

Review on Impacts of Land Degradation on Agricultural Production in Ethiopia

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Abstract

Land degradation is the result of complex interaction among, physical, chemical, biological, socio-economic and political issues of local, national or global nature. Land degradation affects Ethiopian economy and also has many negative impacts on agricultural productivity by reducing the fertility of agricultural land. Land degradation 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. Millions of hectares of land per year are being degraded in all climatic regions. It is estimated that 2.6 billion people are affected by land degradation and desertification in more than a hundred countries, influencing over 33% of the earth's land surface. The global store of arable land and grazing land continuous to decline through urbanization, un sustainable agriculture practices and deforestation, while, significant portion of the remaining arable land and grazing land is under considerable pressure from compaction by livestock and farm implements, over use of fertilizers and pesticides, Salinization, alkalization or acidification depletion of nutrients, water and wind erosion, deterioration of drainage. The velocity of land degradation is high due to, Improper tillage operation on the land, Poor managements of land, The attitude of the community about the consequences of land degradation on agricultural productivity, Lack of knowledge of the farmers about the main biological, physical and mechanical methods of land conservation.

The agricultural impacts of land degradation are, loss of soil nutrient, Soil erosion effects, reduction of crop yield, silting up of reservoir and It also contributes to persistent poverty, and results in decreasing ecosystem resilience e and provision of environmental services. In addition, environmental decline due to land degradation adversely affects the health, well-being and livelihood opportunities of the individuals.

Keywords: Land degradation, Agricultural impacts

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1. INTRODUCTION

Land degradation is the result of complex interaction among, physical, chemical, biological, socio-economic and political issues of local, national or global nature while, the scale of global process may be vast, they may be in state of dynamic equilibrium easily up set by human forces (Ghebru, 2010).

Some of the causes of land degradation are natural hazards, population growth, expansion of agriculture on the forests and marginal lands, poverty, land owner ships problems, political instability and mal administration in appropriate agricultural large scale expansion of irrigated agriculture (Michael, 2006).

Land degradation 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 (Balet *et al.*, 2008). Millions of hectares of land per year are being degraded in all climatic regions. It is estimated that 2.6 billion people are affected by land degradation and desertification in more than a hundred countries, influencing over 33% of the earth's land surface (Adams and Eswaran, 2000). This is a global development and environmental issue highlighted at the United Nations Convention to Combat Desertification, the Convention on Biodiversity, the Kyoto protocol on global climate change and the millennium development goal (UNCED, 2002; UNEP, 2008).

Land degradation includes all process that diminishes the capacity of land resources to perform essential functions and services in ecosystems (Hurni *et al.*, 2010) are caused by two interlocking complex systems: the natural ecosystem and the human social system. Interactions between the two systems determine the success or Failure of resource management (Berry, 2003). Principal processes of land degradation include erosion by water and wind, chemical degradation (comprising acidification, salinization, fertility depletion, and decrease in cation retention capacity), physical degradation (comprising crusting, compaction, hard-setting, etc.) and biological degradation (reduction in total and biomass carbon, and decline in land biodiversity) (WMO 2005). It is a Continuous process and has become, however, an important concern affecting food security and the wealth of nations, and has an impact on the livelihood of almost every person on this earth (Bezuayehu *et al.*, 2002). Ethiopia is one of the most well-endowed Countries in Sub-Saharan Africa in terms of natural resources (Gate *et al.* 2006). However, natural resource degradation in Ethiopia has been going on for centuries (Hurni *et al.*, 2010).

Similarly, Berry (2003) also stated that loss of land resource productivity is an important problem in Ethiopia and that with continued population growth the problem is likely to be even more important in the future. The major causes of land degradation in Ethiopia are rapid population increase, severe soil loss, deforestation, low vegetative cover and unbalanced crop and livestock production (Girma, 2001). Topography, soil types and agro-ecological

parameters are also additional factors playing significant role in the degradation processes influenced by man (Paulos 2001). To combat land degradation, the Ethiopian government launched a massive soil conservation program in the middle of 1970's (Hawando, 2002). A slogan of environmental movement in 1980s and 1990s i.e. "think globally- act locally" face failures. Thus, a new slogan namely "think locally- act globally" have to be created (Horne, 2002). In addition, a forestation and conservation programs have been made in the last three decades (Badege, 2001). However, success to date has been limited (Badege, 2001; Paulo's, 2001).

