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Land Degradation in Amhara Region of Ethiopia: Review on Extent, Impacts and Rehabilitation Practices

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Abstract
Land degradation is a serious issue in Amhara region which leads to depletion of land resources and which in turn induces reduction in agricultural production, loss of biodiversity, water quality depletion, poverty, food insecurity, and social instability. Expansion of agriculture to marginal lands, unmanaged grazing, land insecurity, deforestation, and poverty were mentioned in many reviewed research outputs as the major causes of land degradation on the region. The region has been involved in extensive land rehabilitation activities for centuries and vast structural and biological conservation measures were implemented. The rehabilitation actions were commenced by individual farmers at farm level and community mobilization at large. Many projects and organizations, like AMAREW, ORDA, GIZ, WASE-TANA project and others were also involved in the program. The review shows that despite various interventions have been undertaken, land degradation in Amhara region is continuing with increasing rate. This was mainly due to over exploitation and mismanagement of the land resources. Land management can be successfully realized with greater participation and involvement of the local communities.
Keywords: Population Pressure, Free Grazing, Poverty, Land Degradation, Rehabilitation

1. Introduction

1.1 Background and Rationale

Different authors define land degradation differently. Some others also explain the difficulty to define it because of its wider range and scope (Barrow, 1991). land degradation can be defined as a natural process or a human activity that causes the land to be unable to provide intended services for an extended time (FAO, 2004) or temporary and/or permanent lowering of the productive capacity of land that can take place in the form of deforestation, change in water quality and quantity, and soil degradation (Sil *et al*., 2014). It also refers to any reduction or loss in the biological or economic productive capacity of the land caused by human activities, exacerbated by natural processes, and often magnified by the impacts of climate change and biodiversity loss (UNCCD, 2013). Land degradation is a long-term loss of ecosystem function and services, caused by disturbances from which the system cannot recover unaided (Dogo, 2014).

The history of land degradation is as old as the human civilization. It started as early as the human history of animal domestication and control over fire (Lambin *et al*., 2003). While the world's drylands continue to be the most vulnerable and threatened by desertification, land degradation and drought (DLDD), land degradation is a global phenomenon with 78% of total degraded land located in terrestrial ecosystems other than drylands (UN General Assembly, 2012). Unsustainable human activities that take place in already fragile areas and that are aggravated by natural disturbance such as drought and flooding lead to land degradation. By the year 2020 land degradation may pose a serious threat to food production and rural livelihood, particularly in poor and densely populated areas of the developing countries (Sara *et al*., 1997).

Sub-Saharan Africa has the highest rate of land degradation in the world. It is estimated that losses in productivity of cropping land in sub-Saharan Africa are in the order of 0.5-1 per cent annually, suggesting productivity loss of at least 20 per cent over the last 40 years (World Meteorological Organization, 2005). From sub-Saharan Africa countries, Ethiopia is particularly threatened by land degradation processes due to high dependence of agriculture, population growth, frequent famine and poverty. It is a widespread phenomenon in the highlands of Ethiopia, and the threat is more credible in Amhara Region as about 90% of the population lives in the highlands and 90% of the regularly cropped land is found there (Lakew *et al*., 2000; Assemu & Shigdaf, 2014). Therefore, clear understanding about the extent and impacts of land degradation and the rehabilitation practices undertaken so far will assist for future sustainable land management programs to enhance productivity of land in Amhara region particularly and Ethiopia generally.

1.2 Geographical Location of the Region

Amhara National Regional State is one of the nine regions of Ethiopia which is located in the northern, north eastern and central areas of Ethiopia (Berhanu & Fayera, 2005). Geographically, it is situated between 8˚45 and 13˚45 N latitude and 35˚46 and 40˚25 E longitude (Dereje *et al*., 2012). It is bounded by the Afar, Benishangul, Oromia and Tigray regions in the East, South-West, South and North, respectively. It is the second largest state in the country, following Oromia region, and covers an area of 170,752 square kilometer, which is about 11 percent of Ethiopia's total area (Berhanu & Fayera, 2005). The region is divided into ten administrative zones,

105 rural and nine urban woredas and 3051 rural kebeles (Lakew *et al*., 2000)

Based on the 2007 Census conducted by the Central Statistical Agency of Ethiopia (CSA), the Amhara Region has a population of 17,221,976 with 1.7 annual growth rate, of which 8,641,580 were men and 8,580,396 women. According to the USAID (2000) report, most part of the region is located at the highland plateau and is characterized by rugged mountains, hills, plateaus, valleys and gorges with slope gradients ranging from 5-45 percent. Theregion has three major agricultural climatic zones: highland (above 2,300 meters), semi-highland (1,500 to 2,300 meters) and lowland (below 1,500 meters) accounting for 20%, 44% and 28% of the land area respectively (Berhanu & Fayera, 2005)

