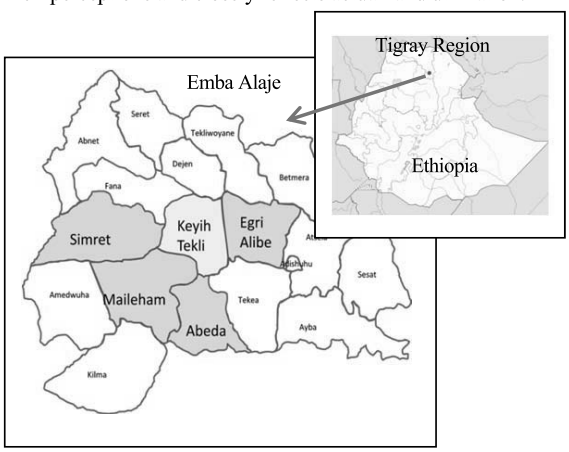

Figure 1. Study site of Emba Alaje, Ethiopia

Typically, the entire community meets (known as a community meeting) to determine the local rules for communal land use. Some communal land is utilized by more than one community, such as the case of a forest located around the border of two communities and used by both. Accordingly, a committee that includes both communities is formed and that committee makes decisions on forest usage. In such a joint management case, coordination of different interests among members is more

difficult than with a single community. If a communal land is located within a domain area of one community, only that community uses it. On the other hand, if communal land is located around the border between two communities so that both communities use it, the land is jointly managed. Thus, joint management of communal land is determined by geographical factors.

4. Results of the survey

The survey results show that various types of communal land utilization rules exist in the area. Table 1 illustrates the proportion of communities that have rules regarding economic activities in communal forests. More communities tend to allow oxen to graze more than cows and calves. Farmers in the Ethiopian highlands consider oxen the most important animals for farm production because they use oxen as draft animals for cultivation (Aune et al. [1]). As a whole, most activities except firewood collection are related to animal husbandry, and no free tree planting by individuals is permitted in these areas. Tree planting by individuals is allowed only under a regional government program called the hillside distribution program ("Hillside and Gully Distribution and Utilization"), which started in 2011 and allocates communal land plots to landless youths (youths defined as people 18—35 years old). In addition, 31% of communities participated in domestic or international tree-planting projects in the last ten years (individual farmers do not have a choice on participation).

With the exception of collecting grass (so-called cut-and-carry systems) and beekeeping (both activities are considered relatively sustainable utilizations of forests), communal forest use is generally restricted, with a small number of communities permitting economic activities.

Table 1. The numbers of communities allowing activities in communal forests (% in parentheses)

Activities	Allowed	Prohibited
Grazing oxen	32 (33)	66 (67)
Grazing cows, heifers	27 (28)	71 (72)
Grazing sheep and goats	26 (27)	70 (73)
Collecting grass	57 (61)	37 (39)
Collecting fuel wood	22 (23)	75 (77)
Beekeeping	54 (56)	43 (44)
Free tree planting by individuals	0 (0)	113 (100)
Tree planting under the hillside land distribution program*	77 (68)	36 (32)

Note: Source is the 2013 Emba Alaje survey (n = 113). The values in parentheses indicate the percentage of communities that provided a response for that activity category. The category marked with (*) denotes tree planting under the hillside distribution program for young, landless farmers.

The productivity and intensity of crop production in individual farms varies across communities: People who earn higher incomes in agriculture may conserve more communal land for future generations, while poor people may pursue income through animal grazing in the forests (Pender and Gebremedhin [10]).

Table 2 shows the relationship between animal grazing on communal land and vegetation changes. The table shows the community responses on changes in vegetation over the last ten years for those permitting animal grazing and those prohibiting it. The data clearly show that vegetation deteriorates more if communities allow animal grazing. In short, poor communities allow more grazing on communal land, which causes greater degradation of vegetation due to overgrazing.

Table 2. Communities' rules for animal grazing on communal land and the vegetation change (% in parentheses)

		Allow ox grazing	
		Yes	No
Vegetation change	Worsened	12 (41)	5 (8)
	Unchanged	1 (3)	0 (0)
	Improved	16 (55)	57 (92)
	Total	29 (100)	62(100)
Pearson's Chi-squared		17.205***	
N		91	

Note: The number marked with (***) denotes statistical significance at the 1% level. Data: 2013 Emba Alaje survey.

How much are the Emba Alaje forests utilized for forestry production? According to our survey results, 44% of communities planted trees on communal land during the period from 2003 to 2012; however, we found that no communities voluntarily planted trees on communal land to pursue economic benefits, except small-scale homestead areas where the majority of households planted trees for sales or domestic use. While there are different types of tree-planting projects in this area such as governmental projects, foreign aid, research–oriented projects, mandatory mobilization, and the hillside distribution program, any of these projects may cause conflict with animal grazing activities. There are 16 forests open for public tree-planting projects, with each forest managed by one community. In

terms of hillside distribution programs, 77 communities out of 113 are involved, while the number of participants varies widely among communities.

