Land Use Policy 77 (2018) 75–83

Contents lists available at ScienceDirect

Land Use Policy

journal homepage: www.elsevier.com/locate/landusepol

Contesting conventional wisdom on the links between land tenure security and land degradation: Evidence from Ethiopia☆

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ARTICLE INFO

Keywords:
Tenure security
Land degradation
Conservation
Rural indebtedness
Ethiopia

ABSTRACT

This paper examines the relationship between land tenure security and land degradation. It investigates how land degradation is viewed, and, in turn, managed by rural land users in Ethiopia through a case study in two districts of the Amhara region. Many have argued that Ethiopia's land tenure system lacks the tenure security required to stimulate investment for enhanced agricultural productivity and sustainable land use. The state's continued ownership of land has been widely criticized by scholars and international development agencies, arguing that it has created a high degree of tenure insecurity – which, is believed to be responsible for the lack of investment in land and the lack of environmental conservation. However, this paper argues that the narrative that the farmers' lack of tenure security contributes to the widespread land degradation problem appears to be misleading. While the literature suggests an inverse relationship between land tenure security and land degradation, the evidence in this paper contradicts this and mobilises relevant data to explain why this is the case. Despite tenure insecurity, poor people in the two Amhara study sites are making substantial investments to halt and reverse land degradation – though to quite differing degrees – and by so doing, are simultaneously investing in the security of their land tenure.

1. Introduction

Across developing countries, climate change – manifested through higher temperatures, irregular rainfall patterns and extreme weather conditions – is increasing the incidence and scale of drought, crop failure and livestock loss, and is accelerating deforestation and land degradation and; millions of poor rural people are already being forced to cope with the impacts of these changes (UNDP, 2007; IFAD, 2010). Land resources and rights to them are fundamental to the livelihoods of rural people in Ethiopia (and indeed, elsewhere in sub-Saharan Africa). The degradation of land means that rural households encounter threats in their everyday efforts to meet their livelihood requirements. It has adverse impacts on their agricultural productivity and household food security. According to a report (UNECA, 2009: 129), Africa has 500 million hectares of moderately or severely degraded land, accounting for 27% of total land degradation in the world. In Ethiopia, land degradation is generally perceived as a serious problem, particularly in many of its highland areas, where extensive deforestation, wide-scale soil erosion, and nutrient depletion are associated with declining land/agricultural productivity (Campbell, 1991; Hurni, 1993; Shiferaw and Holden, 1999; Ezra, 2001; Bekele and Drake, 2003; Bewket, 2007; Amsalu and de Graaff, 2007). Land degradation has been acknowledged as a serious problem that contributes to rural poverty and food insecurity. Nevertheless, it remains a contested issue that has not received much attention in the debate, particularly regarding the extent, underlying causes of, and possible countering measures to the problem.

Land tenure security has been one of the key prominent issues in the debate over the causes of land degradation. It has long been argued that lack of tenure security affects land degradation, as the likelihood that land users will invest in land conservation, depends on their security of tenure (Feder and Feeny, 1991; Besley, 1995; Gavian and Fafchamps, 1996). However, several studies (e.g., Neef, 2001; Brasselle et al., 2002; Gray and Kevane, 2001) have shown that the lack of tenure security may not inevitably lead to a decline in investments in land and that the correlation between land tenure and land conservation practices is not necessarily unidirectional as often argued. Causality can be observed in both directions. A sense of insecurity may stimulate investment in land conservation, such as tree planting, in order to enhance long-term tenure security. As cogently argued by Sjaastad and Bromley (1997: 559), causality may, more importantly, run the other way in which land-based investments may work as a prerequisite for tenure security. They concluded that "tenure security is a result, as well as a cause of land use

☆ This paper is based on data collected between April 2012 and February 2013 for a PhD at the International Institute of Social Studies, The Netherlands, and was funded by the Netherlands Fellowship Programme (NFP). Special thanks to the two anonymous reviewers of this journal for their very helpful comments and suggestions.

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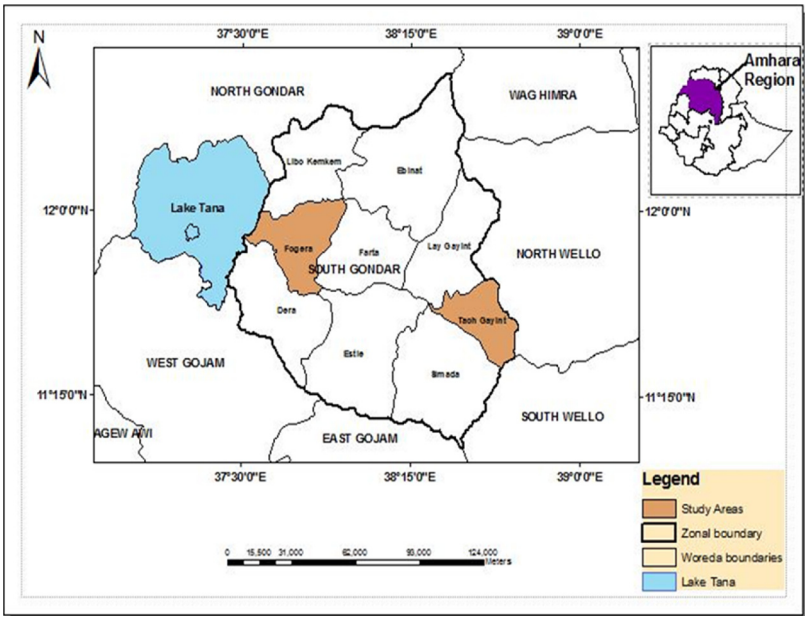
https://doi.org/10.1016/j.landusepol.2018.04.058
Received 10 January 2018; Received in revised form 26 April 2018; Accepted 28 April 2018
Available online 24 May 2018



Map 1. Map of the south Gondar administrative zone (showing the location of study districts).

decisions" (ibid.: 559, see also Gray, 2003).

