THE LOCAL PEOPLES' KNOWLEDGE, ATTITUDE AND PRACTICE TOWARDS LAND DEGRADATION AND CONSERVATION EFFORTS: THE CASE OF SORO WOREDA, HADIYA ZONE, SNNPR

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THE LOCAL PEOPLES' KNOWLEDGE, ATTITUDE AND PRACTICE TOWARDS LAND DEGRADATION AND CONSERVATION EFFORTS: THE CASE OF SORO WOREDA, HADIYA ZONE, SNNPR

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APPROVAL SHEET

JIMMA UNIVERSITY COLLEGE OF AGRICULTURE AND VETERINARY MEDICINE, SCHOOL OF GRADUATE STUDIES

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Title: **The Local Peoples' Knowledge, Attitude and Practice towards Land degradation and Conservation Efforts**

I have incorporated the suggestion and modification given during the thesis work and got the approval of my advisers. Hence, I hereby kindly request the department to allow me to submit my thesis for internal thesis defence.

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We, the thesis advisers have verified that the student has incorporated the suggestions and modification given during his study and the thesis is ready to be submitted.

Hence, we recommended the thesis to be submitted for internal defence

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Decision/ suggestion of Department Graduate council (DGC) _____

_____

_____ _____ _____

Chairperson, DOG Signature Date

DEDICATION

I dedicate the thesis to my wife Tadalech Nigusse and my family, for all their contribution.

STATEMENT OF AUTHOR

First, I declare that this thesis work is prepared by my effort with the guidance andclose direction of my supervisors. This thesis has been submitted to Jimma University, College of Agriculture and Veterinary Medicine in partial fulfillment of the requirements for the degree of Master of Science and is deposited at the Library of university to be made available to borrowers under rules of the Library. I seriously declare that I have not submitted this thesis to any other institution anywhere for the award of any academic degree, diploma, or certificate. Brief quotations from this thesis are allowable without special permission provided that accurate acknowledgement of source is made. Requests for permission for extended quotation from or reproduction of this manuscript in whole or in part may be granted by the head of the major department or the Dean of the School of Graduate Studies when in his or her judgment the proposed use of the material is in the interests of scholarship. In all other instances, however, permission must be obtained from the author.

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BIOGRAPHICAL SKETCH

The author Teshome Ergudo Ashebo, was born Hadiya Zone, Soro Woreda on December 12, 1964 E.C. He attended elementary education at kecha school from 1971-1978, Secondary education at Gimbichu high school from 1979-1982, Diploma at Hawassa teachers training College from 1991-1992 and he attended his Bachelor of education program in Jimma University. He graduated with Bachelor of Education in Biology in 1999 E.C. Then he was employed by SNNPR, Hadiya Zone at Hossana town administrative. He had served as teacher at Yekatit 25/67 Prepatory and secondary School after received BEducuntil he joined Jimma University, College of Agriculture and Veterinary Medicine October 2014 to pursue MSc program in field of Natural Resource Management (Forest and Nature Management).

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LIST OF ABBREVIATION

FAO	Food and Agricultural Organization
FGD	Focus Group Discussion
GDP	Gross Domestic Product
GIS	Geographic Information System
HZFED	Hadiya Zone Finance and Economy Development
KAP	Knowledge, Attitude and Practice
MASL	Meter Above Sea Level
NGO	Nongovernmental Organization
PRS	Participatory Rural Appraisal
PSNP	Participatory Safety Net Program
SLM	Sustainable Land Management System
SNNPR	South Nation Nationalities Peoples Region
SPSS	Statistical Package for Social Scientists
SSA	Sub-Sahara Africa
SWARDO	Soro Woreda Agricultural and Rural Development Program
SWC	Soil Water Conservation
SWFEDO	Soro Woreda Finance Economy Development Office
UN	United Nation
UNCCED	United Nation Conventions to Combat Desertification
UNCED	United Nations Conference on Environmental and Development
UNEP	United Nation Environmental Program
WCED	World Commission on Environmental and Development

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ABSTRACT

The study was conducted in Soro woreda, to investigate local people's knowledge, attitude and practice towards land degradation and conservation efforts.In order to achieve the above stated objectives both primary and secondary data were generated. The techniques of collecting primary data sources includes household survey questionnaires with farm households, group discussion with farmers, field observations and in-depth interview with development agents, agriculture office officers and individual farmers. Secondary data were collected from published and unpublished materials like research reports, journals, books and electronic documents. The study used stratified sampling technique to select sample Kebeles. Simple random sampling technique was also employed to select household participants among the total households under each sample Kebeles. This was also to give equal chance of inclusion of farm households for household survey questionnaire. The data collected was analyzed using both statistical tools such as percentage, frequency and qualitative approach. The finding of the study revealed that, farmers were positive knowledge and attitude on agricultural land management options that are more associated with their agricultural practices like contour plowing, crop rotation,agroforestry,terracing,manure, use of improved crop and diversion ditches. Additionally, farmers' use of organic sources fertilizer and their indigenous soil fertility management practices were found to be limited. The agricultural land in the study area was found to be under serious degradation problem indicted by the development of rill and gully areas over crop farm fields and communal grazing fields. It was identified that institutional capacity related constraints, technical gaps, unsuitable agricultural fields and the attitude of local farmers were among the major challenges that obstruct the practice of more effective agricultural land management options in the study area. Finally, in light of these findings, wider range of support and awareness creation, the provision of practical based trainings, urgent intervention to expand biological management practices and institutional capacity development help the practice of effective agricultural land management in the study area.

KeyWords: Knowledge, Attitude, practice, Land degradation,

1. INTRODUCTION

1.1. Background

Land is the most important limited natural resource that makes up the cardinal resource base in any agricultural production system (Stein *et al.*, 2009). Due to land degradation around 1.5 billion people and a quarter of land areas in all agro–ecological zones of the world are affected (Lal *et al.*, 2012). As a result land degradation in most developing countries is becoming a major constraint to future growth and development of rural livelihoods. About 40-75% of the world's agricultural land's productivity is reduced due to land degradation (Baylis *et al.*, 2012; UNCCD, 2013cited in Feyera, 2015).According to FAO (2010); worldwide 75 billion tons of soil matter are lost because of water and wind erosion every year. At the same time significant quantities of nutrients about 22kg N/ha, 2.5kgP/ha and 15kgK/ha are depleted and lost in Sub-Saharan African countries.

In Africa, land degradation and desertification processes result from both human activities and climatic variability (UNEP, 2008). An estimated 65% of Africa's agricultural land is degraded due to erosion and/or chemical and physical damage. Thirty-one per cent of the continent's pasture lands and 19% of its forests and woodlands also are classified as degraded (UNEP, 2008; FAO, 2005). However, widespread land degradation, exemplified by soil erosion and declining soil fertility, which in turn leads to falling production, remains a big challenge in the region (Kimaru and Jama, 2005). Particularly, such type of land degradation has been recognized as a serious problem in Ethiopian highlands (Belayhun, 2010). Since the poor are dependent on the environment especially natural resources including land for the satisfaction of their basic necessities as a result sustainable natural resource utilization is a key for their poverty eradication (Mugisha and Alobo, 2012).

Ethiopia is one of the well-endowed countries in Sub-Saharan Africa in terms of natural resources (Gete *et al*., 2006). However, natural resource degradation in Ethiopia has been going on for centuries (Hurni *et al*., 2010) which result in loss of productivity. In Ethiopia the average soil loss rate for the whole country was predicated to be 12 tons per annum while the absolute total yearly, loss was estimated at 1.5 billion tons of soils.

To solve the problems of land degradation in the country, many efforts have been made since 1970s. A large number of soil and water conservation activities were implemented in different parts of the Ethiopian highlands with a huge resource obtained from international community, particularly World Food Program (WFP)., However, at the end the intervention couldn't be sustainable and able to bring the intended impact (Yeraswork 2000; Woldamlak, 2003). Among the very reasons behind the failure were: the top-down nature of the conservation approach itself, improper planning, inadequate resource allocation, recurrent drought, costliness of the Structural conservation measures, labor intensive-nature of the technologies, little short term returns benefits gained from the programs, little systematic efforts made to incorporate indigenous conservation practices and political constraints (Aklilu, 2006). As a result in Ethiopia land degradation in general and soil erosion in particular still remain the major challenges in adversely affecting the agricultural performance of the country. Hence the call for improved land management practices is timely (Woldeamlak, 2003).

Therefore, governments and countries have been aware of human actions as the main agents of the problems, they are trying to mitigate the problem by increasing attitude and knowledge of their people about the causes, consequences and solutions of those environmental problems. If appropriate knowledge, attitude and environmentally sound practices are inspired in local population, they can provide knowledge based solutions for the usual environmental degradation in general and soil degradation in particular. Sustainability also requires a population that is aware of the goals of a sustainable society and has knowledge and skills about it to contribute to those goals (Aklilu, 2006). Lack of information and knowledge is considered to be one of the major obstacles for reducing land degradation, improving agricultural productivity, and facilitating the uptake of sustainable land management (SLM) among smallholder farmers (Liniger *et al.,* 2011).

Many scholars for instance (Milfont, 2009) found understanding the nature of environmental attitudes held by the community as important factor towards finding solution for various environmental problems. According to Napier *et al.* (2008) stated that, unless the attitudes of all population in a concerned area are assessed and represented, conservation planning and program implementation efforts may not achieve its expected outcomes. This reflects environmental

conservation efforts become unified only whenever it gains social acceptance, a number of socio economic characteristics influence farmers' attitudes towards conservation of natural resources.

The local peoples with positive attitudes towards conservation efforts are motivated on the activities and maintenance of the conservation structures (Hu *et al.*, 2006 cited in Tsehaye, 2013). This implies it is unusable to induce people into accepting systems of conservation that they do not appreciate. In addition, land resources conservation would be sustainable whenever it becomes biophysically appropriate, economically viable and socially endurable (Hu, *et al*. 2006). Hence understanding the local peoples' environmental attitudes has important contributions for selecting viable land resources management options as it can serve as a basis to assess the effectiveness of introduced conservation methods by avoiding potential conflicts (Hu *et al*., 2006 cited in Tsehaye, 2013). It is, therefore, indicative that any approach to the conservation of natural resources cannot be effective unless the human dimension, especially attitude is considered (Barel, 2006 cited in Tsehaye, 2013).

Due to the fact that some experts think that farmers are ignorant of the seriousness of the ongoing land degradation and are unwilling to changes (Hudson, 1991 cited in Shibru, 2010). Awareness, Knowledge, perceptions and attitudes towards the problem of resources degradation is one of the many socioeconomic, cultural and psychological factors which are known to influence acceptance and practice of conservation measures by farmers elsewhere (Baum and Wolff, 1993 cited in Shibru, 2010). As a result, previous approaches made no positive changes with respect to the rate of land degradation, primarily because they hardly considered farmers' knowledge and their attitude of the land degradation and conservation efforts. Thus, experts need to seek existing knowledge, perception and opinions of farmers before enforcing new recommendations (Hudson, 1991; cited in Shibru, 2010).

Although soil conservation practice methods are widely represented as having significant environmental, economic, social and political benefits for both individual landholders and the wider community, practice of such measures is commonly perceived to be slow. Consequently, severe land degradation continues to affect the farmers' livelihoods. The rich top-soils have been washed off by runoff and the remaining sub-soils are exposed and generally deficient in available

minerals. Knowledge and Attitude towards land degradation soil as a problem by farmers is an important determinant of conservation practice. Moreover, the farmers' attitude towards the soil conservation and implementation of measures can be influenced by different issues. Yet, factors affecting practice of conservation measures by farmers have not been closely examined in the area and often poorly understood.