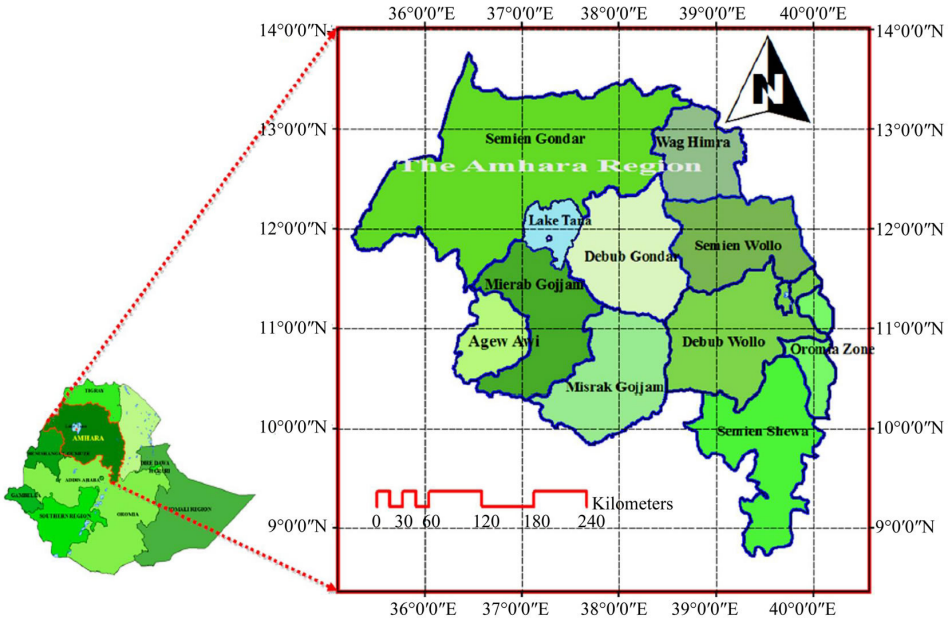

Figure 1: Geographical location of Amhara Region with reference to National Map of Ethiopia
Source: Dereje *et al*., 2012

2 Global Land Degradation Scenarios

Land degradation is a serious global environmental problem and is a matter of serious concern. Vast area of land all over the world has been converted into unproductive and degraded lands (Dogo, 2014). Millions of hectares of land per year are being degraded in all climatic regions of the world (Assemu & Shigdaf, 2014). Globally, land degradation has been hitting more than 2.6 billion people in more than 100 countries (GEF, 2013). It is increasing in severity and extent in many parts of the world, with more than 20% of all cultivated areas, 30% of forests and 10% of grasslands undergoing degradation (Bai *et al*., 2008). Land degradation processes have accelerated rapidly in the last century, with an estimated 24 billion tons of fertile soil lost to erosion in the world's croplands (FAO, 2011). Global assessments indicate that the percentage of total land area that is highly degraded has increased from 15% in 1991 to 25% by 2011 (UNCCD, 2013). In line with this, FAO (2011) indicated that up to 25% of all land is currently highly degraded, 36% is slightly or moderately degraded but in stable condition, while only 10% is improving (Figure 2). IFPRI (2012) report shows that if the current scenario of land degradation continues over the next 25 years, it may reduce global food production by 12% and in turn this will result in world food prices of 30% higher for some commodities.

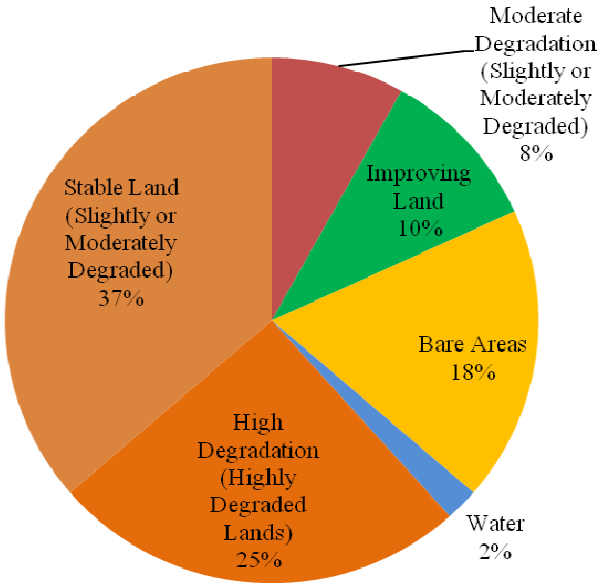

Figure 2: Status of Global Land Degradation, (Data Source: FAO, 2011)