Since the early 1970s, environmental planning and policy in Ethiopia have long based on discourses that attribute environmental degradation to high population pressure and poor farming practices (Hoben, 1995; Campbell, 1991; Rahmato, 2003). Consequently, across many of the country's highland areas, large-scale conservation works were undertaken, particularly during the Derg regime, using food-for-work projects and mass mobilization schemes. However, the conservation works were not sustained and did not largely succeed in bringing desirable outcomes, and peasants have often dismantled the conservation structures built on their cultivated land and hillsides. Top-down planning, lack of participation and proper planning were among the key factors that have contributed to the failure of past conservation works (Hoben, 1995; Campbell, 1991; Shiferaw and Holden, 1999; Keeley and Scoones, 2000; Admassie, 2000; Rahmato, 2003). It is also widely believed that rural land-users lacked tenure security that may have discouraged them from maintaining the land conservation structures (ibid.).

Many have argued that Ethiopia's land tenure system lacks the tenure security required to stimulate investments for enhanced agricultural productivity and sustainable land use (Almeu, 1999; Admassie, 2000; Bewket, 2007; Rahmato, 2009). There is widespread criticism by scholars regarding the state's continued ownership of land, in which it is argued that it has created a high degree of tenure insecurity – which, coupled with other factors, is believed to be responsible for the lack of investment in land and the lack of effective environmental conservation (Almeu, 1999; Admassie, 2000; Rahmato, 2009; Deininger and Jin, 2006). However, the narrative that the farmers' lack of tenure security contributes to the widespread land degradation problem appears to be misleading. As this paper will show, the state ownership of land does not seem to have discouraged farmers from taking care of their land or from responding to the problem of land degradation. Contrary to what has been widely accepted as a fact, this study suggests that farmers in the study area worry less about issues surrounding their tenure (in) security when it comes to land management, and are more concerned with the problem of land degradation and how to resolve it. That being said, while it remains to be seen whether the recent land registration and certification programme would increase their tenure security, the ways in which land users act or do not act towards their land seems to depend more on the circumstances and dynamics of their livelihoods rather than simply on land tenure security.

It is therefore important to focus on farmers' own perceptions, particularly their understanding and interpretation of land degradation and its causes. This is being done by situating our analysis within the specific socio-economic, political and ecological context in which degradation has taken place. This study uses the approach of political ecology, exploring local land users' perspectives and actions regarding land degradation by making note of the processes and contexts within which they are embedded and which affect the ways they use, access and manage their land (Blaikie, 1985; Neumann, 2005; Gray and Moseley, 2005). As an interdisciplinary field, political ecology helps us to better understand the underlying societal factors leading to land degradation and also broadly illuminates the socio-economic and political contexts under which agrarian changes take place.

The rest of this paper is organized as follows. The second section presents a description of the study areas and the research methods employed. In the third section, local people's perception of land degradation is presented. The section also examines how local land users view particular aspects of land degradation, including soil erosion. This is followed by the examination of local perspectives on the dynamics of soil fertility change. In the fourth section, local soil fertility management practices are examined. The final section draws a short conclusion.

2. Study areas and methods

This section presents a description of the study areas and research methods employed in the study areas of the Amhara region. The fieldwork was carried out in the south Gondar administrative zone between April 2012 and February 2013. During this period, a household survey, interviews, group discussions (FGDs), and observation were carried out to collect data (For details, see Moreda, 2016). Two case study *woredas* (districts) – Tach Gayint and Fogera – were chosen to represent differing socio-economic and agroecological contexts (Map 1). These two districts feature differing food security situations, agronomic potentials and livelihood patterns, as well as different incidences of land-related conflicts.

The Tach Gayint district has a population density of about 102 inhabitants per km^2. Most areas of the district have an altitude of more than 2,000 m above sea level (SERA project, 2000). The topography of the district consists of 20% mountainous lands, 12% plains, 40% gorges and valleys, and 28% rugged terrains. In terms of agro-ecological

conditions, it is classified into *dega* (16.1%), *woina-dega* (46.45%) and *kolla* (37.45%).[1] The annual rainfall of the district ranges from 800 mm to 1000 mm (Tach Gayint *woreda* office of Agriculture, 2012). The soil characteristic of the district is generally less fertile and intensively cultivated and more vulnerable to soil erosion because of the rugged nature of the topography.

Whereas in Fogera district, flat plains dominate its topography (76%), followed by valley bottoms (13%) and mountainous and hilly areas (11%). In terms of agro-ecological characteristics, the district is predominantly classified as *woina-dega*. Its altitude ranges from 1,774 m to 2,410 m above sea level.

Averaging of 1216 mm, the annual rainfall of the district ranges from 1103 mm to 1336 mm (Gebey et al., 2012). The dominant soil types that characterize the Fogera plain are black clay soils (vertisols), while luvisols dominate the mid and high altitude areas (LIU/DMFSS, 2008; Gebey et al., 2012). The Fogera plain is a seasonally flooded area bordering Lake Tana and two major rivers (Gumara and Reb). These three water sources cause the flooding of the plain during the main rainy season. In both of the study areas, Tach Gayint and Fogera, a mixed-farming system of crop farming and livestock rearing is commonly practiced.

This study combined a household survey and various qualitative methods. Based on a stratified multi-stage random sampling approach, a survey of 300 households in Tach Gayint district (in three *kebeles*) and 200 households in Fogera district (in two *kebeles*) was carried out.[2] The qualitative fieldwork was also carried out within each of the household survey villages (Map 1).

3. Local people's perception of land degradation

How is land degradation viewed, and, in turn, managed by rural land users in Ethiopia? This section explores this question by looking at farmers' perceptions of land degradation, particularly their understanding and interpretation of the problem and how they are dealing with it.

Land degradation commonly manifests in various ways, including substantial soil erosion, soil fertility decline, loss of vegetation cover, and desertification (Andersson et al., 2011). The causes of land degradation include not only biophysical factors, but also socioeconomic and political factors (e.g., land-use change, resource demands, population pressure, and land tenure). These causes range from poor soil qualities to population pressure to insecure land tenure and climate change. It is widely argued that the processes of climate change interact with ongoing pressures on ecosystems and biodiversity in generating or accelerating land degradation (UNDP, 2007; IFAD, 2010). For instance, changes in the spatial and temporal patterns in rainfall and temperature can lead to or exacerbate land degradation. While land degradation is generally thought to be widespread, there is considerable variation between the two study areas, implying a spatial dimension. The two study areas differ considerably in terms of their physiographic and ecological features. The Tach Gayint district has a topography of rugged terrain; by contrast, the Fogera district is relatively more plain (referred to as Fogera Plain).