A Knowledge, Attitudes, and Practices (KAP) survey is a representative study of a specific population that aims to collect data on what is known, believed and done in relation to a particular topic (Zahedi *et al.*, 2014). This survey was conducted to get a better understanding of local peoples' knowledge of current land degradation, their attitudes toward land degradation control, and practices of conservation in Soro woreda. In addition, in this area, so far limited study has been done on the KAP towards land degradation and conservation efforts.

The results of this study were having been contributions in identifying implemented soil conservation Practices by farmers and their effectiveness in controlling land degradation. Secondly, it were be used to identify farmers' knowledge, attitudes and practice on land degradation and conservation measures in study areas. Such information could be vitally important for local government for the development of more impactful policies and effective measurements to control land degradation and improve conservation quality in future.

1.2. Objectives

1.2.1 General objective

- To investigate the local peoples' knowledge, attitude and practice towards land degradation and the conservation efforts in Soro woreda

1.2.2 Specific objectives

- To assess the local peoples' Knowledge and Attitudes on the causes of land degradation
- To identify the local people's knowledge and attitudes towards the consequence and indicators of the land degradation
- To assess the indigenous conservation practices to control land degradation among small holder farmers

1.3. Research questions

Based on the specific objectives indicated above the research tries to answer the following research question.

1. How the local communities perceive the causes of land degradation in the area?
2. Do the local communities started to fill the consequences and indicator of land degradation?
3. What are the existing traditional conservation practices in the area?

2. LITERATURE REVIEW

There is no single universally accepted definition for land degradation (Blaikie and Brookfied, 1987 cited in Hussein, 2006). It is a broad concept and defined by different people in different ways. UNEP (1992 cited in Desta, 2009) defined land degradation as "a reduction of resource potential by one or a combination of processes including water erosion, wind erosion, a long term reduction in the amount or diversity of natural vegetation, salinization, or sodification acting on the land." Similarly, World Commission on Environment and Development (WCED), (1987 cited in Taffa, 2002) defined land degradation as "the loss of utility or potential utility or the reduction, loss or change of features or organisms which cannot be replaced." Young, (1998, cited in Hussein, 2006) gave a more similar definition of land degradation as the process that causes temporary or permanent lowering of current or future productive capacity of land. Muchena *et al.* (2005) have defined "land degradation as the loss in productivity of the land and its ability to provide quantitative or qualitative goods or services as a result of natural and human- induced changes in physical, chemical and biological processes". Land degradation is a permanent decline in the rate at which land yields products useful to local livelihoods within a reasonable timeframe. Land degradation has also been defined as the reduction of the current or future capacity of land to produce (Oluwole and Sikhalazo, 2008).

2.1. Empirical Approach of Land Degradation

2.1.1. Causes of land degradation

Causes of land degradation can be grouped into two categories, namely; proximate and underlying causes (Lal and Stewart, 2013; Pingali *et al.*, 2014). Proximate causes are those that have a direct effect on the terrestrial ecosystem. These include biophysical (natural) conditions related to climatic conditions and extreme weather events such as droughts and coastal surges, which may, for example, cause land to become saline. For instance key proximate causes include; climatic conditions, topography, unsuitable land uses and inappropriate land management practices (such as slash and burn agriculture, timber and charcoal extraction, deforestation, overgrazing) and uncontrolled fires. On the other hand, the underlying causes are those factors that indirectly affect proximate causes (ibid). Lack of institutions, poverty, and

insecure land tenure may underlie land degradation by hampering incentives to invest in sustainable land management practices (Kabubo, 2007; FAO, 2011).

Similarly; farming on steep slope will accelerate the effects of soil erosion. Another key proximate cause of soil erosion is the practicing unsustainable agriculture such as land clearing, overstocking of herds, charcoal and wood extraction, cultivation on steep slopes, bush burning, pollution of land and water sources, and soil nutrient mining. It is further notable that improperly planned infrastructural development such as transport and earth moving techniques by trucks and tractors nurture land degradation processes (Rademaekers *et al.,* 2010). Charcoal burning and firewood extraction is also significant driver of land degradation in the SSA region. Most deforestation exercises are associated with the continued demand for agricultural land, fuel-wood, charcoal, construction materials, large-scale timber logging and resettlement of people in forested areas. This often happens at the backdrop of ineffective institutional mechanisms to preserve forests. Grazing pressure and reduction of the tree cover continues to diminish the productivity of rangelands (Waters *et al.,* 2013).

Arid and semi-arid climatic conditions with high evaporation rates; together with poor management of irrigation water (in the 4.5% irrigated cropland of SSA) is a major cause of salinization. Similarly, fragmentation, overexploitation of the forest resources and conversion of forest lands to agriculture has turned SSA as world's highest annually deforested area. Overstocking is identified to primarily drive degradation of rangelands, decline of vegetation productivity and eventually livestock productivity, and loss of resilience of the rangeland for droughts. Indeed, overgrazing was estimated to causes about 50% of all soil degradation in semi-arid and arid regions of Africa (ibid). According to Lal and Stewart (2010) shows that overgrazing caused about half (49%) of land degradation in SSA followed by deforestation (27%) and unsustainable agricultural practices (24%). The ever increasing demand for food with an increasing population in Eastern Africa but with stagnant or declining agricultural productivity has led to rapid expansion of agricultural land and reduced rehabilitation of soil fertility through shortening of the fallow periods in extensive land use systems.

Important underlying drivers of land degradation include land tenure, poverty, population density and weak policy and regulatory environment in the agricultural and environmental sectors. Insecure land tenure may act as a disincentive to investment in sustainable agricultural practices and technologies (Kabubo, 2007). Similarly, a growing population without proper support policies and proper land management will exhaust the capacity of land to provide ecosystem services. It is also argued that population pressure leads to expansion of agriculture into fragile areas and reduction of fallow periods in the cultivated plots. However, this is not always the case. Population pressure has been found to increase agricultural intensification and higher land productivity as well as technological and institutional innovation that reduce natural resource degradation (Nkonya *et al.*, 2008).

Poverty is another important underlying driver of land degradation in Eastern Africa (Lambin, 2001). There exist a poverty land degradation vicious cycle; though poverty can be argued as an outcome of degrading land, it is also seen as a cause of land degradation. Land degradation contributes to low and declining agricultural productivity, and this in turn contributes to worsening poverty. Land degradation can contribute directly to poverty, separately from its impact on agricultural productivity, by reducing the availability of other important goods and services to poor households and by increasing the demands on labor needed to seek for such goods.

Another possible cause of land degradation is lack of early awareness about soil erosion and soil fertility decline by farmers. For instance in Uganda, McDonough *et al*. (2001) reported that when farmers were asked to describe their indicators of soil erosion they stated gully/rill formation, exposed underground rocks, landslides, wash away of crops, shall owing of soils and siltation of the soil. These are soil traits that appear in a much later stage of soil degradation, after the soil organic matter and nutrients of the soil are removed. If farmers respond to soil erosion at this stage, the probability of reversing the fertility status to its earlier value would be difficult.

An important factor that used to affect land management in Ethiopia is lack of appropriate land policy not only inappropriate national policy but also absence of by laws that guarantee community level interventions. It could also be hard to differentiate whether land degradation

was a consequence of poor resource management or all of the growing season exposing soil to erosion. Nutrient loss on arable land is significant in areas strongly affected by the nexus dynamic. Estimates show a net loss of 700 kg of nitrogen (N), 100 kg of phosphorus (P),and 450 kg of potassium (K)per ha in 100 million ha of cultivated lands over the past 30years (Sanchez *et al.,* 1995 cited in Shibru, 2010).

Crop residue and manure, which were once major source of enriching soil fertility, are being used as fodder and fuel wood. This considerable nutrient loss is reflected in the widening gap between the actual and potential yield for all the major food crops in SSA. For example, average farm yield for maize, sorghum, and wheat is 1.6 mt/ha (metric tons per hectare), 0.5 mt/ha, and 1.5 mt/ha, while the potential yield is 5mt/ha, 2.5 mt/ha and 3.5 mt/ha respectively (Sharma et al., 1995 cited in Shibru, 2010). The relative impact is probably greater in Ethiopia, where soil nutrient depletion is more severe than the other SSA countries.

2.2. Indicators of land degradation

In natural resources management in general and in land degradation in particular, traditional knowledge refers to the concept of land rather than soil. During the late 1980s, traditional knowledge was gradually accepted by leading soil and water conservation institutions. It is strongly based on peasant perception of land quality and land degradation (Pulido and Bocco, 2003). TK held by communities proved to be useful in evaluating and classifying lands according to types, levels and risks of degradation. Indicators derived from local perception and traditional knowledge is complex, i.e., they encompass a holistic suite of partial elements (Millar and Dittoh, 2004).

Soil and vegetation were used as indicators of land degradation by the people. These components are soil and vegetation possesses the visible signs of land degradation as well as effects which are felt immediately by the local people since they constitute the major resource of the inhabitant. Soil degradation was identified by local residents through changes in crop yield as well as physical changes in the soil structure. The local people were perceived reduction in crop yield associated with depletion of soil nutrients and rainfall variability (Malley *et al.,* 2006). In fact, the farmers said that crop yield on plots of land had generally reduced over the past 20

years. Reduction in yields was perceived by farmers as soil degradation in Southern Ethiopia (Moges and Holden, 2007). Similar observations were made by Stringer and Reed (2007), where reduction in crop yield was used as an indicator of soil fertility decline. Farmers recognized that one of the reasons for low soil fertility is continuous cropping. With regard to physical changes in the soil, the local people identified soil erosion and soil compaction as major indicators of land degradation (Moges and Holden, 2007).

According to Mogos and Holden (2007) also found out that farmers in Southern Ethiopia perceived soil degradation on the basis of the changing physical appearance of the soil, that is, when it is becoming stony or coarser. Similarly Local perception refers to the causes and status of land degradation as farmers detect and express it as occurring on their lands. For example, in KushingaWard, Zimbabwe, the major causes of soil erosion identified by peasants were the cultivation of steep slopes and stream banks, population pressure and overgrazing (Manjoro, 2006). Soil erosion as an indicator of land degradation was also perceived by farmers in Southern Ethiopia through the processes of the soil becoming, the formation of rills, the partition of fields and gullies and topsoil was removed (Moges and Holden, 2007). Other common peasant land degradation indicators include plant species, weed abundance, changes in soil texture and stoniness, and crop yield productivity.

Farmers detect soil compaction through the resistance of the soil to work or its inability to support plant life. Soil compaction was observed along footpaths, trekking lines and places where animals usually gather to rest, and sand winning areas. The compacted soils become very hard and agriculturally unproductive. It was observed that excavated patches for building and road construction are not reclaimed after the sand has been wined; they are abandoned and come under the vagaries of the weather; erosion by rains and heating by the sun, which harden the surface. As the land is being degraded, so is the vegetation. This is because vegetation and soil are inherently linked and therefore the degradation of one leads to the degradation of the other. Local people depend on the vegetation for their domestic energy requirements, building materials as well as pasture for their livestock. The local people detected that their environment is degrading through changes in the quality, quantity and diversity of the vegetation. They perceived a reduction in the quantity of the vegetation particularly around their immediate environment (Reed *et al*, 2008).