Most of land degradation is due to extensive soil degradation caused by erosion, salinization, compaction, and nutrient depletion (GEF, 2013), biodiversity loss, water shortages (Nachtergaele & Petri, 2010), climate change and other related biophysical and human induced factors. Human activities contributing to land degradation include unsustainable agricultural land use, poor soil and water management practices, deforestation, removal of natural vegetation, frequent use of heavy machinery, overgrazing, improper crop rotation and poor irrigation practices.

Land degradation has multidimensional effects on the biodiversity of the earth and the global economy. It blights a significant proportion of the land surface, and as much as one-third (1/3) of the world's population suffer disproportionately from its effects (Dogo, 2014). The land degradation issue for world food security and the quality of the environment assumes a major significance when one considers that only about 11 per cent of the global land surface can be considered as prime or Class I land, and this must feed the 6.3 billion people today and the 8.2 billion expected by the year 2020 (World Meteorological Organization, 2005). Hence land degradation will remain high on the international agenda in the 21st century.

Land degradation has strong relation with loss of biodiversity and climate change both as cause-and-effect (Bai & Dent, 2013). Land degradation aggravates CO_2-induced climate change through the release of CO_2 from cleared and dead vegetation and through the reduction of the carbon sequestration potential of degraded land (World Meteorological Organization, 2005). The threat to sustainable development posed by land degradation has been recognized for many decades. Land that becomes progressively degraded cannot sustain agricultural production, and creates socioeconomic problems in agro-ecosystems dominated by poor smallholder farmers and pastoralists (GEF, 2013). The global demand of food cannot be met sustainably unless we protect and restore the fertility of our soil thus securing the productivity of our land. Restoration of degraded lands requires global attention and concerted efforts by authorities concern, finances and a long period of time for any given portion of a land to be restored back to its original state.

3 Land Degradation Scenarios in Ethiopia

The principal environmental problem in the Eastern African highlands is land degradation, manifested mainly in the form of soil erosion, gully formation, soil fertility loss, water scarcity, and reductions in crop yield, which has been more pronounced in the Ethiopian (Yihenew & Tilahun, 2014). Even though Ethiopia is endowed with an enormous land resource potential, it has been affected by multifaceted environmental problems including land degradation and declining biodiversity (Sisay & Tesfaye, 2003). As it is indicated in many research works, land degradation in Ethiopia which has been started with the history of country's agriculture is highly affecting the livelihood of the rural people as well as the economy of the nation. Even if various soil and water conservation interventions have been introduced, land degradation in the form of soil erosion, has been remained serious problem in Ethiopia (Ahmed *et al*., 2014) and with continued population growth, it is more likely to be even more sever in the future (Assemu & Shigdaf, 2014). Since the country's development is totally dependent on its land resources, the loss of productivity due to degradation has serious implication on social and economic development endeavours (Nurhussen, 2002). The problem is more visible in the highlands of Ethiopia, with most intense population density and greatest livestock concentration (Berry. 2003).

Land degradation in Ethiopia is triggered by complex processes and factors (Lakew *et al*, 2000; Bezuayehu *et al*., 2002). Of which, unprecedented population growth has been considered as the leading factor for the search of land for subsistence agriculture (Markos, 1997; Lakew *et al*., 2000; FAO, 1994) that in turn leads to over exploitation and misuse of land resources. Population pressure with limited land resources and limited secondary (nonfarm) economic activities in Ethiopia is the basis for land shortage, poor land management, and poverty that bring about land degradation (Figure 3). Lakew et al. (2000) identified population pressure, poverty, high costs of and limited access to agricultural inputs and credit, fragmented land holdings and insecure land tenure, and farmers' lack of information about appropriate alternative technologies as the underlying and direct causes of land degradation. Improper resource management and traditional agricultural practices were also found to have great impact on land degradation in Ethiopia (Lemenih et al. 2005; Nyssen et al. 2009).