The global store of arable land and grazing land continuous to decline through urbanization, un sustainable agriculture practices and deforestation, while, significant portion of the remaining arable land and grazing land is under considerable pressure from compaction by livestock and farm implements, over use of fertilizers and pesticides, Salinization, alkalization or acidification depletion of nutrients, water and wind erosion, deterioration of drainage (Taffa,2011).

The main objective of this article is to review cause of land degradation and its impacts on agricultural productivity.

2.1. Definitions and Concepts of Land Degradation

Land degradation is the loss of potential utility of features or organisms which can't be replaced. All countries, rich or poor, arid or humid, cool or tropical, are suffered by land degradation.

Land degradation is a serious problem in which the value of bio-physical environment is affected by a combination of human made process acting up on the land also environmental degradation is the gradual destruction or reduction of the quality and quantity of human activity, animal or natural means, Example: water cause, soil erosion, wind etc. It is considered to be an important topic of 21th century due to the implications land degradation has up on agronomic productivity, the environment and its effects on food security (Taffa, 2008)

The concept of overpopulation refers to the increasing in numbers of population in specific area and the existence of many human populations in an area that is above the maximum carrying capacity of specific land unit (Abiy, 2010). It results in great negative impacts on the land resources of a country by minimizing sustainability of land due to several direct impacts of its like soil erosion over exploitation of land without taking conservation for degraded land (K land ,2008).Land degradation encompasses the whole environment but includes individual factors concerning Soils, water Resources (surface, ground), forests (woodlands), grasslands (rangelands), croplands (rain fed, irrigated) and biodiversity (animals, vegetative cover, soil) (FAO, 2005). On the other hand, the NRC (2005) stressed that land degradation is complex and involves the interaction of changes in the physical, chemical and biological properties of the soil and vegetation. The complexity of Land degradation means its definition differs from area to area, depending on t Land degradation is especially widespread in Sub-Saharan Africa, affecting 20-50% of the land and some 200 million people (Snel and Bot, 2003).

Furthermore, Snel and Bot (2003) stated that land degradation is also wide spread and severe in Asia and Latin America as well as in other regions of the globe. In Latin America and the Caribbean, land degradation affects 16% of the land area.

The impact is more severe in America (reaching26% of the total, or 63 million hectares) than in South America (where it affects 14% of the total or almost 250 million hectares) (UNEP-ISRIC, 2001 cited in GEO – Latin America and the Caribbean, 2000).

2.2. Major Causes of Land Degradation

Although land degradation process can occur without the interference of human being, these are broadly at a rate which is almost in balance with rate of natural rehabilitation. So, for example water erosion under natural forest corresponds with the sub soil formation rate however, accelerated land degradation is most commonly caused as a result of human intervention in the environment. The effects of this intervention are determined by natural land slopes (Hawood, 2009).

Scholars identified different causes of land degradation. For example, according to Berry (2003), the cause of land degradation involves two interlocking complex systems: the natural ecosystem and the human social system. Interactions between the two systems determine the success or failure of resource management. While, WMO (2005) classified the causes of land degradation into biophysical factors such as unsuitable land use (land use for the purpose for which environmentally unsuited for sustainable use), socioeconomic factors such as poor land management practices, land tenure, marketing, institutional support, income and human health, and political factors such as lack of incentives and political instability. In parallel, Mulugeta (2004) argued that land degradation is a biophysical process driven by socioeconomic and political causes in which subsistence agriculture, poverty and illiteracy are important causes of land and environmental degradation in Ethiopia. While, Gebreyesus and Kirubel (2009) reported that the heavy reliance of some 85 percent of Ethiopia's growing population on an exploitative kind of subsistence agriculture is a major reason behind the current state of land degradation. Similarly, studies conducted by Temesgen *et al*, (2014a, b) in Dera District, Ethiopia exemplified the increased of land degradation which mainly caused by the growing population of the area. Additional study by Fit sum *et al*. (1999)

illustrated that there are multiple interacting forces which have caused and are causing land degradation in Ethiopia. These are the proximate and interacting or root causes.

According to Taffa (2008), the velocity of land degradation is high due to: -

- Improper tillage operation on the land
- Poor managements of land
- The attitude of the community about the consequences of land degradation on agricultural productivity
- Lack of knowledge of the farmers about the main biological, physical and mechanical methods of land conservation

Various types of human activities can be identified as the direct cause of land degradation within the high Pamir and Pamir Alai mountains, the most important are believed to be (Kland,2008).