Scarcity of firewood was another indicator used to conclude that the plant population is decreasing. Women now spent more time searching for fire wood than 20 years ago. Increasing distance to firewood locations and a decreased abundance of firewood and timber were also considered as indicators of land degradation (Reed *et al.,* 2008; Stringer and Reed, 2007). Farmers added that the quantity and quality of firewood obtained currently is low compared to two decades ago. Certain tree species, particularly those of economic and medicinal value, were getting scarce (Reed *et al.,* 2008). According to Dembele (2006) the quantity and quality of pasture have also reduced and this serves as an indicator of land degradation. Farmers said their animals are not able to get enough feed because most of the grazing lands have been converted to farmers and invaded by inedible grass; hence animals have to walk for pasture daily. According to the farmers, these inedible grasses are spreading quicklyand are a source of worry to them because their animals are left with no option than to feed on the inedible grass which sometimes results in deaths (Dembele, 2006).

2.3. Consequences of land degradation

Land degradation has substantial environmental, social and economic costs. Land degradation not only reduces the productive capacity of agricultural land, rangelands and forest resources but also significantly impacts on the biodiversity (Davidson and Strout, 2004). The costs and consequences of land degradation can be direct or indirect. Direct costs may include costs such as; costs of nutrients lost by soil erosion, lost production due to nutrient and soil loss, and loss of livestock carrying capacity. On the other hand, indirect costs may include costs such as; loss of environmental services, silting of dams and river beds, reduced groundwater capacity, social and community losses due to malnutrition and poverty.Land degradation has already resulted in noticeable and wide ranging effects on the Ethiopian community-both rural and urban has categorized such effects into non-economic and economic. The effects of land degradation on the individual, the community or the nation as a whole hard to quantify owing to the length of time over which degradation takes place(Aggrey Mensah, 1984 quoted in Aklilu, 2001).

2.3.1. Non-Economic Consequences

Some of the effects of land degradation which could be categorized as non- quantifiable or very hard to quantify) include (Berhanu, 1998 quoted in Aklilu, 2001). Due to depletion of forests and the resultant increase in runoff, the storage of water has greatly diminished and a large number of water points for human and animal use have dried up. Land degradation leads to decrease both in the quality and number of livestock; any change in livestock sectors has tremendous effects on the living standards of the rural people as a wholefirst, in places where the wheel has not yet penetrated, animal transport still provides a reliable and well suited mode of transport. Second, oxen are extensively used for traction power. Where agricultural and livestock production reach very low levels are a result of reduced cultural land yields, a situation will be created where there is insufficient land leading to shrinkage of average farm size which, in turn, creates a disguised unemployment. Ethiopia may stand number one in Africa perhaps in the world to witness the power of land degradation deriving people out of their homes.

In 1984/85 more than half a million people were forced to leave their homes mainly in the highly eroded northern regions to the south-western parts which are less degraded so farPlots have been abandoned and given up grazing owing to the persistent erosion. It is reported that about 20,000 to 30,000 hectares of land in the highlands are abandoned each year because cropping can no longer be supported by the soil (Berhanu, 1998 as quoted in Aklilu, 2001). The consequence is use of marginal lands on steep slopes or relatively unsuitable soils. Dung is by and large the most readily available source of energy for cooking in rural Ethiopia. Its value as fuel is more appreciated and recognized than its use as fertilizers. It has been estimated that the burning of dung for fuel instead of using it as fertilizers causes an annual reduction in grain production by some 550,000 tons (Mekuria, 2005). This in turn leads to shortage of food and malnutrition.Over much of northern Ethiopia, most of the land is absolutely treeless, so much so that in some rural areas only stones are used for building houses, and cow dung for fuel, wood, even for ploughs and other implements, is very scarce, and farmers have to walk long distances into the more remote valleys to get it' (Mesfin, 1984 quoted in Aklilu, 2001).

2.3.2 Economic Consequences

The average soil loss rate for the whole country was predicated to be 12 tons per annum while the absolute total yearly, loss was estimated at 1.5 billion tons (Muluneh, 2000). Soil erosion in 1990 has cost the nation an annual loss of grain production estimated at about 40,000 tons. The permanent in values of the country's soil resources caused by erosion in 1990 was estimated to be Birr 59 million .The Amhara regional soil conservation indicates that soil erosion is greatest on arable land, and the average annual soil loss is estimated total of about 1.1 billion tons per year. The situation is pretty much the same (Gedion, 2005). Livestock play a number of vital roles in the rural and national economy but according to one estimate some 2 million hectares of pasture land will have been destroyed by soil erosion between 1985 and 1995. Land degradation is estimated to have resulted in an annual loss of livestock production in 1990 equivalent to 1.1 million tropical livestock units and, unless arrested, will rise to 2.0 million or to 10 percent of the current national cattle herd by 2010 (MoARD,2007).

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3. RESEARCH METHODOLOGY

3.1. Description of the Study Area

3.1.1. Location

This study was conducted in Soro Woreda, Hadiya zone. Geographically, Soro Woreda is located between 7°23'- 7°46'N latitude and 37°18'-37°23' longitude coordinates at woreda administration town, and it covers an area of 58061 hectare (Kibamo, 2011). The woreda is bordered in the West Kambata Tambro Zone in the North by Gombora woreda in the South by Duna Woreda in the east Lemo woreda. The woreda is located at 262 km South of Addis Ababa and 200km from regional capital, Hawassa. Also the woreda is found at a distance of 32 Km west from zonal administration head quarter Hossana. Soro woreda consists of 49 Kebeles from which 47 rural kebeles and 2 urban kebeles (SWFEDO, 2014).

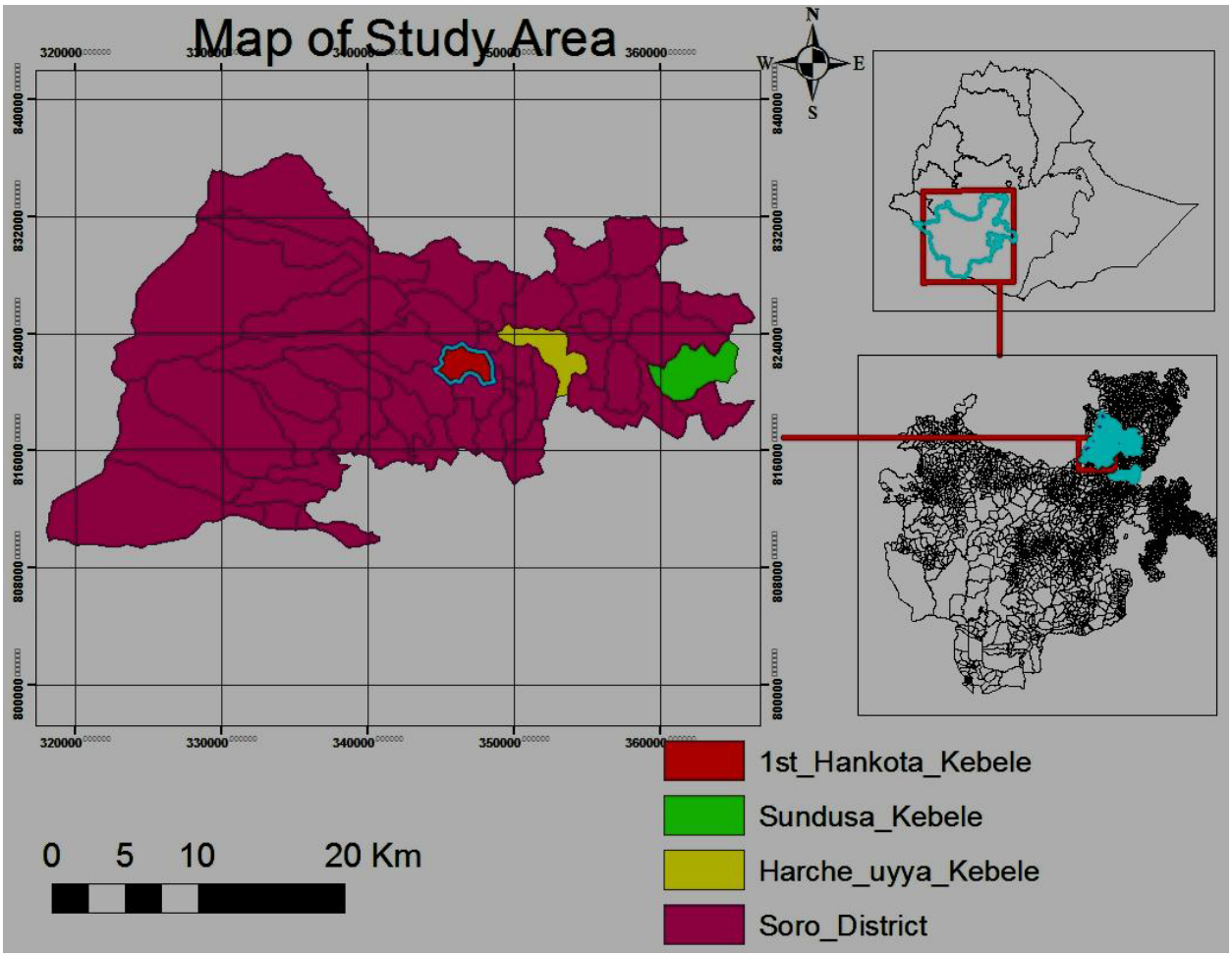

Figure 1: Soro Woreda Map

3.1.2. Demographic and socio-economic background

3.1.3. Population size and density

Based on figures published by the (SWFEDO, 2014), Woreda was an estimated total population of 252,880 of whom 125,942(49.8%) was males and 126,938(50.2%) females and 90.3% of which live in rural areas mostly subsistence farmers depending on rain fed production and 9.7% of its population was urban dwellers, which was less than the Region and greater than Zone average of 10.28% and 8.1% respectively (SWFEDO, 2014). The Woreda was an estimated population density of 436.5 persons per km^2 of arable land and the average arable land holding is 0.94 hectares per household, varying from less than 0.5 ha to 3.0 hectares. More than 89% of households own less than one hectare of farmland (SWARDO,2014).The majority of the inhabitants were protestants with 87%of the population reporting those beliefs 4% were catholic and 6% practiced Ethiopian Orthodox Christianity 3% are others. According to HZFEDD (2014) Hadiya 95.5% is the dominant ethnic group in Soro Woreda followed by Kambata 2.5% and the all other ethnic groups made up of 2% of the population.

3.2. Topography and Geology

The Woreda land mass lies between 840-2850m.a.s.l. This entirely falls into Dega 8%, Kolla 37% and Woina-dega 55% agro-climate (Behailu, 2009 cited in Kibemo, 2011). The soil types exposed to the risk of erosion due to topographic features of the Woreda area. The study area dominated by nito soil that has been particularly susceptible to erosion.

3.2.1. Climate, Vegetation and Soil

The annual mean minimum and maximum temperature is 15^{o}C-25^{o}C, the mean annual rainfall of the area is 1260mm (Kibemo, 2011). Rainfall tends to be bimodal with rainfall becoming more continuous as elevation increases. Most of the rainfall falls during the "Meher" season from June to September (it is most intense during July and August). The study area is relatively high amount of rainfall that causes rockslides and landslides from the highly degraded up slopes. In addition to its high rainfall the study area drained by about more than four seasonal streams such as Gamuna, Lentala, Ajacho Woredaye. There is short rainy season called "Belg" which falls during the months of mid of February to May. However, the short rains would be highly

variableand since they often fail, farmers claim they are relying on them for grain production less and less (SWARDO, 2014).