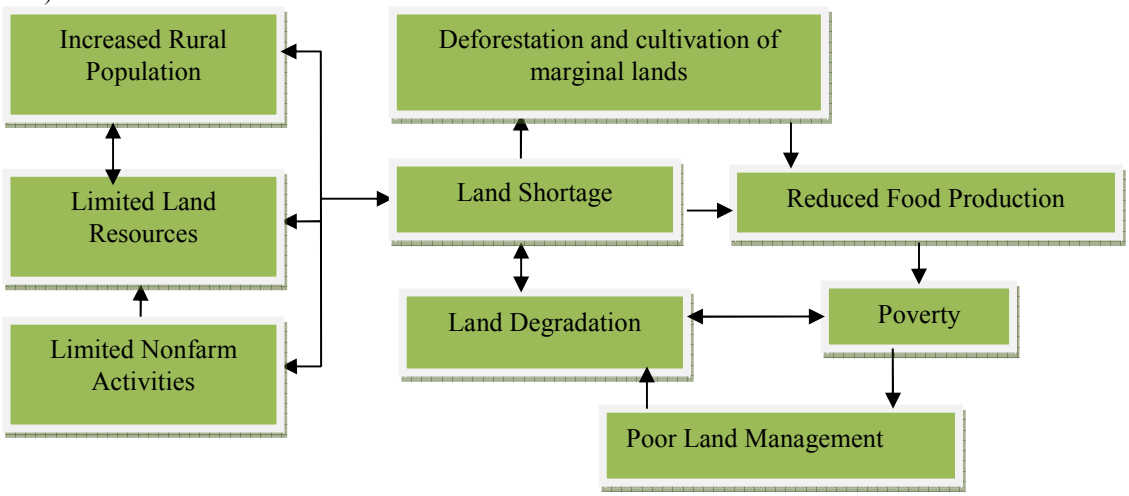

Figure 3: Linkages between Population, Poverty and Land Degradation
Source: FAO, 1994 (Modified)

Forest areas in Ethiopia's highlands are increasingly threatened (Georg *et al*., 2014; Hans *et al*., 2010). Growing population pressures have led to expansion of agricultural land and high demands for fuel and construction wood. This overexploitation of forest resources in Ethiopia has left less than three percent of the country's native forests untouched (World Bank, 2010). Most farmers also opt for expanding cropland through conversion of forests and woodlands when they experience financial strains to access farm inputs like fertilizer and plough (Gray, 2005). The use of firewood and animal dung for household energy sources has been identified as the other important cause of land degradation in Ethiopia (Gebreegziabher *et al*., 2006). Frequent drought (Maria *et al*., 2012), deforestation, overgrazing, expansion of cropland and unsustainable use of natural resources (Descheemaeker *et al*., 2011) has been also contributed to land degradation Ethiopia for long centuries and still going on. Changing patterns of land ownership and policy relating to ethnic groups (Sil *et al*., 2014; Berry, 2003) and the frequent redistribution of land have been exacerbated tenure insecurity thereby reducing the incentive to engage in land conservation (Maria *et al*., 2012). Ending future land distributions have positive and significant impact in land investment improvement and reduction of land degradation (Benin, 2002). Furthermore, uncontrolled grazing in the forests is common and endangers the soil and water conservation activities implemented in the adjacent watersheds (Georg *et al*., 2014).

The land degradation problem has had serious consequences in Ethiopia such as occurrence of persistent food insecurity, economic losses and various environmental hazards such as recurrent drought (Shiferaw & Holden, 1999). Land degradation, due to soil erosion and nutrient depletion, poses a serious problem on the rural producers in Ethiopia (Getachew & Wagayehu, 2007) that has been reducing the productivity of agricultural land, and affects the livelihoods of millions of people (Ahmed *et al*., 2014). It has becoming an alarming ecosystem problem deteriorating biodiversity and land productivity, which further caused reduction in agricultural production, loss of biodiversity, water quality depletion, disturbed hydrological conditions, poverty and food insecurity (Danano, 2002). As evaluated and measured by Berry (2003), the major costs that Ethiopia pays because of land degradation includes costs of nutrients lost with top soil erosion, lost production due to nutrient and soil loss, costs of forest removal, and loss of livestock carrying capacity. In the highlands of Ethiopia, the rate of land degradation in the form of soil loss by water erosion is more sever that ranges from 3.4 to 84.5 tons/ha/year with a mean of 32.0 tons/ha/year (Berry, 2003). Scenarios simulated for the potential production from agricultural land in Ethiopia (Sonneveld, 2002) indicated that the loss of agricultural value due to land degradation between 2000 and 2010 is about $7 billion (or increased by about 12.62%).