Along with crop failure and small landholding size, land degradation was perceived as one of the main challenges to household livelihoods. When asked what major challenges they face in terms of securing their livelihoods, 90 percent of the sampled households in the Tach Gayint district replied that it was land degradation. In contrast, the figure for Fogera was only 29 percent.

One elderly farmer explained how the situation appears to have changed:

> This land used to give more yield. It was relatively wide too. It gave well. Today, however, this land - beyond its small size - is not even blessed. Our land is full of both highland and lowlands. It is full of mountain chains that make it unable to hold the rain and keep the water even for a little while. As a result, the flood from the rain washes away the soil, even uprooting trees, which has left the land without fertile soils or vegetation (Interview, 23 Sept. 2012, Enjit *kebele*).

Similarly, another elderly informant explained that:

> In the past, from what we witnessed and from what we heard from our parents, there were not so many people as today. This same land was more than enough. It was also more fertile and productive. It was also relatively covered with trees that used to hold its soil, protecting it from erosion. If you see our land, nature was not generous towards us. We are disadvantaged in the land topography itself (Interview, Agatt *kebele,* 22 Dec. 2012).

These accounts give emphasis to topography, erratic rainfall, population growth and land distribution patterns when explaining erosion. Ethiopia is one of the countries at extreme risk from the effects of climate change (Maplecroft, 2015). Continued climate change is increasing the scale and incidence of extreme weather events such as droughts and floods which further drive degradation of the country's land resources (UNDP, 2007, 2015). While tenure insecurity has been widely accepted to exist among rural land users, and hence blamed for land degradation, the survey result did not indicate it to be a major constraint: only 11 percent and 12 percent of the households in Tach Gayint and Fogera, respectively, indicated it as a problem.[3] Although informants and focus group participants raised concerns about some of the issues that continue to threaten their tenure security, it seems that these issues do not deter them from planting trees and making other investments in their lands as coping strategies for land degradation (Table 1).

At least in the context of the study area, the findings challenge the widespread notion that farmers in rural Ethiopia do not feel secure about their land rights, and hence do not feel that land-related investments are profitable and would accrue to them (Almeu, 1999; Rahmato 2009; Admassie, 2000; Deininger and Jin, 2006; Bewket, 2007). Survey findings regarding perceptions of profitability regarding land investment reveal that 98 percent of the households interviewed in Tach Gayint and 85 percent in Fogera perceive that land-related investments are profitable and feel such benefits will accrue to their own household (Table 1). A 45-year-old informant from the Enjit *kebele* in Tach Gayint explained the situation as follows:

> Despite the challenges that exist, I do not believe that there is anyone in our village who does not take care of his land out of fear that the land might be taken away for different reasons. It is not difficult to witness that all the people of this community are being involved in various land and environmental management activities. We are working hard in building terraces, applying compost, and building trenches. We are even working hard to transform places that were barren and stony grounds into wetlands by making them increase their underground water discharge. That's why we say our immediate problem is not the issue of tenure (in)security; rather, our pressing problem is that the land is not giving us back, threatening our livelihoods (Interview, Enjit *kebele*, 22 Sept. 2012).

Another informant further explained:

> The most serious problem is that we are not producing enough because our land is full of harmful insects and pests; the rain falls early or stops early, so that our crops die as soon as the seeds start

[1] *Dega*, *woina-dega*, and *kolla* are culturally embedded agro-ecological terms used to refer to the three main classifications: high, mid and low altitudinal ranges, respectively. These classifications are based primarily on altitude, climate and soil.

[2] *Kebele is* the lowest administrative unit in Ethiopia. In rural areas, a *kebele* corresponds to a group of villages.

[3] For an analysis of the concept of 'perceived tenure security', see van Gelder, 2010.

Table 1
Household land investment practices.
Source: Author's own survey, 2012.

Type of investments made on land	Study Area			
	Tach Gayint		Fogera	
	N	%	N	%
Perceives benefits from investments in land will accrue to own household	286	(97.6)	170	(85.0)
Type of investments				
Built stone terraces	276	(96.5)	2	(1.2)
Built soil mound	98	(34.3)	102	(60.0)
Constructed check dam	157	(54.9)	78	(45.9)
Built drainage ditch	78	(27.3)	35	(20.6)
Constructed irrigation canal	8	(2.8)	65	(38.2)
Planted trees	58	(20.3)	51	(30.0)
Planted grass strips	10	(3.5)	5	(2.9)
Constructed flood percolation trench	71	(24.8)	0	(0.0)

> growing. Moreover, floods often wash our crops away. As you can see, we don't have that much plain land. When it rains in the mountains and hilltops, it immediately turns to flood that washes away all our hard work. We have been trying to resist this flood through terracing and other ways. However, we couldn't control it. It's still taking away our food. This is the challenge that we have been talking about. How can we protect the problem that pests and insects are causing us? How can we shelter and protect our land from the bad rains that fall earlier than the regular period? (Interview, Enjit *kebele*, 7 Oct. 2012)

As the above accounts illustrated, farmers often underscore the type of priorities, constraints, and problems they experience that are central to their livelihoods. Land degradation, in particular, is perceived as a pressing challenge in addition to insufficient farmlands. Understanding the importance given to the problem of land degradation provides better insights to understanding the local dynamics under which farmers struggle to meet their livelihood needs. Nevertheless, it should be noted that the fact that farmers widely engage in various land conservation activities may explain more than just the fact that land degradation is a major challenge they are faced with. It is plausible that the active involvement of farmers in various land and environmental management activities also has to do with the conditional nature of land rights; their use rights depend, among others, on 'proper' land and environmental conservation practices. Landholders who do not undertake land conservation activities are subject to penalties, including the loss of their right to the land. It could be argued that farmers are increasingly engaging in land management practices not only to reverse perceived problems of land degradation, but also to strengthen their land rights, as a form of inverse causality.[4] By making substantial investments to halt and reverse land degradation, rural land users are simultaneously investing in the security of their tenure. This dimension is reflected in this farmer's statement:

> According to the land law, if a farmer does not take care of his farmland and doesn't build terraces and plant trees around the farm, his land could be confiscated. Although no one has lost land because of this in our community, this law has been used as a key strategy for mobilizing the community towards land management (Interview, Enjit *kebele*, 22 Sept. 2012).