On communal land, the trees have been planted as a result of the hillside distribution program for landless farmers and tree-planting projects sponsored by the Ethiopian government or international organizations.[2)]

Although planting eucalyptus trees on private land is common practice in this area as eucalyptus is bought and sold at local markets, not all the communities in Emba Alaje have adopted tree-planting projects on communal lands. Labor shortages and low profitability would seem to be the most plausible reasons that commercial trees are rarely planted on communal land. However, our previous study (i.e., Oniki and Gebremichael [9]) rejected these hypotheses. One would also think that if communal land were far from residential areas or water sources, people would be reluctant to plant trees there. However, even with some communal land being located near villages and water sources, it is still not used for forestry.

Thus, it is justifiable to posit that the non-adoption of tree-planting projects is caused by the existence of transaction costs for coordination of resource use for tree-planting when people try to exclude others. Transaction costs for negotiation among community members with diverse concerns may hinder the ability to achieve consensus.

Exclusivity of use differentiates forestry from animal husbandry. Once trees are planted on communal land, the area is enclosed so that no animals can enter until the trees grow to a certain stage. In some cases, new forests are enclosed forever. Even if a forest is communal, it excludes those who are grazing animals in the communal areas. This exclusive nature creates transaction costs for coordinating communal land use, resulting in communal land not being fully utilized for forestry production.

Exclusion also requires costs for monitoring or enclosure. In Emba Alaje, most communities hire guards or people in the community take shifts working as guards. According to our survey, the average wage for hiring a guard to protect a community forest is 9.9 birr per day, while the average annual fee collected from community members for communal land protection is 19.9 birr per household. Compared to the average value of Eucalyptus timber (41 birr per cord) and the average wage for a farm worker (32.6 birr per day), the cost for a guard is not high.

Distribution of communal land to landless farmers is an extreme case of exclusivity. The hillside land distribution program allocates communal land to individual farmers and allows them to plant trees or engage in other activities such as beekeeping or collecting grass for feed. It does not allow cultivation except for select cases of agricultural conservation through irrigation. In 2011, the Tigray Region started the hillside land distribution program. As the number of landless young people has increased since the last land distribution, the government rents out communal land to young farmers. Those under age 35 are eligible to apply for the program. If a household's application is approved, that household is allowed exclusive use of 0.25 ha of land.[3)] The application requires approval by community meeting. While opponents to application approval are usually those who are grazing animals in the area, in the meeting all members of the community discuss whether land will be allocated to landless youths.

Difficulty in negotiation or coordination among resource users may affect utilization of communal resources and any attempts to change local communal land rules. We use joint management of communal land as an indicator or a proxy for difficulty of negotiation. Joint management of communal land is geographically determined—if the communal land is located between communities, it is managed jointly.

The upper part of Table 3 shows the cross relationship between joint management of communal forests and local rules for grazing oxen in communal forests. It shows the numbers of communities that allow ox grazing by the categories of joint management and without joint management. The right column shows the Chi-square tests between the categories with and without joint management. The table shows that, in the case of joint management, more communities allow ox grazing and in the case of no joint management, most communities prohibit the grazing. The Chi-squared tests confirm the difference. Where joint management is practiced, negotiation is more difficult and communal lands tend to remain for grazing.

The lower part of the table shows a similar cross relationship for tree planting. The hillside distribution

[2)] Farmland was allocated to those above 18 years old in the 1990s. Those who were under 18 years old were considered "landless."

[3)] It ranges from 0.125 to 0.50 ha based on land conditions; for example, in the case of a riverside area, it is 0.125 ha.

program, as well as other governmental and international projects, has carried out tree planting. Unlike previous projects, which were intended for rehabilitation of natural resources rather than commercial utilization, the hillside distribution program was the first to allow people to cut trees as part of a tree-planting project. The proportion of tree planting is lower in the case of joint management. The Chi-squared tests also find statistical significance at the 10% level, suggesting that tree planting is less active where negotiation among users is more difficult. We also confirmed that tree planting and ox grazing have a negative correlation (Table 4), showing their mutually exclusive characteristics.

Table 3. The number of communities that use communal land for ox grazing and tree planting (% in parentheses)

		Ox grazing			Tree planting		
		yes	no	total	yes	no	total
Joint management	no	9 (23)	31 (78)	40 (100)	24 (62)	15 (38)	39 (100)
	yes	23 (40)	35 (60)	58 (100)	26 (45)	32 (55)	58 (100)
Chi-square test		3.168*			2.607*		

Note: Numbers marked with (*) denote statistical significance at the 10% level. Data: 2013 Emba Alaje survey.