- ✓ Over reliance of fuel wood, shrubs, dung and peat to meet house hold energy needs
- ✓ Poor pasture management in particular the over grazing of pasture areas close to the village
- ✓ Poor soil and water management in plots used for irrigation rain fed crop production system
- ✓ Poor construction and maintenance of irrigation system

2.2.1. Natural cause of land degradation

The natural factors causing land degradation includes high intensity of rain fall, types of soil, topography, earth quack, volcanic eruption and steep relief is the major ones; impact of rain drop with tremendous amount of energy. On bare un protected soil starts the process of erosion by water. Generally, distribution frequency and intensity of rain fall are the major factor affecting land degradation. Gentle rainfall distributed more evenly throughout the year causes less land degradation than heavy rainfall concentrated only to a few months. More frequently rain fall cause more land degradation than that of less intensity. According to the law state university extension web site during normally rain fall millions of rain drop from 1 -7mm in size will pound the surface and splash soil particles 3-5feet way from where they were before the rain and cause land and soil degradation (Narayana ,2004)

2.2.1.1. Erratic rain fall

Distribution, frequency, intensity and timing of rain fall energy produced by rain fall are among major factors affecting the land degradation. The severity of the land degradation dependent on those parameters when those factor are with higher degree, then severity of the degradation of land is also higher and the reverse is also true. Gentle rainfall distributed more over through the year cause of less land degradation than heavy rainfall concentrated only few month rain fall evenly distributed over water shed (Bekele, 2003). More frequent rain fall causes more degradation the less frequent one.

Rain of high intensity causes more land degradation than that of less intensity. According to the law state university extension web site during normal rain fall millions of rain drops from one to seven millimeter in size fill pound the surface and splash soil particles three to five millimeter frequency from where they were before the rain and causes land and soil degradation (Naryana and Babu, 2004).

2.3. Human Induced Causes of Land Degradation

The manmade land degradation includes production on steep slopes and fragile soils with inadequate investment in soil conservation or vegetation cover, declining use of fallow, limited recycling of dung and crop residues to the soil, limited application of external source of plant nutrient, deforestation and overgrazing. The cause also includes proximate causes such as population pressure, poverty, high costs of and limited access to agricultural inputs and credits, low profitability of agricultural production, farmers' lack of information about alternative technology. Moreover, in order to survive in subsistence economy, farmers are forced to mine soil and to cut down trees leading to land degradation (Hurni, 1999).

2.3.1. Deforestation

Deforestation is the clearing or removal of tree from an area woody land or forest of tree an area woody land or forest for many reasons usually commercially. It is one of the major issues in this century since it is one of the many causes of prevailing land degradation. Tree cutting is common occurrence which has taken place for centuries. Hundreds of year back in history some parts of our country continents which are suffering from conditions caused by land degradation (Esdoman, 2006).

The scale and extent of deforestation in prehistoric and historic times early varied continent to continent and from country to country. The causes of deforestation are in fact man made and most of them derive from the highly increasing number of population which can directly due to the land resources by resulting sever form of soil erosion which leads to land degradation (Buckmans, 2007).

2.3.2. Over population

Population increase has been one of the frequent cause of land degradation. There has been debate on relationship between population number, growth rate and agricultural development, particularly the intensity of farming system. That means as the number of population increase, the required land for agriculture, house hold construction and

other activities increase. This lead so miss management of land without knowing their degraded form (Gok, 2002). The population of the world is increasing at an alarming rate. Land redistribution, which in recent year has been the only means of normally acquiring access to land accommodate new households has lead to sever fragmentation of plots, reduction of crop yields and in security. Reduction of crop land per capital and in security have lead to the reduction in activities such as, fallowing, planting trees and investing in conservation structures. While a reduction in crop land per capital has caused cropping and grazing activities to be shifted to hill side and ecological damaged areas (Bhargava, 2005).

The Ethiopian population increasing day to day and resulted in rapid deforestation, sever soil erosion and alarming environmental degradation (Tamene et al., 2006; Nyssen et al., 2009). Soil erosion creates severe limitation to sustainable agricultural land use, as it reduces on farm soil productivity and food security (Mogos and Holden, 2006; Bewket, 2007).