Historically, the Woreda is covered by dense natural forests, but the distribution of natural forest is declining over time, largely owing to human interference. Currently forest coverage of the Woreda is only about 8 % of the total land area (SWARDO, 2014). The common vegetation in the area include, *Crotonmacrostachyus*, *Ficussur*, *Cordiaafricana*, *Hageniaabyssinica*, *Podocarpus falcatus*, *Millettia ferruginea*, *Schfflera abyssinica*, *Ficusvasta*, *Acacia* species and *Erthyrina abyssinica* which were found as scattered trees in most agricultural lands. While *Eucalyptus globulus*, *Eucalyptus camaldulensis*, *Juniperus procera* and *Gravillia robusta* will grow as boundary, windbreak, live fence and woodlot.

The wide diversity in climate, topography and vegetation cover in the study area has given rise to marked variations in soils, even within relatively small area. No detailed soil surveys have been Carried out in Soro woreda. As farmers' classification, the dominant soil types are red-brown to red clayey soils on undulating land to steeping lands including the rolling plateau. These soils are relatively fertile and productive than grayish soil types which dominated the flat to undulating lands. The soils of this area are highly susceptible to erosion with gradually declining productivity. Whereas the soils of flat slopes are grayish to dark with leaning to water-logging during rainy seasons, yet less susceptibility to erosion. Thus, management of the soils of the area is likely dependent on soil types, fertility, slope, workability, water holding capacity, and susceptibility to erosion. Addition of nutrient through the crop residues and manuring was very rare and tends to rapidly increase in moisture depletion (Kibemo, 2011).

3.2.2. Land use and agriculture

Agriculture in the area is characterized by small-scale subsistence mixed farming-system, with livestock production as an integral part. Crop production is mainly rain-fed. Livestock are also very important to agriculture in the Woreda. The current land use can be categorized broadly into three categories: arable land covering the largest proportion of the Woreda with about 73.5%, grazing land covering 4.45%, forest 8.42%, uncultivated land 5.5% and unproductive8.13% land (SWARDO, 2014).

The dominant activities under land use pattern in the study area include cultivation of perennial crops such as enset and coffee. Whereas the annual food crops, including cereals (maize, sorghum, barley, wheat, teff), pulses (beans, soybeans), and root crop such as sweet potato and potatoes. A very small fraction of farmers produce vegetables or fruits. These crops are grown mainly in homestead gardens or where irrigation exists (SWARDO, 2014).Livestock isalso very important to agriculture in the woreda. The woreda has an estimated population of 193,725 cattle, 54,319 sheep, 50,068 goats, 4,716 horses, 21,476 donkeys, 2,869 mules and 130,503 chickens. Out of the total 24,760 farm households found in the woreda around Six percent have no ox. The remains own atleast one ox. Donkeys and Horses are the most common pack animal. The availability of feed and water are serious constraints to livestock production in the woreda. Communal grazing areas, private pastures and crop residues are the principal sources of feed (SWARDO, 2014).

Land and soil degradation, reoccurring drought, small farm plots, high population density and input shortage including draught animal and improved seed are the major agricultural problems of the woreda. These agricultural production problems are enhanced with poor delivery of research technology and extension support. Cash income for household financial requirements is mainly generated from sale of livestock and crop products. Households facing seasonal food shortage receive cash or food transfer, either ‘for work’ (through public work program to employ beneficiaries in SWC works, building roads and other infrastructures) or ‘for free’, from productive safetynet program (PSNP).A total of 17,645 families have got support from food security program (SWARDO, 2014).

3.3. Methodology

3.3.1. Sampling techniques and sample size determination

3.3.2. Sampling Technique

The study sites have a total of 1200 households out of which 400 are inhabitants of Harche Uyya, 450 are inhabitants of Sundusa while the rest 350 resides in 1st Hankota Kebeles (SWFEDO, 2016). Stratified sampling technique was used to select the study kebele. Due to the limited resources and time at the disposal of the researcher, the total size of the sample was 197 farms household.

However, since it is difficult to collect the data from such a large number of HHs population, the researcher determined a sample size by the use of a mathematical sampling technique:

$n = N/1 + N(\alpha)^2$

Where: n= the required total sample size

N= the total farm household population in all sample Kebeles

α = the margin of error from 95% of confidence level (Miller, 2003)

Since there was a large farm household population size, 95% level of confidence with 0.05 errors was used to select total participant respondent farm households using the procedure as follows:-

$n = 800/ 1+ 800 (0.05)^2 = 800/1+2$

$n = 800/3$

$n = 266$

n= 197 household heads were selected from total house hold. The number of household heads were selected from each kebele were determined based on the proportion of household heads (population) in the representative kebeles. The household heads were selected by simple random sampling method todetermine sample size of each kebele proportionally, Kothari (2004), formula were implemented.These comparable sample sizes among the Kebeles were determined in proportion to their household size using a principle of a simple proportion formula:

$n1 = N1/N (n)$

Where: n1= the required sample size from each Kebele

N1=Total number of farm households in each Kebeles

N= Total number of farm households in all selected sample Kebeles

n = Total sample size selected from all sample Kebeles

Table 1: Distribution of Sample size in Study Area

Study area Kebeles	Total Household	Sample size Household
Harche Uyya	280	93
Sundusa	320	106
1st Hankota	200	67
Total	N= 800	n= 266

Source: Soro Woreda Rural Development Office, 2015/2016.

3.4. Data sources and method of data collection

Both primary and secondary data were used for the study. Primary data was collected using quantitative and qualitative methods. The quantitative data was collected by the help of household survey using questionnaire. Household questionnaire data was conducted using both closed and open ended questionnaires to collect the local people's knowledge, attitude and practice towards land degradation and conservation effort. The total of 266 heads of households from the study area was surveyed. The primary data was collected from all of the study Kebele namely 1st hankota, Sundusa, and harchre uyya. The qualitative data was collected participatory rural appraisal (PRA) tools such as Key informant interview and Focus group discussion.

Key informants interview: A checklist was prepared to ask information from key informants. A key informant is an individual who is knowledgeable, most informed, accessible and willing to talk about the issues under study. The key informants' interviews were conducted during the data collection process 21 key informants were interviewed from all of the three Kebele to reveal the specific information relating to knowledge, attitude and practice towards land degradation. The key informants included in this study were Soro woreda agricultural experts, Village Chairpersons, Kebele Executive Officers and Village Elders**.**

Focus group discussions: Focus group discussions were employed purposely to explore information from people of different ages, sex and occupation. This technique was complemented by direct observation where some existing features in economic incentives-related environmental conservation practices were observed. The combination of these techniques is necessary for data triangulation purposes aimed at facilitating validation of data through cross verification from more than two sources. Towards undertaking FGDs, a group of 10 experienced

and knowledgeable individuals who were accessible and willing to talk about the issues under study participated in each kebele. A checklist was prepared to ask information from the proposed members. The prepared list of 11 questionnaires which were reflecting the study objectives were posed to the Village Environmental Committee, Village Natural Resources Committee, Village elders and Environmental conservation committees. The detailed discussions were used to reveal important aspects underlying the study and to learn about rural conditions in relation to conservation practices in an intensive and interactive manner.

3.4.1. Secondary data

Secondary data on agro-ecology of study kebele, total livestock population, main crop, topography, and rain fall and temperature total human population size of each sample kebele was gathered from the woreda agricultural finance and economics office.

3.5. Environmental Knowledge Assessment

To assess the local people basic environmental knowledge concerning land degradation and related environmental problems 13 questionnaire were developed (Appendix A). Thirteen questionnaire targeted the item of knowledge that scored by True or False choices. Answer to knowledge questions where evaluated based on the correctness of each choices may possibly correct or incorrect. The correct answer was valued 1 while incorrect answer scored 0 (Zarrintaj *et al*., 2013). It is very difficult to get a standardized test to measure local people's knowledge, specifically, to measure local people's knowledge on environmental degradation issues. In relation to this, the researcher developed twenty items and got them revised by the Soro woreda agricultural office expertise to measure the local people's environmental knowledge.

To determine the reliability of the items, a pilot test was conducted on 30 farmers at Sundusa, Harche uyya and 1st hankota and comments were collected from agricultural expertise. Based on this, the items were reduced from twenty to thirteen. Using split-half method of calculating reliability, the reliability of the researcher made test was found to be 0.72. Before the administration of the final test, the thirteen items were translated from English into Hadyisa by Hadyisa teachers at Gimbichu Prepatory School. In addition, four expertise from the Soro

Woreda agricultural office and Forest and Nature conservation office were asked to set a cut-off point before the administration of the test.

Accordingly, two expertise from agricultural office suggested 70% and 75%; the other two from Forest and nature conservation suggested 65% and 70%. These figures were averaged and the test cut-off point was taken as 70 %. It was obvious that expertise have a vital role in the teaching and process, including deciding on the cut-off point. Thus, it was evaluated out of 100 with lowest possible total score of zero and the highest possible score of 100. A high score shows high environmental knowledge while the low score reveals the opposite. Scores above 70% show high environmental knowledge, 50%-70% average and scores below 50% show low environmental knowledge (Melaku, 1994 and Asmare, 2007).

3.5.1. Environmental attitude inventory

A Likert-Type Scale was employed to measure the extent to which the local people' feelings were favorable or unfavorable towards land degradation and conservation effort. This scale seems to be easy to construct and administer and gives the same results as the more laboriously constructed scales in measuring attitudes toward a variety of environmental topics (Millward, 1975). 12 attitude items were developed using a five point Likert Type questionnaire and each item indicating the degree of one's feelings toward the land degradation and conservation efforts. The alternatives were strongly agreed, agree undecided, disagree and strongly disagree with allotted marks of 5, 4, 3, 2, and 1, respectively(Appendix A). The items were worded both positively and negatively to minimize the risk of collecting false responses. The marking was reversed for statements requiring negative responses.

After the pilot study, the eighteen items were reduced to fifteen based on the test results and the comments given by Soro woreda agricultural experts. Using split-half method of calculating reliability, the reliability of the researcher made test was found to be 0.75. Like the knowledge test, the attitude items were also translated into Hadyisa for ease of understanding of the items by local peoples. This was done for ease understanding of farmers about environmental issues. The attitude score of an individual farmers is the sum total of item scores on all the 12 items. The highest score would be 60 (if a farmer strongly agrees with all 12 items) indicating favorable

attitudes and the least was 12 (if a farmer strongly disagree with all 12 items) indicating unfavorable attitudes.

Mean percentage score and standard deviation were then calculated and used to describe the local peoples overall attitude towards land degradation and conservation efforts. The attitudes of one individual can be categorized as favorable if its sum of attitude score is high or unfavorable otherwise (Shobeiri, 2005). Some authorities stated that using the score allotted to 'undecided' as a dividing line, the attitude one has can be categorized as favorable or unfavorable (Best and Kahn, 1989, in Teka, 2010). In this case 3x12=36 was used as a dividing line.

3.5.2. Measurements of practice

Thirteen the local people's traditionally practice method inventory items was written on a five point Likert scale was used to measure the local peoples practice towards land degradation and conservation efforts or willingness to reduce and tackle the problem of land degradation to improve the environment. The scale employs five point Likert scales, ranging from always to never at all (Appendix A). In this scale some of items were worded to show positive values whereas others were worded to show negative value. For the positive items value was assigned 5, 4, 3, 2 and 1 always, often, sometimes, rarely and never at all and this value was reversed for negative value items. Always show maximum frequency for an event and therefore it was assigned the highest score. This gave score range of 13 to 65 to practice section. The responses always and often were considered as positive or acceptable and rarely and never were considered as negative or unacceptable (Asmare, 2007cited by Teka, 2010). The internal consistency of the scale was 0.73 practice items using Cronbach alpha.