From the perspective of political ecology, farmers' decisions to invest in their farmlands appear to be shaped not only by the degradation of the land upon which their livelihood is based, but also by the institutional dynamics and power structures that determine their rights to land. As the interpretation of "proper" land management practices rests with the local authorities, it is likely that the land law will not be read objectively, which could be an important political strategy for denying farmers their rights to land for various reasons (see Rahmato, 2009).

3.1. Perceptions of soil erosion and fertility change

This section focuses on farmers' perspectives on aspects of land degradation, particularly soil erosion, soil fertility change, and agricultural productivity. Most of the sampled households in Tach Gayint (89 percent) indicated the existence of soil erosion problems on their farmland; this was the case for only 27 percent of the households in Fogera (Table 4). This difference between the two study areas can be explained by variations in their topography: while Tach Gayint is full of sloped land, the study sites in Fogera are overwhelmingly flat. One farmer in Tach Gayint explained: "Look up there, our land is full of rugged terrain. Erosion gullies are everywhere. Every time it rains, the soil is being washed away. Due to this, the landscape remained naked" (Interview, Enjit *kebele*, 7 Oct. 2012). Although farmers attributed soil erosion to nature (particularly topography), they also pointed to the fact that the landscape is largely barren, which is thought to have increased the threat of erosion during the rainy season. Many farmers argued that the lack of vegetation cover has increased the problem of erosion.

A discourse that "our land was not like this before, it was not naked nor was there a lot of erosion gullies" was commonly heard during FGDs held with elderly farmers in Tach Gayint. Although this might shed some light on what the environment was generally like in the past, contemporary landscapes "may also be interpreted incorrectly through an inappropriate reading of landscape history" (Scoones, 1997: 164). This may be the case because assumptions and interpretations about the past may depend on 'misreading' the landscape that is visible today (Fairhead and Leach, 1996). Leach and Mearns (1996) also asserted that narratives that take for granted that the landscape was better before pose challenges to the ways in which land degradation is understood, analyzed and acted upon, especially in terms of environmental policymaking. The way elderly farmers in the present study area viewed their surrounding environment as "a landscape of loss" sharply resonates with the conclusion once made by Crummey and Winter-Nelson (2003: 120) among northern Ethiopian farmers: "a landscape of loss is how most of our elderly informants view it; not a landscape stripped of vitality, nor denuded of value or meaning, but one, nonetheless, impoverished from the one they knew as younger people." In this respect, the survey result appears to depict a mixed image regarding households' perception of changes in environmental conditions of their areas over the last 10 years. For example, while the results for Tach Gayint (Table 2) indicate a generally high perception amongst households (74%) that the soil condition of their lands has worsened in the last 10 years, a considerable proportion of households have perceived improvements in water and forest resources (42% and 34%, respectively). At the same time, 40% and 49% of the households, respectively, believed there to be worsening conditions of water and forest resources. This is indicative of the intricacy inherent in the interpretation of landscape change. Views and interpretations diverge among rural people even in the case of short-term environmental histories, covering periods within their living memories.

The farmers were aware of the effects of erosion in their individual farmlands and the landscape around them. In the household survey, farmers identified declines in crop yield, increases in the level of stoniness, the development of erosion gullies and loss of tree cover as common indicators of soil erosion (Table 3). In addition, a considerable number of households in Tach Gayint (35%) reported a decrease in their landholding size because of erosion.

Aware of its effects, farmers in the sample have taken many

[4] Related to this, many studies on Africa have already demonstrated that rural landholders undertake land-related investments to enhance their tenure security when they perceive that their land rights are uncertain (Besley, 1995; Platteau, 1996; Sjaastad and Bromley, 1997; Gray, 2003).

Table 2
Households' perception of changes in environmental conditions in the last 10 years in the Tach Gayint district.
Source: Author's own survey, 2012.

Environmental conditions	Improved a lot (%)	Improved (%)	Remained the same (%)	Worsened (%)	Worsened a lot (%)
Soil resources	0.3	6.0	4.3	74.3	15.0
Water resources	3.0	42.3	10.3	40.0	4.3
Forest resources (e.g., vegetation)	1.7	33.7	11.3	49.3	4.0
Overall environmental conditions	0.3	19.3	6.7	47.3	26.3

Table 3
Perception of the indicators of soil erosion.
Source: Author's own survey, 2012.

Perception of soil erosion indicators	Study Area			
	Tach Gayint		Fogera	
	N	%	N	%
Increase in the level of stoniness	183	(70.9)	6	(11.1)
Development of erosion gullies	125	(48.4)	44	(81.5)
Decline in crop yield	218	(84.5)	28	(51.9)
Exposure of plant roots	41	(15.9)	1	(1.9)
Loss of vegetative cover	63	(24.4)	2	(3.7)

Table 4
Household perception of soil erosion.
Source: Author's own survey, 2012.