General negative impacts of overpopulation for rapid land degradation includes (Bolan, 2008)

- ✓ It results in rapid expansion of different form of erosion
- ✓ It facilitates over use of land resources
- ✓ As population number increases the demand of people to obtain land for agricultural purpose can be highly increase. As result, deforestation takes place and it affects land.
- ✓ As population number increase rapidly, then activities of humans to satisfy their different needs becomes highly increase, as a result deforestation takes place and it affect land.

2.3.3. Traditional farming system

It refers to a type of farming practice that farmers are following without properly identifying the relationship between crop soils requirement and without following several soil and water conservation measures which are highly vital for conservation of land resource and compromising of future generation benefits (Moltimore, 2005). The productive layer of dirt is called top soil. If this eroded away through back ward farming system, then land is very unproductive in producing crops soil can be eroded away by wind and Water. High winds can blow away loose soil from flatter, hilly terrain, Water erosion generally occurs on slopes and its severity increase with the severity of slope (Voteberg, 2009).

2.4. Soico- Economic and Institutional Factors

Socioeconomic and institutional factors are the underlying causes that affect land degradation through their impacts on farmers' decisions with respect to land use and land management practices. For example, absence of a comprehensive land use and administration policy, proclamations, laws, regulations and master land use plans developed in a participatory at federal, regional, and community level are the major factors that have contribute to the unchecked land degradation in the country (Gebre eyesus, 2009).

2.5. Major Impacts of Land Degradation on Agricultural Productivity

Land degradation manifests itself in many different ways: vegetation becomes increasingly scarce, water courses dry up, thorny weeds predominate in once rich pastures, footpaths grow into gullies, and soils become thin and stony. All of these manifestations have potentially severe impacts on the environment, for land users and for people who rely for their living on the products from a healthy landscape (Berry, 2003)

2.5.1. Agricultural impacts of land degradation

2.5.1.1. Soil erosion effects

Soil erosion is the processes in which soil and rock are removed from the earth surfers by exegetic process such as wind or water flow ,ways of numerous physical, chemically and biologically process which include weathering with associated erosion .soil erosion from land area is wide spread and already adversely affected all natural and human managed ecosystem including agriculture and forest for that reason soil erosion ranks as one of the most serious environmental problem in the world, which is the effect of land degradation .It effects are pervasive and its damage are long tasting (Pimentel, 2005).

Although soil erosion has occurred throughout history, it has intensified expanding human population coupled with their diverse activities, intrude further in to natural ecosystem, thereby reducing the productivity of the land as result the diversity of the plant, animals, and microbes rediminished ultimately the stability of entire ecosystem threatened (Pimentel *et.al.*, 2005).

2.5.1.1.1 On –site effects

The breakdown of aggregates and the removal of smaller particles or entire layers of soil organic matter can weaken the structure and even changes the texture, textural changes can in turn affect the water – holding capacity of the soil, making it more susceptible to extreme condition such a drought (Berry, 2003).

2.5.1.1.2 Off-site effects

Off-site impacts of soil erosion are not always as apparent as the on-site effects. Eroded soil, deposited down slope can in habit or delay the emerges of seeds, bury small seedling and necessitate replanting in the affecters area.

Pesticides and fertilizer, frequently transported along with the eroding soil can contaminate or pollute downstream water sources and recreational areas (Morgan, 2000). Water erosion main off-site effect is movement of sediment and agricultural pollutants into water course. This can lead to the silting up of drinking water. In some cases, increase downstream flooding may also occur due to the reduced capacity of eroded soil to absorb water. Movement of sediment and associated agricultural pollutants into water course is the major off-site impact resulting from erosion (Dave, 2005).

2.5.1.2. Loss of nutrients

When soil is eroded basic plant nutrients such as; nitrogen, phosphorus, potassium and calcium also lost eroded soil typically contains about three times more nutrient than the soil left behind on the eroded land (Lat, 2001). A ton of fertile soil typically contains one up to six kilograms of nitrogen, 1-3kg of phosphorus and 2-30kg of potassium whereas the soil on eroded land frequently has nitrogen levels of only 0.1-0.5kg/t (Alexander, 2001 and Torch 2002). Once the organic matter layer is depleted the productivity of the ecosystem as measured by crop yield declines both because of the degraded soil structure and depletion of nutrients contained in organic matter (Lat, 2001).