Table 4. Ox grazing and tree planting in the past ten years

		Ox grazing		Chi-square test
		yes	no	
Past tree planting	yes	23 (40)	24 (77)	15.305***
	no	43 (60)	7 (23)	
	total	66(100)	31(100)	

Note: The number marked with (***) denotes statistical significance at the 1% level. Data: 2013 Emba Alaje survey.

The bivariate probit model, though seemingly unrelated, is used to estimate tree planting and animal grazing factors since the error terms are possibly correlated. The dependent variables are the probability of tree planting and that of grazing in community *i*. The variable for *tree planting* equals 1 if the community planted in the last 10 years and 0 otherwise. That of *grazing* equals 1 if it permits grazing and 0 otherwise. The sample size is now decreased to 94 since some communities lack communal land.

The definitions of dependent variables are listed in Table 5. The variable of *joint management* equals 1 if a community jointly manages a communal forest with another community. As discussed above, it represents the difficulty of making rules for communal land. It should be noted that this variable is exogenous, since it is determined by geographical factors. If communal land is located on the border between two communities, the land must be managed jointly, because both communities have rights to use the land. If a communal land is located inside of a territory of one community, joint management never occurs. Thus, it is not determined by people's decision but by the location. Therefore, we regard *joint management* as an exogenous variable.[4] Controlling for all the household-level and community-level variables that may affect demand for a particular land use, the variable of *joint management* will capture only the difficulty of negotiation. While the governance capability of the community may have influences, it is difficult to observe it. This study assumes the governance capability is neutral to tree planting and animal grazing activities.

Table 5. Dependent variables used for bivariate probit model

Variable	Description	Mean	Standard deviation
Joint management	1 if the communal forest is managed jointly	0.51	
Total household	The total number of households in the community	45.60	24.28
No animal	Proportion of households that have no animals	0.195	0.132
Landless	Proportion of landless households	0.196	0.145
Church forest	1 if the communal forest is managed by church	0.07	
Distance	Distance from village center to the communal land (km)	6.162	5.275
Grazing household	Proportion of households grazing oxen in pasture	0.310	0.392
Farm area	Area of farmland per person (ha)	0.130	0.103
Highland	Proportion of highland area (2300 m above the sea)	0.450	0.448

The estimated coefficients of the model are shown in Table 6. In the tree planting equation, the estimate of *joint management* is negative and statistically significant at the 1% level. It shows that probability of tree planting decreases when more negotiation with other community members is required. The coefficient estimate for proportions of landless households has a negative value. Most tree-planting is for public planting by a community, not for the landless. The landless people are likely to oppose tree planting because it leads to restriction of animal grazing in communal land to protect seedlings.

[4] It must be noted that this variable is endogenous if communities have decided to stop existed joint management, although it seems that there are few, if any, cases where they have actually decided to stop the joint management in the area.

For the grazing equation, the estimate of *joint management* is positive but not significant. Thus, effects of negotiation on animal grazing rules are not clear. The estimate for *no animal* is negative, suggesting that the restriction of grazing on forestland is more likely to be introduced as the proportion of households without animals increases. If more people have animals, it is more difficult to gain consensus among communities to prohibit animal grazing.

Table 6. Coefficient estimates of the bivariate probit model for factors related to tree planting

	Tree planting		Grazing	
Joint management	-0.696	***	0.425	
Total household	-0.0038		0.0067	
No animal	1.812		-2.358	*
Landless	-2.491	***	0.775	
Church forest	0.162		0.496	
Distance	-0.016		0.018	
Grazing household	-0.857	***	0.024	
Farm area	1.257		-0.794	
Highland	-0.137		0.506	
Constant	1.432	***	-0.642	
Log likelihood	-100.5			
ρ	-0.562	***		
Sample size	94			

Note: Number marked with (*) denotes statistical significance at the 10% level. Numbers marked with (***) denote statistical significance at the 1% level.

5. Conclusions

Rural communities and local governments in the highlands of Ethiopia have established a wide range of rules for utilization of communal land. Nonetheless, communal land is not fully used for forestry production. A possible reason for it is the transaction costs for coordination. Since tree planting excludes using the land for animal grazing, negotiation to get new approvals for planting is not easy. Even if tree planting is more profitable than animal husbandry, such difficulty in coordination makes fuller use of local communal resources impossible.

Our findings have several policy implications. Most significantly, since the underutilization of communal land for tree-planting (particularly land jointly managed by different communities) is driven by the existence of transaction costs, allocation of jointly used communal land to an individual community may increase tree planting. In cases where geographic or social reasons would make dividing communal land difficult, the government should help coordinate the different interests of community members to facilitate a resolution.

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