Land degradation problem in Ethiopia is continuing and seems to be more sever in the future with

highly increasing population growth and unsustainable land use. This needs the collaborative and immediate actions to rehabilitate the affected areas from further deterioration and prevent the unaffected parts. Land degradation can be minimized significantly if appropriate, flexible and large scale soil and water conservation interventions are carried out, which are tailored to the biophysical setting (Ahmed *et al*., 2014). Restricting access and use of free grazing can reduce degradation of the resource by eliminating overexploitation and improve availability and quality of forage in the long run.

Multi-level approach should be used through the provision of capital investment, technical assistance and capacity building for smallholder farmers in the watersheds and government institutions at national and sub-national levels for sustainable land management. Georg *et al*. (2014) indicated that through this approach around 180,000 hectares of degraded land have been rehabilitated benefiting around 194,000 households in the highlands of Ethiopia. Sil *et al*. (2014) also notified the reduction rate of soil erosion and sediment yields in some parts of north highlands despite the increased population pressure, due to the participatory conservation efforts and equal land rights succeeded in slowing down the land degradation processes.

4. Land Degradation In Amhara Region

Land degradation is sever in the highlands of Ethiopia, which account for about 45% of the nation's total land area and 66% of the total land area of Amhara Region.

4.1 Drivers of Land Degradation

Natural factors coupled with the effects of a long history of settlement, prevailing farming methods and increasing population pressure which forces people to cultivate even steeper slopes have exacerbated the devastating land and resource degradation in Amhara region (Askale, 2005; Berhanu & Fayera, 2005). The high population which is increasing at an alarming rate has caused cropping and grazing activities to be shifted to hillsides and ecologically fragile areas, forced the people to use crop residues and dung for fuel rather than using them as sources of organic fertiliser to improve soils, and have led to reduction in land management activities such as fallowing, planting trees and investing in conservation structures (Lakew *et al*., 2000).

Deforestation is severe and has a long history in Amhara region where subsistence farming and settlements have been changing landscapes for millennia. Deforestation was always followed by a change in land use and land cover, from forest to grassland and cropland. A particular increase in cropland was observed in the second half of the 20th century, largely at the expense of grassland and forestland (Hans *et al*., 2010). About 20 thousand hectares of forest are harvested annually in Amhara region for fuel wood, logging and construction purpose (Lakew *et al*., 2000; ILRI, 2000). Forest degradation in Amhara region is dwindling from day-to-day due to population growth, overgrazing pressure, and lack of strong forest policy. There is still no regional forest policy, strategy, and proclamation to control deforestation and illegal forest product movement and encroachments (Mulatie *et al*., 2015). The increasing demand for pasture, shelter, food crops, urbanization, and the eventual conversion of natural forests to croplands were also contributed to severe deforestation in Amhara region.

Throughout history, the region suffers from recurrent droughts and pest invasions. There has been no single year since 1950 where there was no drought in the eastern part of the region (USAID, 2000). This drought unable the land to regenerate and develop secondary bush and tree vegetation, aggravate the runoff and removal of topsoil during the first raindrop periods, and finally result in land degradation.

Livestock production is a major component of the economy of Amhara region. The region has been the home to about 35% of the total country's livestock population (BoA, 1999) and based on agricultural sample survey 2012/13, high populations of livestock per km^2 were found in this region (Samson & Frehiwot, 2014). Compared with other regions, Amhara stands first in the number of goats, second in cattle, sheep, asses, horses and poultry (CSA, 1998). Livestock in the region provide about 16.4 million tonnes of manure annually, equivalent to 114 thousand tonnes of nitrogen, which is being used primarily for fuel rather than manure (CEDEP, 1999).

Uncontrolled or free grazing and browsing too many livestock for too long a period on land unable to recover its vegetation (overgrazing) are the dominant grazing systems in the region. Uncontrolled grazing on crop land contributes to soil compaction and the need for frequent tillage to prepare fields for crops, making practices such as reduced tillage less feasible. Grazing concentrated on hillsides fragile areas slopes, on marginal and cultivated land after harvest result in soil compaction, low moisture retention and high runoff, which are the main causes for the formation of gully, excessive vegetation removal, and reductions in crop yields (Lakew *et al*., 2000). Uncontrolled grazing system also has a negative effect on the conservation efforts, as trampling animals often damage physical conservation structures such as stone terraces and soil bunds. Biological conservation practices such as grass strips and tree plantations are also being destroyed or trampled, reducing the chance for establishment and regeneration. It is more destructive during the rainy season when other sources of feed (e.g., stubble grazing and crop residues) are in short supply (Samuel & John, 2002), the period of high runoff

production, and when the soil is very sensitive to be washed by floods.