Perception of soil erosion	Study Area			
	Tach Gayint		Fogera	
	N	%	N	%
Household perceives the existence of soil erosion on farmland	260	(88.7)	54	(27.3)
Household undertakes soil erosion measures	285	(97.3)	102	(51.5)
Types of soil erosion control measures being practiced				
Cultivation along the contour	245	(86.0)	31	(30.4)
Terracing	266	(93.3)	26	(25.5)
Strip-cropping along the contour	17	(6.0)	2	(2.0)
Soil or stone bunding	131	(46.0)	45	(44.1)
Windbreaks	4	(1.4)	–	–
Tree planting	51	(17.9)	20	(19.6)
Check dams	155	(54.4)	68	(66.7)
Drainage ditch	89	(31.2)	7	(6.9)

measures to control erosion on their lands, including cultivating along the contour, terracing, building bunds and check dams, planting trees, and digging drainage ditches alongside their lands to direct floods away from them. As Table 4 shows, most farmers (particularly in the Tach Gayint district) are undertaking measures to control soil erosion. In this respect, 97 percent and 52 percent of the households in Tach Gayint and Fogera, respectively, practiced some kind of soil erosion control measures (Table 4). Notwithstanding the difference in the extent of soil erosion between the two study areas, the fact that the overwhelming majority of the farmers in Tach Gayint have been undertaking some kind of erosion control measures could be partly due to the influence of ongoing Productive Safety Net Program (PSNP). PSNP is a cash and food-for-work programme that aims to provide support to food insecure households in ways that improve their access to services and natural resources and rehabilitate and enhance their natural environment, mainly by requiring the able-bodied adults to participate in public works. This has meant that a significant number of beneficiaries participated in activities aimed at reclaiming degraded lands. It also appears plausible that farmers in Tach Gayint generally have poor quality land, which forces them to undertake more anti-erosion measures – since there are very limited options for abandoning a land that has erosion problems. Due to these reasons, farmers in Tach Gayint are making more investments to combat erosion than farmers in Fogera.

It is of further interest to note that, throughout the Amhara region (as is the case for the whole country), massive soil and water conservation and forestry activities have been promoted and are ongoing in an effort to combat the present state of environmental degradation. A great deal of community mobilization is being made towards watershed conservation on the premise that the present state of environmental degradation and the resultant food insecurity problems that are pervasive in rural areas can be countered through various large-scale soil and water conservation activities, including the construction of bunds, terraces, drainage ditches and check dams, and community forests. Although such activities have been underway throughout rural areas, in Tach Gayint and other districts that are food insecure, a great deal of effort and resources are being channeled in soil and water conservation through the PSNP. PSNP beneficiaries are expected to provide five days of labor per month for six months to the public work schemes. According to information obtained from the district agricultural office and field observations, the scale of conservation structures constructed through the public work schemes is remarkable. However, participation in the public work schemes would not have been the same without the PSNP. Farmers indicated, during group discussions and individual interviews, that free labor does not have wide acceptance since almost all of the people involved in the program are poor. Interestingly, the existence of the PSNP itself appears to have discouraged non-beneficiaries of the programme from participating in the community environmental conservation activities. This is despite current government directives, which stipulate that every farmer is expected to contribute free labor to public work schemes in their respective communities. Particularly, people who are not in the PSNP commented that it is a great disadvantage not to be included into the programme in terms of access to various trainings, credit, and opportunities to participate in the resettlement program as most of the farmers needed these desperately.

The implication is that the selection of participants to the PSNP is contested. Designed as an important part of the government's food security strategy, beneficiaries of the PSNP are eligible for a variety of support services, delivered through a packaged approach geared towards helping them become food secure. According to the Tach Gayint district PSNP desk officer, the program participants are selected according to the programme's guidelines. These require the formation of a task force consisting of members from local government offices and the communities. This task force would then draw up a list of the most food insecure households in each *kebele*. However, informants indicated the lack of transparency and consistency in the selection of the participants. Reflecting on the practice, Rahmato (2009: 203) pointed out that "local officials are responsible for selecting beneficiary households, preparing the employment and package schemes, managing the program and distributing resources. This has been a windfall to local authorities because it gives them considerable power and influence over peasant farmers." A relatively similar assertion was made by Lavers (2013: 461) that the PSNP serves the political objective of "ensuring state control over the rural population".

While the remarkable effect of the PSNP on the scale of conservation activities is noticeable, there is also the need to take a closer look at farmers' perspectives on the ongoing public conservation activities, in

order to understand how much these activities arise from their own experiences. A key impression emerged during group discussions and individual interviews: many farmers in Tach Gayint appeared more concerned with their livelihoods (including farmland shortage and crop productivity) than the benefits of environmental conservation efforts in the long run. One informant, a 42-year-old farmer in the Enjit *kebele* from Tach Gayint stated as follows:

> There is a huge programme of the government, which has been implemented to turn some barren lands devoid of trees to a green and forested area. I say that a farmer could have cultivated at least one *Akimada* (one *Akimada* is approximately 30 kg) of crop from the land that was secured for afforestation purposes. I understand that our land is exhausted, as it has continuously been eroded by flood and its soil blown away by wind. It is my worry that many people will pass away before we will be able to develop our area and turn it into green. It is just that many people are suffering from hunger and many others are fleeing to other areas. Otherwise, we are by now well aware of the advantages and disadvantages of the government's programme of rehabilitating our hillsides and slope lands (Interview, Enjit *kebele*, 14 Oct. 2012).

The above account points out a fundamental aspect of the farmers' views on the ongoing conservation efforts (particularly on community lands): the farmers seem more concerned with overcoming the problems of access to land and short-term productivity than envisioning the benefits of land conservation in the long run. In the absence of alternative livelihood opportunities, the fact that conservation efforts may claim land from already land-scarce households means that the farmers tend to hold a short-term perspective. Considering the general shortage of land and increasing difficulty in gaining access to land, it is quite understandable that farmers perceived ongoing large-scale conservation efforts that involve the construction of structures and enclosures as competition for the very limited land available. Although the overwhelming majority of farmers from Tach Gayint perceive land degradation as a major problem, they have a different perspective in terms of what they see as a priority – overcoming the problems of access to land and increasing crop yields from their diminishing landholdings. Since most farmers are faced with a "simple reproduction squeeze" (Bernstein, 1979: 427), they may tend to look for short-term benefits from the land that would have developed under conservation projects.