2.5.1.3. Reduction of Crop Yield

By diminishing soil organic matter and over soil quality soil erosion reduces biomass productivity in ecosystem ultimately this has a profound effect on the diversity of plant, animal, microbes and other forms of life present in ecosystem. Plants, animals and microbes as well as other forms of life present in the ecosystem are a vital component of the soil as mentioned and constitute a large measure of the soil biomass (Lee E, 2006). Indirect effect of erosion on ecosystem frequently may be nearly as damaging as the direct effect of reducing plant productivity. For example; the stability and biodiversity of grassland where significantly reduced when plant species reduction occurred (Tillman, 2004).

2.5.1.4. Silting up of reservoirs

Silt resulting from runoff water often results in the silting of reservoirs that in the path of a river or stream. Water in the reservoirs is where nearly still, and therefore, a great proportion of the soil brought by the streams drops out. A good deal of the silt, clay and organic matter remaining in the suspension are carried to the lower end of reservoir. The rate at which reservoirs are filled up with the sediment depends on the erodability of the soil in the contributing watershed, its topography, climate, type of agriculture and the ratio between the size of the watershed and the volume of the reservoirs (Gray, 2002). Generally, the silting up of reservoir can have great direct or indirect impact on the agricultural productivity of an area.

2.5.2. Socio-Economic Impact of Land Degradation

Land and water degradation threaten food security for many of the poorest and most food insecure living in Asia, Africa and Latin America. It also contributes to persistent poverty, and results in decreasing ecosystem resilience and provision of environmental services (Bossio et al. 2004). In addition, environmental decline due to land degradation adversely affects the health, well-being and livelihood opportunities of the individuals (Vivian *et al.*, 1994; Scherr and Yadav, 1996; Fitsum *et al.*, 1999). Due to the presence of land degradation, Africa as a whole has become a net food importer since the mid-1980s. However, the economic implications of land degradation are particularly severe in Sub-Saharan Africa because 65% of the population is rural and the main livelihood of about 90% of the population is agriculture (PDF, 2007). The most serious problem of Ethiopia's land resources is soil erosion. Every year the country is losing billions of birr in the form of soil, nutrient, water and agro biodiversity losses (Paulos, 2001).

As a result, poverty and food insecurity are concentrated in rural areas (MoARD, 2010). Estimates vary considerably but direct losses of productivity from land degradation in Ethiopia are minimally 3 percent of agriculture GDP (Berry, 2003).

Land degradation is one of the major causes of low and in many places declining agricultural productivity and continuing food insecurity and rural poverty in Ethiopia (IFPRI, 2005). The Ethiopian highlands are affected by deforestation and degraded soils, which have eroded the resource base and aggravated the repeated food shortages caused by drought (Tilahun *et al.*, 2001)

Land degradation reduced livestock productivity as a result of reduced grazing resources, loss of nutritious plants and grass species (Fitsum *et al.* 1999). Due to land degradation, increased runoff and reduced infiltration contributes to flooding problem (Destat *et al.* 2000; Bezuyehuet *et al.*, 2002). Deforestation and desertification adversely affect agricultural productivity, the health of humans as well as of livestock, and economic activities such as ecotourism (UNCCD, 2004).

Similarly, Shibru (2010) reported that the loss of soil productivity in Limo Woreda leads to reduced farm income and food insecurity, particularly among the rural poor and thus continuing or worsening poverty. Land degradation can contribute directly to poverty by reducing the availability of other valuable goods and services important to poor households (for example, fuel wood, construction materials, wild foods, and medicinal plants) and by increasing the demands on labor needed to forage for such goods.

2.5.3. Ecological Impact of Land Degradation

Land degradation has multiple and complex impacts on the global environment through a range of direct and indirect processes affecting a wide array of ecosystem functions and services (GEF, 2006). The principal environmental impacts of land degradation include a rapid loss of habitat and biodiversity, modifications of water flows, and sedimentation of reservoirs and coastal zones (PDF, 2007). The resultant ecological impacts of land degradation in Ethiopia include loss in the chemical, physical and/or biological properties of soil which directly affects the type of plant that are grown on the area, reduced availability of potable water, lessened volumes of surface water, depletion of aquifers due to lack of recharge, and biodiversity loss (Berry, 2003).

Similarly, Mulugeta (2004) also described that land degradation is threatening biological resources and agricultural productivity. Land degradation also interrupts the regulating and provisioning services of ecosystems, in particular nutrient cycling, the global carbon cycle and the hydrological cycle (GEF, 2006). Generally, land degradation has a number of environmental impacts on regional and global level. First, degradation of forests and woodlands has impacts on global biodiversity. Second, changes in forest cover and wetlands are impacting the flow of major rivers. Third, large scale loss of forest cover changes the albedo and air circulation patterns and may affect global climate change. Fourth, soil erosion may cause excessive siltation in rivers and inland lakes, causing reduced water storage capacity in lakes, as well as eutrophication and water quality problems (PDF, 2007).