3.6. Methods of data analysis

To analyze and interpret data gathered from the questionnaires were arranged, analyzed and interpreted by using SPSS version 20.0 software's. In order to analyze the data, appropriate descriptive statistical tools such as percentage, frequency table, standard deviation and mean was used. Mean and standard deviation as well as percentage and frequency table are used to investigate average scores with respect to the variables under investigation while correlation coefficient were used to examine the relationship among respondents environmental knowledge, attitude and practice.

4. RESULT AND DISCUSSION

4.1. Socio-Economic Characteristics of the Respondents

The results in Table 2 revealed that, greater proportion 52% of the farmers were between the age range of 20 and 40 years, while 23.3% of them were between 41 and 50 years of age. Those that fell within above 50 years accounted for 24.7%. The average age of the respondents was 37 years. This implies that the farmers are adults. Also, majority 88% of the farmers were male, while the remaining 12% were females. This implies that male were more involved in agricultural activities in the area. Greater proportion 49.3% completed primary school education, while 38.0% of the respondents were illiterate. About 12.7% of the respondents completed secondary school education. It implies that, the majority of farmers could read and write. Data in further revealed that, 35% of the farmers had been in farming business for more than 21 years, while 25.0% had between 16 and 20 years of farming experience. The table further revealed that 20.0% of the farmers had between 11 and 15 years farming experience while only about 18% and 3% had between 6 and 10, and 1 and 5 farming experiences, respectively.

The average farming experience was about 19 years. This implies that, the respondents are experienced farmers; hence they have acquired enough farming experience needed to perceive the effect of degradation on farming activities in their area, over the years. Moreover, revealed that, 22% of the respondents had between 1 and 3 family, while the remaining 33%, 28.7% and 19.3% had between 4-6, 7-9 and ≥10 persons in the family respectively. The average family size was 6 persons. This implies that, the farmers had a large family size in the area, which could reduce the demand for hired labor as members of the farm families could carry out some of the farming and non-farming activities. Also, further revealed that, majority 40% of the farmers had less than 1 hectare while only 48% had between 1 and 2 hectares of land for farming and 12% of had 3-4 hectares. This shows that they are small scale farmers, which is a typical feature of rural farmers in the study area.

The farmers are engaged in small scale mixed farming systems using simple farm implements and methods of production. Because of the basic nature of farming they produce very small yields, and thus their farming is better described as subsistence. Most of the household heads

drive their livelihood from mixed farming, crop production and mixed farming and petty trade. The numbers of respondents, who were engaging in crop production, are 58 %, and mixed farming are 21.3% and mixed farming and petty trade 20.7%.

Table 2: Socio-economic characteristics of the respondents

Sex	Frequency	Percent
Male	132	88
Female	18	12
Total	150	100
Age	Frequency	Percent
20-30	48	32
31-40	30	20
41-50	35	23
≥51	37	24.7
Total	150	100
Family size	Frequency	Percent
1-3	33	22
4-6	45	30
7-9	43	28.7
≥10	29	19.3
Total	150	100
Education status	Frequency	Percent
Illiterate	57	38
1-4	45	30
5-8	29	19.3
≥9	19	12.7
Total	150	100
Economic activities	frequency	percent
Crop production	87	58
Mixed farming	32	20.7
Mixed farming and petty trade	31	20.7
Total	150	100

4.1.2.The local people's knowledge towards land degradation on the causes of deforestation

The survey result indicates that around 75% of respondents have a positive knowledge towards deforestation and 25% of respondents have a poor knowledge towards deforestation that is a cause's of land degradation (Table 3). Deforestation is one of the serious problems in the study area as observed during the site assessment and observation. Most of the hill sides are barren of vegetation as a result of continued destruction of the natural forests without management and

protection. Farmers within the study area have to travel long distances to cut down the first available tree to obtain wood for fuel and construction.

According to the information obtained from FGDs and key informants, deforestation as the removal or damage of vegetation in the forest to the extent that it no more support its natural flora and fauna. In other words, deforestation is the transformation of forest land to non-forest land. Deforestation impacts economic activity and threatens the livelihood and cultural integrity of forest-dependent people at local level. Deforestation reduces the supply of forest products and leads to siltation, flooding and soil degradation. The result supported by Yasuka and Levins (2007), are of the opinion that clearing forests and the subsequent agricultural development has a detrimental effect on every element of local ecosystems such as microclimate, soil and aquatic conditions, and most significantly, the ecology of local plants and animals including human disease factors.

. According to the experts and development agents, soil erosion and deforestation are the major problems that seriously affect the livelihoods of the communities in the woreda, in general and in the study area, in particular.

Figure 2: Clearing of trees

Source; field survey, 2017

4.1.3. The local people's knowledge towards land degradation on the cause of population growth

The survey result shows that 72.7% of respondents have good knowledge about rapid population growth leads to land degradation where as 27.3% of respondents have poor knowledge to that of rapid population growth leads to land degradation, those who say the increment of population is useful to decrease labor work time (Table 3). In developing countries, land degradation is one of the greatest threats which strike at the basic resource of the population. The degradation process is so acute in study are that thousands of people have fallen into poverty and have suffered famine and death. In the study area, massive environmental degradation has occurred during the last few decades due to natural factors, unwise use of its natural resources, unsound ecological practices and population pressure.

. Berry (2003) cited by Temesgen *et al.* (2014) also reported that the loss of land resource productivity in Ethiopia is due to the continued population growth. In this regard, Tilahun *et al*. (2001) cited by Temesgen *et al*. (2014) also argued that declining vegetative cover and increased levels of farming on steep slopes in Ethiopian highlands is associated with population pressure have eroded and depleted soils in the area, so that soil degradation is now a widespread environmental problem.

4.1.4. The local people's knowledge towards land degradation on the causes of over grazing

The result shows that 75% of the respondents have good knowledge on overgrazing were cause of land degradation, where as 25% of the respondents has poor knowledge to that of overgrazing was cause of land degradation (Table 3). Overgrazing reduces soil organic matter content, degrades soil structure, and accelerates water and wind erosion. Trampling by cattle causes soil compaction, reduces root proliferation and growth, and decreases water infiltration rate and drainage. Increase in stocking rate results in corresponding increase in runoff and soil erosion in heavily grazed areas. According to Dessalew (2016), 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 cited in Dessalew, 2016).

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 (Dessalew, 2015). The result was supported by (Czeglei and Radacsi, 2005) over grazing is abuse of grassland, due to decrease in grassland and increase in livestock numbers.

Figure 3: The formation of gullies through over grazing

Source; field survey, 2017

4.1.5. The local peoples knowledge access to extension services improving land degradation

Any new agricultural practices in particular area need adequate mechanism in diffusing information. Lack of relevant and timely information can prevent a wide spread practices of natural resource conservation activities. Access to extension services helps farmers to gain better understanding of the potential effects of soil erosion and benefits of soil and water conservation practices as well as enhancing knowledge on the application of soil and water conservation technologies. The respondents were asked whether they have access to any extension services related to land management practices. Accordingly, 74% of the respondents replied that they have access to extension services that promote land management practices. Significant number of respondents (26%) reported that they have no any access to extension services related to land

management practices. Those respondents who have access to extension services were asked whether they implemented it on their land or not. The result supported by Gebreslassie (2015), the success story on soil and water conservation practice in a given watershed is a function of training facility and access to extension service (Woldamlak and Sterk, 2002).

The study clearly indicated that Developmental agents took a lion of share in providing training and remains committed on the task of extension services. Moreover, there is a chance where training and follow up on soil and water conservation measure from Non-Governmental Organization even though inconsistent. According to the survey report, DAs 63.7% are the major source of information for land management followed by traditional (their own experience) 56% by which farmers used to carry out soil and water conservation practices. About 41.7%, 12.6% and 7.7% respondents indicated that people in the neighborhood, NGO's and mass-media respectively are source of information for land management practices in their own and communal lands

Figure 4: Key informant interview about land degradation

Source; field survey, 2017

4.1.6. The local people's knowledge towards land degradationon cause of soil erosion in the area

Throughout the discussion perception of farmers on the causes of soil erosion were very familiar. From the finding as farmers of the study area said that some of the main causes of soil erosion problems of Soroworeda perceived by farmers were the slope of the land, deforestation, improper farming practice and high intensity of rainfall and absence of appropriate soil conservation practice. Moreover, based on the focus group participates and key informants of the study area farmers perception of soil problems refers to the perception to relationship and processes of soil erosion, and fertility of the soil. The surveyed households were asked about the indicators of soil erosion problem on their own farm plots, 45.3% of farmers reported that thepresence of gullies and rills as a major indicator on their cultivated plot and communal grazing land. The rest, 37.3% and 17.4%, of farmers also reported that the decline of agricultural productivity of their farm plots and the change of soil color were the indicators of soil erosion, respectively (Table 3). This perception of the farmers is most closely associated with the scientific finding of most researchers.

According to the survey result, soil erosion was severe on farm plots and communal grazing lands at rainy or summer season locally called "hagaye". This shows that the major causes of soil erosion in the study area is water erosion. The study showed that the majority 89% of farmers' stated that livestock have contribution for soil erosion process, whereas 11% of household farmers reported that live stocks have no contribution for soil erosion process.The result in line with (Firuza and Yusuf, 2015) Farmers' perception of soil erosion is one of the important social factors determining their level of understanding about soil erosion and its effects. All of the interviewed farmers are well aware and the majority (91.9%) perceived soil erosion as plots. Of course, farmers are familiar with soil erosion from observations of their surroundings, where, farm lands have been left uncultivated and became rock outcrops with un-crossable gullies, and accumulated years of farming experiences. The majority of the farmers 80.2% noted the problem of water erosion on their farm plots increasing. The rest, 12.5%, and 7.3%, of farmers also reported, no change and decreasing respectively. This implies that the farmers had a high level perception of the trend of water erosion as increasing in the study region.

Figure 5: Formation of gullies through deforestation

source field survey, 2017

Table 3: Percentage Distribution of Knowledge of respondents towards land degradation and conservation efforts

Statements	**Yes (%)**	**No (%)**
Significant information from DAs is important to conserve soil fertility.	80%	20%
Access to extension service	74%	26%
Population growth has a problem to environmental degradation?	72.7%	27.3%
reduction of agricultural product shortage of food and lack of fire wood are the indictor of land degradation	61.3%	38.7%
Institutional factor is the under lined cause of land degradation	78%	22%
Over grazing are consequence of land degradation	59.3%	40.7%
Soil erosion is cause of land degradation.	92%	8%
The current land tenure system is important for land conservation efforts.	52.7%	47.3%
Deforestation is subjected to the force of land degradation	74.7%	25.3%

4.1.7. The local community attitude towards land degradation on the causes of assessments of institutional factor

The finding indicates that 78% of Farmers make decisions within a broader environment or context. One of the elements in the environment consists of institutions. These can be seen at the local and national level. Local labor organizations, social institutions such as kin networks and cultural norms are identified factors affecting soil and water conservation. The farm household justified that since soil and water conservation activities are highly labor intensive they may need labor more than available in the household. They replied that Agricultural extension services are the major institutions operating in the rural area. It is necessary to provide information and enhance the knowledge and skills of farmers, and other institutional changes made. The information obtained and the knowledge and skills gained through training accelerates farmer's decision on soil and water conservation practices.