3.2. Farmers' perspectives on the dynamics of soil fertility change

Soil fertility refers to the availability of essential nutrients such as nitrogen, phosphorus, potassium, and organic matter in the soil (Dejene et al., 1997). Soil fertility decline is a gradual process in which essential soil nutrients are lost as a result of the interplay of different processes – including erosion and continuous cultivation – at a rate faster than they are replenished through organic and inorganic inputs (Andersson et al., 2011: 300). It has been widely argued that most soils in sub-Saharan Africa are poor, degraded soils; moreover, the low or declining soil fertility status has been considered a major constraint to agricultural productivity across the continent (Sanchez, 2002; Koning and Smaling, 2005; IFAD, 2010). As a result, issues concerning soil fertility depletion have received much attention in the development agendas at national and regional levels over the last two decades (Andersson et al., 2011). Many scholars have questioned the underlying assumptions, methods and scales supporting assertions that soil fertility is declining in Africa (Scoones, 1997; Fairhead and Scoones, 2005). Although "soil fertility is clearly a problem in some places for some people" (Scoones, 1997: 161), existing broad assertions of soil fertility tend to obscure local dynamics and variations in soil fertility change. In this respect, farmers' own understandings and assessment of soil fertility change at the local level deserves attention.

In our study, a decline in soil fertility was a commonly cited problem in both the case study areas. This was further reiterated by the household survey in which 95% (Tach Gayint) and 73% (Fogera) of the households perceived a decline in the fertility of soils on their cultivated lands over the past five years preceding the survey (Table 5). According to farmers' own perspective, the most evident manifestation of soil fertility depletion is a decline in crop yield. When asked whether they had perceived changes in productivity over time, nearly 95 percent of the respondents in the household survey in each of the study areas replied that they have indeed observed changes in the level of crop yields. When asked what trends they had observed over the last five years, 96 percent and 79 percent of the households in Tach Gayint and Fogera, respectively, reported a failing crop productivity; 4 percent and 21 percent said they had observed better yields. Accordingly, most of the farmers asserted that a declining trend in crop yield is an important indicator of soil fertility change. The informant from the Agatt *kebele* in Tach Gayint stated:

Table 5
Farmers' perception of soil fertility change.
Source: Author's own survey, 2012.

Perceptions of soil fertility change	Study Area			
	Tach Gayint		Fogera	
	N	%	N	%
Household perceives soil fertility decline on farmland	277	(94.5)	145	(73.2)
Household perceives changes in the level of crop yield	278	(94.9)	187	(94.4)
Trends in crop yield change over the last five years				
Increased	10	(3.6)	39	(20.9)
Declined	268	(96.4)	148	(79.1)
Household undertakes measures to replenish soil fertility	283	(96.6)	181	(91.4)
Soil fertility management measures being practiced				
Use of chemical fertilizers	155	(54.8)	117	(64.6)
Use of manure	220	(77.7)	81	(44.8)
Intercropping	17	(6.0)	44	(24.3)
Compost	250	(88.3)	111	(61.3)
Agroforestry	30	(10.6)	1	(0.6)
Fallowing (field rotation)	3	(1.1)	18	(9.9)
Crop rotation	210	(74.2)	49	(27.1)

> Our land is no longer fertile and productive. It doesn't give good harvests. This is because we have practiced continuous farming on the same land for years and years. Now, this land hates us. Even if we cultivate it, we do this and that, it hates us. It refuses to give back (Interview, Agatt *kebele*, 20 Dec. 2012).

One elderly farmer, who was also a priest in one of the churches in the Enjit *kebele* (Tach Gayint), described the changes:

> Today, the land has left the community in a lot of difficulties. The problem is that, no matter how hard one works, the yield is not enough even for a household of only two people (a husband and a wife). Its soil is infertile. In the past, in those good days, by working hard, one farmer used to share his fortune with the less fortunate. But now, never mind sharing with others, he does not produce enough to sustain his family. It was this farmer who worshiped and provided praises to this village church. This church has been administered through the contribution of each farmer in the village. However, today, most farmers have got into troubles to the extent of finding nothing to contribute and thus the church service has been continuously decreasing. I say this from what I experienced and saw while serving the church for many years. I know what the community used to bring when coming to the church. When doing '*zikkir*' [commemoration of a saint], our community likes to present food and drinks in abundance. It used to be copious. It used to brew

> '*tella*'[local alcoholic drink] using '*gan*'[a large pottery used in making drinks]. Then it turned to using '*gembo*'[very small clay pot compared to '*gan*'] to brew the drink (*tella*). What is worse is that our community presently is being forced to use plastic containers (relatively even smaller in size) to brew the same drink. All this is happening because of the hardship we are in. The land is exhausted….it doesn't produce (Interview, Enjit *kebele*, 22 Oct. 2012).

Many farmers also emphasized that weed infestation has become more common, signifying a decline in soil fertility. This in turn contributed to a decline in crop yield. Farmer accounts suggest the low level of fertility of the soils they cultivate and how it is difficult to produce enough to feed their families, have become major issues that preoccupy them when they look to the future. Nonetheless, this challenge faced should be seen in the context of the general precariousness of the farmers' livelihoods, rather than relating it to an inability to produce sufficient food due to declining soil fertility. As a 42-year-old informant from Tach Gayint succinctly put it: "whether the land gives or not, we have no other options. Whatever it is, we still cultivate it because it's our source of livelihood" (Interview, Enjit *kebele*, Dec. 2012). In the context of Ethiopia, in addition to the low fertility of soils, "small plot sizes mean that livelihoods must be sustained through means that go beyond the intensification of agricultural production" (Scoones, 2001:38).

4. Local soil fertility management practices

Aware of the effects of declining soil fertility on crop yields, the overwhelming majority of respondents in the household survey indicated that they had used some methods to replenish soil fertility. Accordingly, an overwhelming majority – 97 percent and 91 percent of the surveyed households in Tach Gayint and Fogera, respectively – reported undertaking measures to replenish the fertility of soils on their fields (Table 5). These ranged from the application of inputs to crop rotation techniques. For example, as shown in Table 5, more than half of the households surveyed in each of the study areas used fertilizer to enhance soil fertility in their fields. Despite the survey indication that more than half of the households have used chemical fertilizer, all individual informants and group discussion participants in Tach Gayint emphasized problems in their respective communities regarding the availability and use of chemical fertilizers. One informant, the 55-year-old farmer from Tach Gayint, indicated financial difficulties in gaining access to chemical fertilizer. He explained as follows:

> We were relieved a bit about the productivity when we started applying chemical fertilizers on our farmlands. Today, however, using fertilizer has become another headache (*chana*) to us. The price of this fertilizer has become untouchably expensive. As most of us are very poor, there is nothing we can do, and there is nowhere we can go to find that amount of money for the fertilizer. Its price is too much for us. Otherwise, it could have helped us to see some flashing positive changes in the harvest. Even if the peasant is well aware of the advantage of using the fertilizer, he is left with no choice on his hand but to leave the fertilizer aside. Presently, many farmers are in a difficult situation as they are being asked to pay three years residue debt of fertilizers. Being in this situation, how could a farmer dare to use it? The loan has him tightly handcuffed (Interview, Enjit *kebele*, 8 Oct. 2012).