As indicated above, the livelihood of the population in the region is more dependent on livestock and their products, basically due to land shortage and reduction in crop production. This reasons coupled with large population size increased the number of livestock in the region. The system of livestock production depend on free grazing that causes degradation of forest, soil, and water as well as the distraction of land management measures (Figure 4).

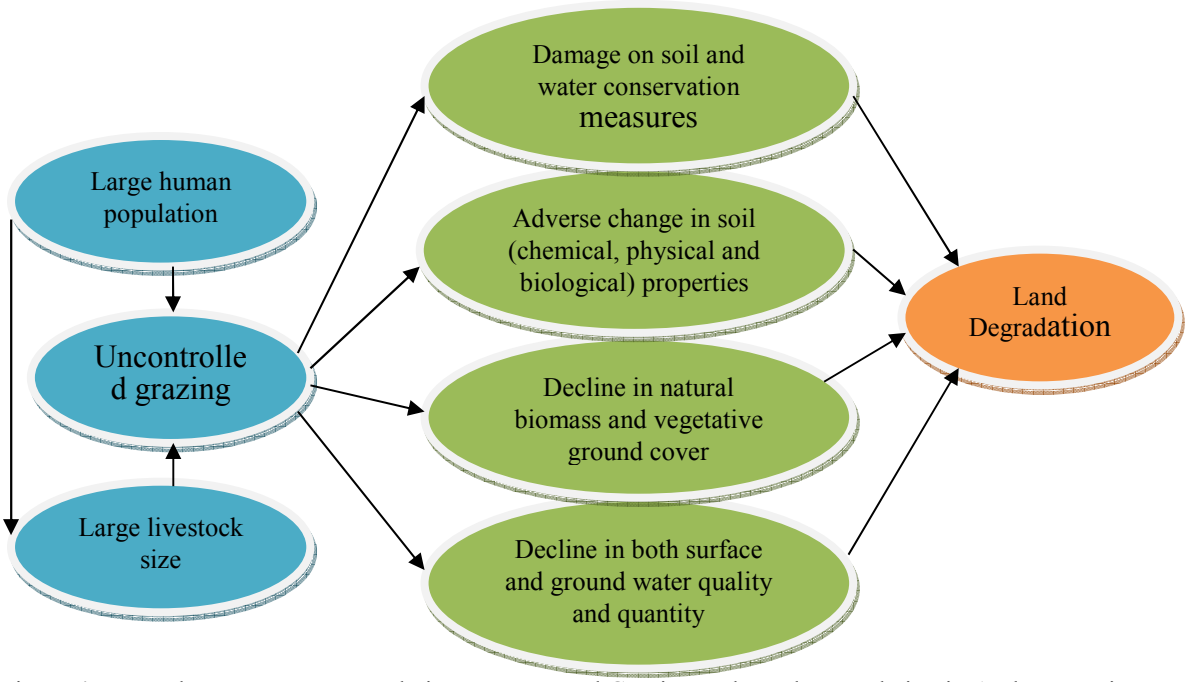

Figure 4: Nexus between Large Population, Unmanaged Grazing and Land Degradation in Amhara Region

To a large extent, land degradation in the region is thought to be aggravated by inadequate property rights (Askale, 2005). It is believed that in the absence of secure property rights, land and natural resource degradation will accelerate (Berhanu & Fayera, 2005). Assefa (2010) indicated that, for previous many centuries, inadequate land right in Amhara region caused overgrazing, deforestation, and soil erosion which, coupled with socio-cultural factors, backward method of agricultural practices, and ever increasing population pressure, exacerbated the devastating land resource degradation in the region. Samuel *et al*. (2002) also show that in Amhara, land redistribution (which has continued in this region since 1991 but not in Tigray or Oromiya) has had significant impacts on livelihoods and land management, and it has also increased use of crop residues as animal feed and increased pressure on grazing lands.

In the other side, the constitution of the Amhara National Regional State adopted in 2003 declares that the state and its people own all natural resources and land – urban and rural. It states that the right to utilise land and resources is leased to individuals and firms. Land registration and title certification program was also started in this year in order to improve tenure security and promote better land management and more investment. It was supported by the Swedish Sida, as part of a rural development programme support for the Amhara region (Berhanu & Fayera, 2005). This implies that even though the people of the region have been certified for their land, they are still not confident about the possession of the land and their expectations of future land redistribution undermine them to invest in land improvements. This tenure insecurity is mainly due to the frequent land redistribution, which has been ongoing since 1974 in an attempt to equalise land holdings and quality across households (Ehui *et al*., 2003). The implication is that more work needs to be done to raise awareness with the beneficiary communities, land owners.