According to Shifaw (2015), among institutional factors, low credit availability 78% and applying new SWC technologies before consulting farmers (82%) were mentioned by the majority. In addition, Presence of different drawback associated with introduced SWC measures such as narrowing land, inconvenient for tillage and damage of structures by rain or livestock were the other limiting factor explained by the majority (51%). It was also observed that infrastructure and access to markets were not good. If a good road system and competitively priced transport provide access to urban markets with high demand crops, crop values will increase, resulting in higher incentives to conserve land for long-term gain.

4.1.8. The local people's knowledge towards land degradation on the cause of tenure insecurity

Farmers in the study area are contented and hopeful with the right to their land. Their willingness for resources conservation and transferring to their sons increases when the land possession is secure. The relationship between land tenure security and practice of structural soil conservation measures is positively associated. This is in consensus with the study of Lakew *et al*. (2005).

Seventy five percent of accessed farmers suggested that secured landholding encourages farmers in planning and implementation of relatively permanent conservation structures on their plots. They started to rehabilitate even the rock outcrop area after land ownership certification, because that belongs to them and will become the land of their sons in the future. Thus, many studies in

Ethiopia found that land tenure insecurity has negative effect on farmers' decision to practice soil conservation structures (Bekele and Holden, 1998). Since stable land tenure is very important for adoption of major investments especially terrace construction, the low level of retaining conservation structure throughout the country is attributable to land tenure insecurity (Bekele and Holden, 1998). Lakew *et al.* (2005) described that the certification of the land owned by farmers has great relation with and importance on investing on soil conservation and it is best reinforcement to rehabilitate the degraded land. He added that each farmer has to conserve and manage his/her land as per the watershed development program.

The land tenure pattern of the nation also affects the decision of farmers on soil and water conservation practices. Farmers are unwilling to invest on soil and water conservation if they are land insecure. The incentives given by external organizations to farmers through food for work encourage or discourage farmers' to use improved soil and water conservation measures.This finding is supported by Wegayehu (2006) and Yitayal (2003), suggested that households with access to institutional support such as extension services and soil and water conservation program, tend to acquire supported inputs, information and better understanding of the land degradation problem and soil conservation practices and hence may perceive soil and water conservation to be profitable. Also, households that participate in labor sharing groups and receive recourses (e.g. implements) through soil and water conservation program are expected to have more incentives to adopt conservation measures than other.

4.1.9. Sources of information about Land degradation and Soil and Water Conservation Practices

The finding of result indicates that older members of households, having long-term interaction with their environment were able to compare past and present production trends when describing the patterns of land degradation. The result shows that friends and relatives were indicated by 80% of respondents as a most significant source of information. About 80 % of the respondents used kebeleleaders as a source of information. The respondents commented that the solution for minimizing or stopping land degradation in the study area first to aware the society about the outcomes of degradation those activities dependingup on entire farming process who made agriculture as a main source of income for livelihood. Secondly, giving material and financial

support to those depend up on these activities. Thirdly giving land for cultivation which they depend up on crop production and finally formulating and implementing polices to protect land degradation. This supports the works of (de Graaff, 2008) stated that the underlying cause for the excessive soil loss is unsustainable exploitation of land resource via poor practices of natural vegetation for fuel wood and other uses and expansion of cultivation and grazing lands. As the study area is more susceptible and relatively highly populated and increasing intensification and continuous cultivation on sloping lands without fallowing or conservation measures a serious threat to sustainable land use management.

4.2. The Local Peoples Attitude towards Land Degradation and Conservation Efforts

In this study, attitude among respondents were investigated by the responses to 12 questionnaires on the attitude towards land degradation and conservation efforts. The result showed that the majority of 68% of local peoples favorable attitude towards land degradation and conservation efforts, while 32% of respondents have unfavorable attitude towards land degradation and conservation efforts. The Local farmers attitude of land degradationResponse to the inquiry on whether the study area perceived soil degradation as aproblem in their villages have shown that 71% of the respondents considered landdegradation as being a serious problem in their area. This attitude may beinfluenced by differences in socio-economic characteristics inherent among the local people..

4.2.1. The relation ship between Land Degradation and poverty and famine

The result of survey indicate that 9.3% strongly agree,40% of the respondents agree,8% of the respondent undecided, 36.7% disagree and 6% of the respondents strongly disagree, this implies that in the study area the respondents more or less have positive attitudes that land degradation leads to poverty and famine. While we know that land degradation leads to poverty as part of its eventual consequences on the rural people, some authors have also argued and stated that poverty leads to land degradation. According to Dessalew (2016), 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 cited in Dessalew, 2016). Local institutions and organizations, 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.

According to Tallis *et al.* (2008), cited by Obaisi (2015), the provision of ecological services are generally thought to contribute to poverty alleviation, especially in rural regions of developing nations. Eventually the degradation of these services is also presumed to lead to adverse effects on human-well-being, or to down play efforts to reduce poverty (Sjostedt, 2012 cited by Obaisi, 2015). Indeed, a lot of the research into ecological services and well-being focuses on developing nations; perhaps stemming from observations that the down ward spiral in well-being has been linked with growths in dependence on ecological resources (Shackleton and Shackleton, 2012 cited by Obaisi, 2015), and because the livelihoods of the poor appear to depend most directly on the supply of ecological services. However, environmental degradation aggravates poverty even if the responsibility of environmental degradation falls more heavily on the wealthy and on the policies of Western countries (Kuri, 2007). Essentially, the poverty hold explanation of the linkage between land degradation and poverty is to a large range correct. However, institutional and policy issues are a huge cause of environmental degradation, which in turn worsens the living standards of those impoverished.

4.2.2. The local community attitude in the involvement in off-farm activities lead to land degradation

Involvement in off- farm jobs is common in the study area. Its own effect on land restoration practices. As poor farmers generally hold small land, they are more often engaged in off farm activities such as petty trade, daily labor work, handicraft and small scale trading and brewing local beverages (keneto, shameta and Arake). This can decrease their interest to invest on soil conservation practices 73.5% of the respondents replied that some members of their family are involved in off-farm activities, while 26.5% of the respondents replied that none of their family members has involvement in these activities. Those respondents, who are involved in off farm activities, were asked to indicate the type of activities they were involved.

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The result in line with Adugnaw (2013) the engagement of farmers in off farm activities was found to influence continued use of conservation structures negatively. The implication is that farmers who involve in off-farm income generating activities are far from the farming plots and likely to put less effort in maintenance and hence on retention of conservation structures. More than this, most of off farm income is generated in the winter season which is also suitable time for farmers to undertake construction and maintenance of soil conservation activities. Hence, it appears that off-farm activities compete for the labor resource the farmer uses for conservation and maintenance of conservation structures. Alemu (1999), cited by Adugnaw (2013) have also found that the probability of continual use of soil conservation structures decreases with increasing farmer's involvement in off-farm income generating activities. This may be due to the fact that farmers who involve more in off farm employment have less commitment to the farm and hence, they do not view the economic impacts of soil erosion as being large enough to justify undertaking soil conservation.

Figure 6: Focus group discussion

Source; field survey, 2017

4.2.3. The Local Peoples Knowledge and Attitude towards the consequence of Land Degradation

The result indicated that the majority of 79% of the respondents have good knowledge and favorable attitude towards consequences of land degradation on in the study area decline in crop yields; reduced responses to inputs; increased inputs and greater costs; total leaving of land; loss of water for irrigation; loss of flexibility in land management; lowering of the water table; and diversion of resources to reclamation. The consequences of land degradation on people in the study area were categorized into the following: increased landlessness; lower incomes; increased labour requirements; and lower and less reliable food supplies. The study established that lower and less reliable food supplies was the most serious outcome of land degradation in the study area.

In general, the global extent of arable land and grazing land continues to decline due to degradation emanating from urbanization, unsustainable agricultural practices and deforestation. Moreover, a significant portion of the remaining arable and grazing land is under considerable pressure due to compaction of livestock and farm implements, salinization, alkalization or acidification, depletion of nutrients, water and wind erosion and deterioration of drainage. Especially, sub Saharan Africa where Ethiopia is found is facing serious environment and development problem (Taffa, 2002). In Ethiopia, the issue of land degradation is so vital since the livelihood of the biggest portion of the country's population and the overall economy of the country depend on agriculture. Land degradation is seriously affecting agricultural production and food security of the country's population. Nowadays, it is becoming one of the most important problems of food security in the country (Aklilu, 2006). This is for the reason that, the high degree of land degradation in Ethiopia, especially the degradation in the form of soil erosion is one of the major environmental problems that have negatively affected the performance of agricultural sector as the overall economy.

Accordingly, the livelihood of Ethiopian population is threatened by the increasing trend of land degradation (Aklilu, 2006; Habtamu, 2006). The impact of land degradation on Ethiopia's agricultural economy is very large. Ethiopia is losing 30,000 hectares of land on annual basis due to degradation and so far more than 2 million hectares have already been severally damaged (WB, 2007). The country is losing a significant volume of soil every year due to soil erosion.

The annual loss of soil in highlands of Ethiopia was estimated to range from 20 to 100 tons/hectare per year which leads to an annual productivity loss on cropland of 0.1% to 2% of total production for the country (Lakew, *et al* 2000). In general, the agricultural economy of the country is highly threatened by land degradation induced by specifically accelerated soil erosion.

4.2.4.The Local people's Knowledge and Attitude towards on indicator of Land Degradation

Declining soil fertility was perceived as the major indicator of soil degradation in the studied farm lands. A majority of the farmers 89.7% attributed such decline to continuous cultivation without resting the fields, whereas 11.3 % described it to inadequate application of manure and/or fertilizers. One explanation to continuous cultivation was the increasing land shortage that has led to intensified crop cultivation and short or no fallow periods. This finding supported by (Moges and Holden, 2007; Stringer and Reed, 2007) the indicator of land degradation was identified by local residents through reduction in crop yield, depletion of soil nutrients, rainfall variability, soil erosion, soil compaction continuous cropping,.

Soil erosion and surface runoff featured as indicators of soil degradation as indicated by about 70% of respondent farmers. Attitude of soil erosion as a soil degrading process featured more prominently among the respondents. Visual observation of the landscape in these study area confirms the local people's response. Discussions with key informants in these area indicated that historically had large numbers of livestock prior to destocking that reduced many places barren of vegetation because of overgrazing. This situation exposed the land surface to agents of soil erosion, in the study area.

According to Mogos and Holden (2007), also found out that farmers in Southern Ethiopia perceived soil degradation on the basis of the changing physical appearance of the soil, that is, when it is becoming stony or coarser. Similarly Local perception refers to the causes and status of land degradation as farmers detect and express it as occurring on their lands. For example, in KushingaWard, Zimbabwe, the major causes of soil erosion identified by peasants were the cultivation of steep slopes and stream banks, population pressure and overgrazing (Manjoro, 2006). Soil erosion as an indicator of land degradation was also perceived by farmers in Southern Ethiopia through the processes of the soil becoming, the formation of rills, the partition of fields and gullies and topsoil was removed (Moges and Holden, 2007). Other common peasant land

degradation indicators include plant species, weed abundance, changes in soil texture and stoniness, and crop yield productivity. In general terms, it can be concluded that the farmers were aware of the severity of land degradation. This finding supports Tigist (2009), in which land degradation is common in area were improper use and inappropriate conservation of natural resources were practiced. She found that development of degradation will start when the people and government have not commitment towards soil conservation practices.