Another informant added that working the land has become so difficult that even the use of chemical fertilizer does not help enhancing yields. He also stressed that farmers have generally felt powerless in finding solutions to this problem, forcing them to look to the government for solutions:

> We were told to use fertilizers. Accordingly, we tried to use it getting it with a loan. Now, most of us are indebted nearly 1000 birr, which we are going to pay back. From what I observed, I do not think the land could even be productive enough to feed the family, never mind paying back the debt. It is not only that we do not have any other means to buy the fertilizers, but also that, even after using it, the productivity still has not improved that much (Interview, Enjit *kebele*, 8 Oct. 2012).

What emerges from the above is that the ability to use fertilizers to increase yields appears to be constrained by lack of money, reflecting the generally poor socio-economic conditions and resources available. Many farmers have incurred debts that they have not been able to repay and can no longer apply chemical fertilizers to sustain their soils. In addition, farmers explained that the fertilizers' less than impressive impact could have resulted from not knowing on what type of soils to apply the fertilizer. The informants argued that, despite the fact that fertilizers improve soil fertility, this did not lead to increases in yields, because some farmers used it inappropriately. One informant in his mid-fifties, from the Agatt *kebele* in Tach Gayint, mentioned that – desperate to enhance yields from their already exhausted lands – farmers apply fertilizers irrespective of the slope and soil types of their fields:

> Applying fertilizer has been effective only on limited farmlands. I believe that conditions such as whether the land is eroded or not, whether it is plain or sloppy, and the type of the soil should be taken into account instead of simply being eager for its benefits and rushing to use it. Here in my *kebele*, I know many farmers who simply apply fertilizers for enhancing productivity without taking into account these issues, including the nature and characteristics of their land and its soil, and this has been putting them into a great loss. For example, when we use fertilizer on this 'walka soil' (black soil), we get better results whereas applying it on other lands like sloppy fields where its soil is greatly washed away, the crop grows in June but soon dries and dies away quickly as September comes in. As a result, not only will the crop not give any yields, its residue (hay) becomes so poor that it can barely be collected for animals. For instance, if we take '*teff*' crop in which fertilizer is applied on the farmland, when we try to mow it with a sickle to collect its harvests, the stalk is so weak that it gets easily broken. As the stalk breaks every time we hold it even before using the sickle, collecting the yield becomes a tough task that leaves most of the produce scattered on the field (Interview, Agatt *kebele*, 20 Dec. 2012).

This underscores the need to look beyond the application of inorganic fertilizers as a means of restoring the productivity of eroded soils. It has previously been noted that "the efficiency of inorganic fertilizer in an eroded soil where the physical properties are degraded alongside chemical nutrients depletion depends, to a large extent, on the dynamic relationship between the level of harm done to the soil's physical condition and the level of progress made in the difficult task of improving it which needs a combination of carefully selected, suitable management practices" (Obalum et al., 2012: 5). The erratic nature of the rainfall patterns has also often been seen by farmers to impact the effectiveness of fertilizers, as lack of rain was seen to mean that the fertilizer would 'burn' the crops quickly. As a consequence, many farmers have incurred debts, as they could not get more out of the land, jeopardizing their ability to repay their debts. Their indebtedness appears to have far-reaching consequences on their livelihoods, including threats to their land rights. For many farmers, this has meant that, coupled with diminishing plot sizes, they struggle to continuously cultivate without adequate fertilizer input, which is a factor partially accounted for low productivity. Failure to repay debts also threatens their land rights, as local authorities may keep the debtors from using their farmlands. In this case, the debtor's land may be rented out by authorities to someone else who can cultivate it until all the debts of the original landholder are repaid from the rent. From among informants, for instance, the elderly farmer who was also a priest from the Enjit *kebele* in Tach Gayint indicated that he had lost his land because of the

debts he had incurred. The informant argued that it had been a year since he had paid his debts completely, but that he had been told of six more months of unpaid credit. As a result, he had been forbidden from using his land – which made him 'at a loss for words, because it is my livelihood' – leaving him to resort to day-labor in order to survive. Indeed, as Gerber (2014: 741) pointed out "many farmers in developing countries get into debt to buy unsustainable 'green revolution' technologies [such as fertilizers] that drastically accelerate pressures on the environment", and the repayment of such debts continue to be a source of worry and anxiety for poor farmers (see also Gerber, 2013).

Since declines in soil fertility vary from place to place (Elias and Scoones, 1999) – as do the strategies used to cope with them – unlike the farmers in Tach Gayint, most of the farmers in Fogera believe that they have land of better quality, suggesting a spatially disaggregated view on soil fertility status between the two study areas. As indicated in Table 5, despite the fact that more survey respondents in Fogera used chemical fertilizers than those in Tach Gayint, it was pointed out during the qualitative study that the use of fertilizer is an emerging trend. More farmers claimed not to have used chemical fertilizers because their land did not need it. For example, a farmer from the Shina *kebele* in Fogera explained that:

> Only a few farmers have been using fertilizer starting from two or three years ago. Most farmers don't use any kind of chemical fertilizers on their fields. Because farmlands in our village are still in a good condition. Even for those farmers who have been using it, they do so just to try it. Otherwise, so far the land is fertile naturally. As this area is low lying, everything from elsewhere gets washed and brought to this area, which maintains the fertility of its soils (Interview, Shina *kebele*, 11 Dec. 2012).