Poverty is very likely to contribute to land degradation in region for many reasons. When people lack access to alternative sources of livelihood, there is a tendency to exert more pressure on the few resources that are available to them. Deforestation and burning of dung and crop residues are increased by people's inability to afford, or lack of alternative fuel sources. Electricity and kerosene are expensive and in most cases not available (Lakew *et al*., 2000). Local institutions and organisations, perceptions and attitudes of local community about the problem, and other agricultural extension issues were also indicated as the main causes of land degradation in Amhara region.

4.2 Impacts of Land Degradation

Land degradation is very challenging problem in the Amhara region that causes many socioeconomic and

environmental impacts. As the economy of the region total depends on agriculture and its products, land degradation (i.e. soil loss, change in water quantity and quality, vegetation loss) is greatly influencing the livelihood of the community. It is estimated that the annual rate of soil loss in the region due to water erosion is about 119 million tons, which amounts to 70 % of the total soil loss in the country as a whole (IFSP, 2004). About 29% of the total area of the region experiences high erosion rates (51.2 t/ha per year); 31% experiences moderate erosion rates (16.50 t/ha per year); 10% experiences very high erosion rates (>200 t/ha per year); and the remaining 30% experiences low erosion rates (<16 t/ha per year) (Lakew *et al*., 2000). The situation is becoming catastrophic because increasingly marginal lands are being cultivated, even on very steep slopes (Tesfahun & Osman, 2003), grazing land is becoming scarce, and what remains is thereby exposed to extreme grazing pressure (IFSP, 2004). This has resulted in low and declining agricultural productivity and continuing food insecurity and rural poverty (Assemu & Shigdaf, 2014). Poverty then drives populations to over-exploit the remaining natural resources triggering a vicious cycle, accelerating land degradation still further. Decline in soil fertility and food scarcity also lead to the migration of the rural population. As indicated by Pendleton (2007), recurrent drought, rainfall scarcity, land scarcity, land and soil degradation, food scarcity and decline in soil fertility are the major push factors for migration of the Amhara people to urban areas and other rural areas with surplus and fertile land.

Land degradation is a major threat to biodiversity, ecological sustainability, and ecosystem stability. Land degradation interrupts the regulating and provisioning services of ecosystems, in particular nutrient cycling, the global carbon cycle and the hydrological cycle. Even though Amhara region has a wide biodiversity of flora and fauna, the quality and quantity of biodiversity is diminishing due to significant depletion of forest resources, soil erosion, loss of soil fertility, and degradation of water resulted form increase in the population, livestock pressure, and increased demand for arable land (Mulatie *et al*., 2015). The regional forest resource, currently estimated to be 5.91 % of the total area of the region, is dwindling as the population growth and overgrazing pressure increased from day-to-day. Land degradation is also altering hydrological conditions where vegetative cover is removed and the soil surface is exposed to the impact of raindrops. It deteriorates the quantity and quality of water resources. Many perennial springs and streams of the region had become seasonal (Lakew *et al*., 2000). Water bodies are prone to rapid sedimentation, thus reducing the storage capacity of irrigation and drinking water, and hindering the generation of hydroelectric power (IFSP, 2004).

4.3 Land Rehabilitation Practices

Amhara region started to implement land rehabilitation measures through massive soil and water conservation (SWC) program in 1970s, the program launched by the government of Ethiopia to reverse land degradation following sever famine. Since then, the region has been realized the treatment of vast degraded areas (both cultivated land and hillside government lands of the highlands) through mass movement of the community in line with different projects run by Governmental and Nongovernmental organizations. It comprises structural conservation measures (physical earth works like construction of terracing, cut off drain, bunds) followed by biological measures (plantation of grasses and forage plants to stabilize physical measures) that take place during the rainy season. The study conducted by Assefa (2010), in Awi Zone of Amhara Region, show that majority of the households were involved in one or more of land improvement activities like tree planting, terracing, and preparation and use of compost to increase the fertility of the land after certification.