Figure 7: The indication of soil erosion on farmland
Source; field survey, 2017

.Table 4: Percentage Distribution of Attitude of respondents towards land degradation and conservation efforts

Statements	Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
Inoff farm activities leads to land degradation?	73.5%			26.5%	
Consequenceof landlessness lead to land degradation.	79 %			21%	
Land degradation leads to poverty and famine.	9.3%	40%	8%	36.7%	6%
Forest fire is consequence for land degradation in local area.	75%			25%	
Loss of production stony and sandy soil are indicator of land degradation	89.7 %			11.3%	

4.2.5. Attitude of local peoples towards the consequences of forest fire

The finding of result shows that more than 75% of the respondents were a positive attitude towards the consequence of forest fire in the area. A Forest fire, one element that harms forests, is one of the most important natural disasters directly concerning all countries with its effects and results. Fires, caused by various reasons, are the most important environmental threat that causes millions of hectares of forest land to be destroyed each year, a large amount of forest fire fighting expenses and loss of recreational value and lives. Large scale fires in forests not only cause the floras to be destroyed but also, as a result of depriving the land of floras, a chain reaction occurs, which causes water resources to be spoiled, air pollution, desertification, and natural disasters such as flood, avalanche and landslip to be experienced more frequently. Also, the large scale fires that take place in different areas may continue for many days and may even threaten agricultural and settlement areas.

4.3. The traditional soil fertility improvement and practices methods

Individual farmer practices different land management activities mainly to increase agricultural yields and to conserve the natural environment on their farming plot. They practice both the short and long benefit oriented soil fertility management. For short term effect, farmers apply chemical fertilizer to obtain high agricultural yield. Traditionally through time, farmers have developed

different soil conservation and land management practices of their own. With these practices, farmers have been able to sustain their production for centuries. Even up to now, it has been acknowledged that these technologies, which include ploughing of narrow ditches on sloping fields to control run-off, farmland terraces, traditional ditches and furrows, contour ploughing, fallowing, crop rotation, farmyard manure and agroforestry continue to play a significant role in the production of subsistence agriculture (Betru, 2003).

As many parts of Ethiopian highlands, farmers have a pool of indigenous knowledge with which they use and manage their land resources. They make efforts to conserve their soils against erosion by applying a range of conservation techniques. Among soil and water conservation measures, which is widely used by farmers, in almost all households, is contour ploughing. Almost above 76.7% respondents confirmed that they manage soil from erosion through contour ploughing. To establish the structure, the farm plots are ploughed horizontally: - following the contours so that those contour furrows are created with the help of traditional iron plough. As it was discussed with the woredaexpert; the furrows that are formed along contours help to hold the water until it infiltrates into the soil and then in to the ground. Hence, it reduces the erosive effects of surface run off on farming plots. Traditional ditches are extensively practiced to conserve soil and water in the area. According to survey result, about 85% practice traditional ditches in most of their farm plots. Homestead areas are less affected by erosion because the permanent enset cultivation in homestead farm plots. Findings from the survey respondents indicated that, hill side terracing and check-dams were among the most frequently used physical structures for soil and water conservation. However, it was noted from FGD participants and key informants that the terracing and check-dams were poor quality.

As a result they serve only for a short period of time, until they face a heavy rain fall. Moreover, the potential positive impact of conservation attempts had also been reversed by the simultaneous devastating act of the farmers themselves for cultivation and uncontrolled animals grazing Grass strip, stone bounds. The result supported by Tatek (2014),Soil (stone) bundis an embankment or ridge built across a slope along the contour. Soil bunds are made of soil or mud. On moderately sloping areas the farmers construct the soil and stone bunds for erosion control but most of the time farmers of the study area used soil bund structures instead of stone bund. As the key informants stated that if shortage of stone is exist on their farm area they were used soil

bunds structures. As it is stated by key informants during focus group discussion the stone bund are considered effective in erosion control.

4.3.1. The indigenous knowledge of crop rotation system to improve soil fertility on farm land

According to survey results, as indicated in (Table 5) 34.7% always, 42% often and 23.3% sometimes this implies in the area the respondents practice crop rotation as one of the most important methods of improving soil fertility and soil conservation method on cultivated fields. It is a method through which nutrient content of the soil is improved by interchangeably cultivating different crops on the same plot of land. This method again becomes more important when leguminous crops are part of the rotation system to improve the nitrate content of the soil. This was supported by Shibiru (2010) and Tatek (2014) traditionally; the major cereals are grown in rotation with sorghum or maize. More than 92% of the respondents reported that they practiced crop rotation. But, a relatively high proportion of farmers reported that they grow sorghum or maize in rotation with teff, wheat or barley. Asked why they preferred this sequence of crop rotation, they perceived that soil fertility was improved when cereals were grown in rotation with sorghum or maize. According to the information obtained from FGDs and key informants, this system is one of the widely practiced soil fertility improvement system. The rotation system mostly consists of cultivation of cereals (wheat, barley, teff, maize and sorghum), legumes (mainly beans and pea), and root crops (potatoes) in the farm plot at different seasons and years.

4.3.2. The local people's indigenous knowledge on application of organic manure to control land degradation on farm lands

Manure is an important input of promoting the fertility status of the soil. Its application to farm land raises soil nutrient level, increasing rate of infiltration and reduces soil erosion. The survey result shows that about 24.7%, often 23.3% sometimes 21.3% rarely and 30.7% never at all of the respondents use manure to improve soil fertility. However, recently, manure application on farm lands have been decreasing from time to time. This is mainly due to the significant decline of the number of livestock per household as well as used as a source of energy.

As farmers explained during individual interview session, most of the time farmers used manure application on their farm fields some weeks before planting and late to incorporate it with the

soil. This implies that, the application of manure was highly exposed for direct sun light that causes nutrient volatilization during dry season and leaching during rainy season. In principle knowledgeable farmers always followed the application of manure at the time of crop planting and incorporated it in the soil (Rajan, *et al*, 2010 cited by Bizayehu, 2014). The FGD participants indicated that fragmentation of farming plots has confined the use of manure only around the homestead area than the distance farming plot. In addition, the use of cattle dung as source of fuel for cooking is another contributing factor for low application of manure for soil fertility improvement practice.

4.3.3. The traditionally construction of terracing method to reduce soil degradation

The study sought to establish whether the practice method of terraces protect land degradation the shows that 8% of the respondents strongly agree always practice terracing method,28.7% often,14% sometimes the majority 45.3% practice terraces rarely 4% never at all this implies terracing method were not commonly practice in the study area. But The Konso of southern Ethiopia is well known for their traditional soil and water conservation practices. Their farming is based on an elaborate system of terraces, a variety of other soil and water management practices and the integration of livestock and forestry with the rest of their agriculture. Stone bunds are generally quite common in the dry zones of the tropics, since they are relatively easy to construct during the dry season. The result in line with (Assefa, 2014) however, the availability of stones is one of the factors that limit the expansion of terraces to other places. In the study area, labor shortages for the construction and maintenance of terraces are also a recent challenge. This is attributed to the migration of young people to South Africa and other towns for economic reasons. The recent modern transformation and assimilation of cultures and religions as well as urbanization processes have also exacerbated the problem of land management.

For example, some people who went to urban areas, where they worked in off-farm jobs, returned to their rural environment with little interest in the construction and maintenance of terraces. The older people rightly stated that their parents were better at constructing and maintaining the terraces than themselves, with the current younger generation being yet weaker in this regard. The narrow spaces between consecutive terraces are another limitation. According to the information obtained from FGDs and key informants, terracing practice method is not

common in the study area because of there is no the availability of stone bund to construct terracing method this result in line with (Shibiru, 2010).

Figure 8: Integrated soil and water conservation effort
Source; field survey, 2017

4.3.4. The local people' areused traditional intercropping practice method to improve soil fertility

The survey result indicated that 33.3% of respondents often practice intercropping, 31.3% sometimes practice intercropping and 35.3% of respondents rarely practice intercropping this result shows that the commonly practice method in the study area. Intercropping is the simultaneous cultivation of two or more species on the same field, during a growing season, in order to produce a greater yield, by making use of resources that would otherwise not be utilized by a single crop.Accordingto Hailu (2015),intercropping can be seen as the practical application of diversity, competition and facilitation in arable cropping systems. Grain leguminous-cereal mixed intercrops are better at exploiting natural resources as compared to the sole crops of different plant species. Grain leguminous can cover their nitrogen demand from atmospheric N2 and therefore in intercropping with cereals compete less Compared with grain leguminous-cereal intercropping, the grain leguminous can cover their nitrogen demand from atmospheric N2 and

therefore in intercropping with cereals compete less Compared with grain leguminous-cereal intercropping, the grain leguminous from monoculture can be grown under organic agriculture conditions but they have some disadvantages. For example, pea plants from monoculture may often lodge heavily, making harvesting difficult and great yield losses can occur.

4.3.5. Traditionally agroforestry practice method to control land degradation in farm lands

The survey result indicates that the agroforestry practice in the study area were only 2% respondents practice always,36% of respondents often,21.3% practice sometimes,32.7% practice rarely and 8% of the respondents practice never at all (Table 5). The result shows that the agroforestry practice decreases time to time due to lack of positive attitude towards agroforestry practice and applying various specialized knowledge and skill to sustain the farm land. The role of agroforestry in satisfying the basic needs of the rural people of Ethiopia is large but, little research has been initiated to identify suitable agroforestry technologies and appropriate tree species for specific area. The findings of this study in line with Shibiru (2010), also suggest that agroforestry is rarely used as a means of maintaining soil fertility. In the study villages, scattered trees on crop land are also found, but the trees are widely spaced and probably have little effect in maintaining soil fertility. Agroforestry practices offer practical ways of applying various specialized knowledge and skills to the development of sustainable rural production systems. Agroforestry is recognized as a land use option in which trees provide both products and environmental services. In agroforestry systems, the trees grown on different farmlands in the same locality when aggregated can bring about improved wooded situation thereby enhancing environmental protection.

4.3.6. The l local people's traditional knowledge and attitude on practice of retention of crop residue method to control land degradation

The result indicated that the respondents in study area 14.7% always, 12% often 43.3% some times, 24.7% rarely and 5.3% never at all respectively practice crop residue retention method. This result shows that the participation of the respondents in the crop residue practice to improve and conserve soil management practice was very low. Key informants and focus group discussion informs that in the study area crop residue used as a source of fuel and fodder for livestock. These result supported by (Desta, 2012), Worth noting is the fact that only 4.2% of the

respondents' leave crop residues to burn on farm land in-order to maintain or improve productivity of land and that 10% of the respondents reported planting trees. This indicates little practicing of these measures in the study area. Focus group discussions further reiterated that the low level of crop residue application is not due to lack of knowledge of its importance, but that it is now a primary source of livestock feed with the increasing scarcity of grazing land. It was further revealed that manure is now gradually becoming more used as a source of fuel than for use in fields due to shortage of firewood.

Figure 9: Burnings of crop residues

4.3.7. The indigenous knowledge and attitude of local peoples on practice of Soil bund to control land degradation in the study area

The result indicates that 78% of the respondents practice soil bunds implemented by farmers to protect and conserve soil fertility in study area. Soil bundis an embankment or ridge built across a slope along the contour. Soil bunds are made of soil or mud. On moderately sloping areas the farmers construct the soil bunds for erosion control but most of the time farmers of the study area removed soil bund from cultivated land (Figure 10). As the key informants stated that if shortage of stone is exist on their farm area they were used soil bunds structures. During focus group

discussion stated that the removal of soil bunds from their cultivated land due to shortage of farm size.