Some of the informants in Fogera indicated that they did not opt to use chemical fertilizers on their fields because if they were to apply it, the land would get used to it and would need more of it year after year. Instead, the farmers reported that they opt to use organic fertilizers like manure and compost, which are better than chemical fertilizers in terms of cost and sustainability. However, despite the preference for organic fertilizers, farmers (particularly from Tach Gayint) often comment on the declining availability of manure, as many of them do not generally own or have only very few livestock to produce it. Although they emphasized its importance, some farmers viewed the preparation of compost as demanding, particularly in terms of the space required, as this competes for the small arable land left at their disposal.

Another important soil management practice in the study area, as elsewhere in the region, is that farmers traditionally relied on the sequence of crops and rotation that involves planting crops sequentially depending on differing soil types and fertility status. However, as shown in Table 5, fewer survey respondents in Fogera practiced crop rotation than in Tach Gayint. Since the expansion of rice cultivation, this practice is on the decline in Fogera; this is because most farmers cultivate rice every year, while also planting short season crops after the rice is harvested. The observed spatial variation in soil management practices, in this case crop rotation, implies that farmers do not always practice it uniformly. Instead, they give preference to some crops over others, with the choice of crops being shaped by the farmers' understanding of spatial variations in soil fertility and other soil properties. In other words, spatial variation in soil quality is taken into account in the farmers' choices of soil fertility management practices to be applied by crop type.

The survey also suggested that agroforestry is not widely used as a means of maintaining soil fertility in the study areas, although 11 percent of survey respondents in Tach Gayint claimed to have used it. Interviews and field observations revealed that farmers tend to plant trees mainly around their homesteads, eucalyptus being the commonly planted tree. The main reason for planting eucalyptus was not to control soil erosion; instead, they are planted principally for their economic value. A 52-year-old informant from the Shina *kebele* in Fogera explained:

> In fact there has never been a natural forest in our *kebele,* even in the past. Despite the absence of natural forests, eucalyptus trees planted and owned by individuals have increased profoundly over time. One can make a lot of money from the sale of these trees for construction purposes. Here also, it is used for fuel and to construct our houses (Interview, Shina *kebele*, 11 Dec. 2012).

Unsurprisingly, fallowing fields as a mechanism for soil regeneration is almost not practiced anymore, although most farmers interviewed believe that their land actually needs to rest. Given the shortage of land, it appears that farmlands are now cultivated continuously without leaving them fallow. Nonetheless, 10 percent of the survey respondents from Fogera still reported to have fallowed some of their fields. This seems to indicate that households in Fogera held relatively larger holdings than households in Tach Gayint, where most even complained about the poor quality of their already small-sized fields. In spite of the fact that landholdings are generally too small to leave idle even for a year, under the current land law of the Amhara region, the landholders' usufruct rights to their land are contingent upon continuous cultivation. If landholders leave their farms fallow for three or more consecutive years, they risk losing their right to the land, which would then be allocated to someone else. This hinders their inclination to leave their fields fallow.

It is of further interest to note that the absence of the fallowing practice has not corresponded with a widespread use of fertilizers in the study area, although farmers do use low-input techniques, such as composting, manure, and crop rotation to sustain their soil fertility. In fact, chemical fertilizer use in Ethiopia is generally far lower than in other developing countries. In 2010, for example, the consumption of chemical fertilizer in the country was 22.8 kg per hectare of arable land, while this was as high as 174.5 kg per hectare for South Asia (World Bank, 2014).

5. Conclusions

This paper analysed the dynamics of land degradation in two districts of the Amhara region in the context of climate change. The paper has emphasized the importance of understanding farmers' own perceptions and interpretations of land degradation, particularly how it is viewed and managed. As shown, land degradation was perceived as one of the major challenges faced by households, along with the limited plot size. Declining soil fertility, widespread soil erosion and declining yields were perceived to reflect land degradation. One might expect that, under conditions of mounting land shortage, peasantries are extracting surpluses by over-using their land resources (Blaikie and Brookfield, 1987; Bernstein, 1979; Deere and de Janvry, 1979), in fact the findings in this study suggest otherwise. Cognizant of both land shortage and land degradation, most households have been engaging in various land management and conservation activities, limited by the resources available to them. The paper's findings revealed that, in the study areas, tenure insecurity was not a major influencing factor on land degradation. Although the existence of tenure insecurity has been widely accepted by landholders, the paper demonstrates that most households in the two Amhara study sites are making substantial investments to halt and reverse land degradation – though to quite differing degrees. The paper, therefore, suggests that the focus on land tenure security may be misleading, at least in the areas studied. The findings also revealed some existing concerns that appear to threaten landholders' tenure security (e.g., the conditional nature of land rights) that might have led to more investments in land conservation activities. This resonates Sjaastad and Bromley's (1997: 559) assertion that "investment or prudent use may be a prerequisite for tenure security."

Farmers are responding to both land shortages and what they perceived as land degradation by engaging in various land conservation practices. This is mainly because they cannot abandon their land, even when it is degraded or no longer able to sustain their livelihoods. The

farmers try to develop their land regardless of their tenure (in)security, in order to meet their subsistence. The growing concern among farmers was that the ability to sustain their land through intensification and land conservation efforts had been rather constrained by their limited access to economic and other resources. Blaikie (1989: 35) argued that rural land users' lack of access to resources is "one which locks them into a cycle of untreated land degradation". However, despite their limited access to economic and other resources, poor people in the study areas are undertaking substantial investments to reverse land degradation. The finding is significant in that it challenges the general assumption among scholars that landholders' prevailing sense of tenure insecurity had discouraged them from taking care of their land and from responding to the problem of land degradation. Contrary to what has been widely accepted, the paper showed that farmers in the study area worry less about tenure (in)security and instead they have always been struggling to cope with the problem of land degradation.

Overall, it is important to understand why farmers engage in various land conservation strategies the way they do, particularly by looking at the socio-economic, ecological and political circumstances that frame their land use and conservation. An understanding of these issues, therefore, allows the focus of the analysis to extend beyond that of tenure security, to emphasize the role of other non-tenurial factors.

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