ORDA, for many consecutive years, has been planting trees to restore and rehabilitate degraded lands in Amhara region. For a decade, 100,000 hectares of land has been covered. More than 38 million seedlings were planted in different Districts of the region like Gubalafto, Wadla, Gazgibla, Sekota, Lasta, Mersa (ORDA, 2014). According to GIZ (2015) report, different soil and water conservation activities have been executed in Amhara Region, with the involvement of the community, government and non-government organisations. AMAREW project (2007) report reviled that extensive physical and biological conservation works have been carried out in Yeku and Lenche Dima watersheds through food for work as well as free community labor mobilization. The physical conservation works include extensive hillside terracing, check dams using stone/gabion/sand bag, stone and soil bunds, eyebrow and micro-basins, trenches, sediment storage dams, and rock-fill dams. Biological conservation works mainly focused on area closure. Planting Sesbania, Leucenea, and Pigeon pea on bunds on farmlands has been successful. At the present time over 120 hectares of land is under closed area management in Yeku & Lenche Dima. AMAREW project also used very simple sand bag to control the estimated 20 kilometer of gulley network within the cultivated land in Lenche Dima watershed.

REDD (2013) indicated that about 77,000 hectares of land have been rehabilitated; a further 79,000 hectares of forest have been established as Participatory Forest Management sites and these are now managed in partnership with local communities; and approximately 50,000 households have adopted sustainable land management practices in Amhara, Oromia and Tigray regions. Other various actions were also undertaken in different parts of the region to rehabilitate the degraded lands, for example, agroforestry practices in Koga Watershed (Aklilu *et al.,* 2013); area enclosure in Gondar Zuria District (Getachew, 2014), exclosure and

farmland terracing in Wello areas (Shimeles, 2012).

Despite various interventions have been undertaken, land management in the region did not last long or achieve sustainability, with widespread failure of SWC measures (GIZ, 2015). The most reason was less participation of the community. Achieving sustainable pathways out of the downward spiral of land degradation and poverty requires farmers' adoption to profitable and sustainable land management practices (Walle, 2013). The unregulated free livestock grazing practise is also the main reasons for the unsuccessful rehabilitation efforts of the past decades in the region. Any project, including regular extension activities, which is aimed at natural-resource conservation and development, has to take serious account of free livestock grazing traditions.

5. Conclusion and the Way Forward

Land degradation is a widespread phenomenon in Amhara region which is causing social, economic, ecological, and other related impacts. Due to low and declining agricultural productivity resulted from continuing deterioration of soil fertility, the region is one of food insecure regions in Ethiopia. This in turn leads to overexploitation of the remaining natural resources, out migration, social and political instability, and ecological imbalance. The major reasons for land degradation in Amhara region are plenty and complex. As per different studies, population growths, deforestation, overgrazing and land right were indicated as the major causes. Of which, population growth is the leading factor that forces people to cultivate steeper and marginal lands, clear forests, use crop residues and dung for household energy, diminish motivation to invest in conservation activities, and destroy conservation measures. It is expected that land scarcity will continue, not only in Amhara region but also in all regions of Ethiopia, which will pressure the people for expansion of cultivation into marginal lands, particularly the hillside areas.

Since the last few decades, the government of Ethiopia has been mobilizing the communities to undertake massive soil and water conservation works to combat land degradation by using free labour during the dry season. Enormous agricultural and hillside communal lands were rehabilitated in Amhara region through this approach. However, studies indicated that, land management practices in the region did not bring about the expected result due to top to down approach which lacks the willingness and full involvement of the local community. Successful land rehabilitation initiatives require greater participation and involvement of the local communities through suitable platform to enhance community awareness of the fact that conservation is to their own benefit. Success in fighting land degradation requires an improved understanding of its causes, impact, severity, and the adoptability of the technologies as well as its relationship with climate, soil, water, land cover and socioeconomic factors.

Based on the literatures reviewed and the author's own experience about the area, the following recommendations were forwarded to protect and rehabilitate the land:

- There should be willingness between land users and local authorities to cooperate and work for the common good of today and the near future environmental sustainability
- Social fencing through area enclosure is very important to easily restore highly damaged areas. The management of area enclosures should follow down-top approach.
- Promoting agro forestry practices, increasing education about forestry, and use of electric stoves will best benefit to remain the remaining forests and biodiversity.
- Supporting and rewarding the local organizations, communities, and individuals who best manage local resources and also designing legal rules to punishment those who misuse and mismanage the local land resources.
- Micro-watersheds can be used as the best land management areas as they are easy to manage and can be demonstrated for other large areas.
- Continuous follow-ups, maintenance of measures undertaken, appropriate rights for land resources, flexible planning, and proper and timely information systems for land management are vital for sustainable and participatory land improvement
- High priorities should be given to promote public investment in research aimed at understanding land degradation, improvement mechanisms and better technology development.

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