2.6. Mechanisms to Prevent Land Degradation and Restore Degraded Lands

Land degradation can be prevented through different mechanisms depending up on the nature and form of degradation. Most types of soil degradation can be prevented or reversed by adding nutrients to nutrient depleted soil, rebuilding topsoil through soil amendments, reestablishing vegetation, or buffering soil acidity (Scherr and Yadav, 1996). However, some aspects of land degradation are less easily reversed than others. For example, terrain deformation by gully erosion, or total topsoil loss from erosion, or the wiping out of native soil fauna is more irreversible than a negative nutrient balance, or surface sealing and crusting (Cox head and ygard, 2008). In parallel, Scherr and Yadav (1996) illustrated that some types of land degradation are, for all practical purposes, irreversible. Examples are severe gulling and advanced salinization. Displacement of soil material (erosion) is also irreversible, although its long-term effects on productive capacity depend on the depth and quality of soil remaining.

According to Cox head and yard (2008), the main environmental principles for reducing land degradation are to maximize vegetation cover to prevent erosion, replace nutrients removed, and to put in place structures (terraces, bunds, vegetation strips) so as to reduce the speed and volumes of water flow over the soil. From this perspective, tree crops, perennial crops, intercropping and reduced-tillage systems are preferred. Similarly, UNCCD (2004) revealed that forests and tree cover combat land degradation and desertification by stabilizing soils, reducing water and wind erosion and maintaining nutrient cycling in soils. Therefore, sustainable use of goods and services from forest ecosystems and the development of agro forestry systems can contribute to poverty reduction, making the rural poor less vulnerable to the impacts of land degradation.

Broadly speaking, land degradation can be controlled, reduced or even reverted if the land is used wisely, if all functions of the land are taken into account, and if long-term interests of all segments of human kinds

replace short-term vested interests of privileged group globally, naturally and locally (Getachew, 2005). Scherr and Yadav (1996) also pointed out that rehabilitating degraded landscapes depend on the costs relative to the value of output or environmental benefits expected. Throughout history, efforts to combat land degradation in Ethiopia is focused on physical conservation structures (Woldeamlak 2003). Similarly, Temesgen et al. (2014c) reported that farmers in Dera Woreda, Ethiopia heavily depend on physical soil conservation structures.

Table 1: Component of degradation, type of degradation and ways of improving degraded land (Scherr and Yadav 1996)

Component	Degradation	Improvement
Physical soil management	Crusting Compaction Sealing Water erosion Wind erosion De vegetation Over tillage	Soil conservation barriers Terracing Re vegetation of denude land Tree protection Soil decomposition Breaking up of pans cover crops Wind break Soil deposition Improved soil tillage methods
Soil water management	Impeded tillage Water logging Reducing infiltration Nutrients depletion Reduced water holding capacity	Irrigation Water harvesting Field drainage Drainage of water logging areas Filter strips
Soil nutrients and organic matter management	Alkalization Acidification Nutrient leaching Burning of vegetative residues Nutrients depletion	Fertilization Composting Green manuring Animal manuring Flushing of saline, alkaline soils Liming acid soil
Soil biology managements	Over application of agri chemicals Industrial contamination	Introduction of biotic organism Nitrogen fixing micro organism
Vegetation management	Decline in vegetative cover Decline species Compaction Decline in availability of valued species	Increase vegetation cover Increase species diversity Improved species composition Improved availability of valued species

3. CONCLUSION

Land degradation affects Ethiopian economy and also has many negative impacts on agricultural productivity by reducing the fertility of agricultural land. Being a common problem in Ethiopia, land degradation puts disastrous impact on the socio-cultural environment, ecological setting of the country and also many agricultural impacts. Some of those, soil erosion, loss of nutrients, reduction of crop yield and setting up of reservoirs.

The major causes include rapid population increase, severe soil loss, deforestation, low vegetative cover and unbalanced crop and livestock production. In addition, topography, soil types and agro-ecological parameters are contributing factors in the degradation processes influenced by man. To control and degradation, conservation measures throughout history are mainly focused on physical conservation structures which have less contribution for the addition of nutrients removed and to control soil erosion as compared to vegetation measures.

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