Figure 10: Removal and construction of soil bunds from farmland

As the (Figure 10) indicates, about 72% of the farmers either partially removed or modified and maintained the soil conservation measures. Moreover, among the remaining farmers (28%) of the

respondents totally removed the soil conservation structures. These findings inline with other studies that argue farmers in developing countries often reject externally introduced SWC technologies because of the inappropriateness to farmers' requirements and local farming systems. The practice has largely remained delivery oriented in which the farmers are forced to implement conservation measures designed for them by technical experts (Woldeamlak, 2003). Investigations made in other study areas also came up with similar result. Habtamu (2006), found that 53% of farmers interviewed removed introduced conservationmeasures completely, 31% removed selectively and only 16% maintained the original conservation measures. Woldeamlak (2003), reported that more than half of the farmers that installed conservation structures on their fields did not plan to maintain the structures after the project were phased out. Woldeamlak (2007), also found that 78% of farmers interviewed did not intend to continue to implement introduced conservation technologies in their plots that did not receive treatment with the assistance of the project. This indicates that farmers' adoption of conservation technologies is lower in most parts of the country.

4.3.8. The traditional practice of mulching method to improve soil degradation

According the survey result shows that 2% and 31.3% of the respondents practice mulching methods always and often respectively, 11.3% of the respondents sometimes practice mulching methods and most of the respondent such as 49.3% of the respondents practices the method rarely and 6% of the respondent does not practice mulching method. Mulch has many positive effects on soils. Generally, organic mulches conserve water, reduce weeds, improve soil quality and enhance plant growth.Mulches also protect the soil from compaction by rain and foot traffic. By preventing the loss of soil structure caused by compaction, mulches promote water infiltration into the soil. Also mulched plants can better use water stored in the soil because, young weeds cannot produce sugars needed for growth and ultimately die. Some weed seeds require light in order to germinate, so mulch can also prevent germination.

The result was supported by (Yeshambel, 2013),most farmers were using surface mulches on their fields, thus providing protective cover at a time when crop cover is not present. Some farmers left crop residue while others used by branches. The benefit of protective covering was widely appreciated, as was the improved infiltration rate afforded by the techniques and reduced

evaporation rate. Further stated objective is the addition of nutrients to the soil through the decomposition of the organic matter.

Table 5: The percentage of traditional soil conservation practice method

State ments	**Always**	**Often**	**Some times**	**Rarely**	**Never at all**
Animal manure		24.7%	23.3%	21.3%	30.7%
Crop rotation	34.7%	42%	23.3%		
Fallowing	16.7%	4.7%	10.7%	24%	44%
Intercropping		33.3%	31.3%	35.3%	
Agroforestry	2%	36%	21.3%	32.7%	8%
Green manuring		34%	18%	28.7%	19.3%
Contour plowing	34%	42.7%	23.3%		
The use of strip and terraces	8%	28.7%	14%	45.3%	4%
Wind breaks or vegetation covers	7.3%	25.3%	9.3%	55.3%	2.7%
Construction of Soil Bunds	25%	36%	30.7%	8.3%	
Mulching	2%	31.3%	11.3%	49.3%	6%
Reforestation	23.3%	24%	40.7%	12%	
Retention of crop residue	14.7%	12%	43.3%	24.7%	5.3%

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5. CONCLUSION AND RECOMENDATION

5.1. Conclusion

Land degradation is the process of reducing or depleting the productive capacity of land caused by improper and poor farming system, improper land use system, deforestation soil erosion, high population pressure and over grazing. However, awareness of farmers in the importance of land management practices like agroforestry; afforestation and fallowing are found to be too low. This paper addresses the issue of land resource degradation and conservation with the aim of assessing local people's knowledge, attitude and practice. To attain this intention, descriptive statistical analysis was used. The results show that all assessed farmers have noticed the existence of soil erosion, deforestation, over grazing, over cultivation, burning of crop residue and population pressure problems and the majority prioritized conservation of these resources first among others.

The majority of farmers said that land degradation in the form of soil erosion, deforestation over cultivation and over grazing is increasing and the levels of these problems were rated from medium to high. Farmers had relatively better awareness of the causes and consequences of deforestation population pressure and soil erosion. Different land resource conservation measures were practice in the area but not widespread. Particularly, introduced conservation measures were not common and there were no result show sites before disseminating new technologies to the farmers. It was also found that some technological, institutional and household factors were limiting local community active participation in land resource conservation.

The analysis also shows that the respondents have favorable attitude towards land degradation and conservation efforts in that the majority were generally agreed to positive. We believe that this study could contribute to policy interventions for land conservation that take into account local peoples knowledge, attitude and practice of the problem, their priorities and the conditions that influence their decisions. This analysis also contributes to the body of literature in the field of land degradation and conservation as well as to make good use of farmers' knowledge in the area. The findings could be extended to other areas with similar agro-ecological and socio-economic settings. As it is obvious that land degradation and conservation is complex that is

linked to different physical, social, economic and institutional systems, further studies on the issue should continue to bring the magnitude of the problem to the community and high level policy makers in order to rehabilitate the degraded natural resources.

5.2. Recommendation

- The educational/training programme which was provided for local peoples should be modified by considering the existing knowledge and practices in a particular area.
- The shaping of attitudes, values, commitment and skills to protect and preserve the environmental problems begins at an early age. Since environmental education and training is an instrument to equip local peoples with efficient knowledge, attitude and positive environmental practices.
- The local peoples' environmental practices were not in performance with the level of their knowledge and attitude. In order to enhance the local communities environmental practices the existing environmental organization and non-governmental organization should be strengthened, environmental corners should be established in local area and the media should play its role in order to replicate positive environmental practices.
- Integrating soil conservation measures of the local people with the currently working farming system. That can improve the indigenous knowledge system of soil conservation and the possibility of integration between indigenous knowledge systems with some modern/scientific knowledge rather than totally forget the indigenous knowledge of the farmer. This is because building upon indigenous knowledge system will boast farmers' self-reliance and felling of empowerment as determinants of their own course towards an improved livelihood and sustainable land use.
- Extension contacts are urgently needed to maximize positive attitude and transform it into practical actions in sustainable manner. Information should also be made available to local peoples especially about the impacts of the loss of natural resources through one or the other means on top of benefits of conservations.
- This study also recommends that policymakers at different levels should recognize that farmers are traditionally practicing soil and water conservation. Hence, this fact should be taken as an input for policy formation of soil and water conservation in agriculture and rural development in particular and for its usability among farmers.

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APPENDIX - 1

Part I. General Information

1. Date of the Enumeration……..

2. Respondents Kebele……

Part II. Personal Information

1. Sex of the respondent A/ male B/ female

2. Age of the respondent A/ 18-25B/26-40C/41-60D/Above 60

3. Marital Status of the respondent A, single B, married C, divorced D, widowed

4. Educational status of the respondent A, illiterate B, 1-4 C, 5-8 D, 9-10

E, above 10

5. Family size Male…….Female…….Total……..

Part III. Economic Activities

6. What is your major economic activity? A, crop production B, animal rearing

C, mixed farming D, petty trade E, mixed farming and petty trade F, others

(Specify)----------

7. Do you have your own farm land? A, yes B, no

8. If your answer is 'yes', what is the estimated total size of your farmland?

A, less than 1 ha B, 1-2 ha C, 3-4 ha D, above 4ha

Part IV. Knowledge Test questions

Read each of the following questions carefully and circle the latter which contains the correct answer.

1. The population density increases lead to land degradation. A / Yes B/ NO

2. Improper crop rotations and unbalanced fertilizer is the cause of land degradation. A / Yes B/ No

3. Burning of crop residue for cooking and heating have a problem to environmental degradation. A / Yes B/ No

4. Contour farming is used to control soil degradation. A / Yes B/ No

5. Agroforestry practice is used to control land degradation. A / Yes B/

6. Mulching is used to control land degradation. A /Yes B/ No

7. Constructed ditches along the contour to avoid the water running down the hill sides. A / Yes B/ No

8. Reduction of agricultural product, shortage of food and lack of fire wood are the indicator of land degradation. A / Yes B/ No

9. Terracing helps to reduce runoff and rate of soil erosion enhance it reduce land degradation. A / Yes B/ No

10. Over grazing is important to reduce the rate of soil degradation A / Yes B/ No

11. Institutional failure is the under lying cause of land degradation A / Yes B/NO

12. Soil bunds and Fanya juu are used to control soil erosion? A/Yes B/ No

13. Deforestation is subjected to the force of land degradation. A/ yes B/No

Part V. Attitude Test

Read each of the following statements very carefully and decide whether you Strongly Agree, agree undecided, disagree or strongly disagree put an (x) mark inside the appropriate box that indicates your opinion.

S.No	Statements	Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
1.	Rapid Population growth leads to land degradation?					
2.	Over cultivation accelerates land degradation?					
3.	It is important to use animal dung and crop residue as a fuel rather than using it as compost?					
4.	Terracing helps to reduce run-off rate of soil erosion?					
5.	Land degradation leads to poverty and famine					
6.	In your view, is soil erosion a major agent for land degradation in local area?					
7.	over grazing destroys natural vegetation and causes the soil to wash or blow away more easily					
8.	Plow up and down the crop field to plant crops; the soil is more exposed to rain and wind erosion lead to land degradation					
9.	Green manuring, animal manure and improved fallows enhance soil fertility					
10.	Covering the surface with grass or crop residues reduce soil loss.					
11.	Crop rotation maintains soil fertility					
12.	Chekdams, soil bands and fanya juu are used to minimize land degradation					
13	Over cultivation lead to land degradation					

Part VI. Land practice questionnaire

Read each of the following questions carefully and circle the latter which contains the correct answer.

1. To what extent of your land is degraded?

1. Severely 2 Moderately 3. Little 4. No land degradation risk

2. Are there any land management practices in your area? 1, yes 2/ no

3. How do you describe the contact you have with soil and water conservation experts?

1/Non 2/ Limited 3/Good 4/ very good

4. How is your participation in land management practice over time? 1, high 2,

Medium 3, low 4, I didn't participated

5. Do you get training on soil and water conservation technologies?

1. Always
2. Sometimes
3. Never
4. Do not know

6. Farmers in-off farm activities lead to land degradation A/Yes B/ No

7. How your attitude towards in-off farm activities 1/ favorable 2/ unfavorable

9. The source of information to practice soil and water conservation measure 1/developmental agents 2/ from existing knowledge 3/ from kebele leaders 4/ from electronic media such as radio

1 From the following soil fertility management practices and protecting land degradation method select your level of practice in front of the represented numbers using a thick mark on the table provided below:

Key:

1. = Never at all 2. =Rarely 3. =Sometimes 4. =Often 5. =Always

Statements	Always	Often	Some times	Rarely	Never at all
Animal manure					
Crop rotation					
Fallowing					
Intercropping					
Agroforestry					
Green manuring					
Contour plowing					

Statements	Always	Often	Some times	Rarely	Never at all
The use of strip and terraces					
Wind breaks or vegetation covers					
Construction of Soil Bunds					
Mulching					
Reforestation					
Retention of crop residue					

Check list for key informant's interview

1. If there is a problem of land degradation, what are the indicators?
2. What are the contributing factors for land degradation?
3. What is the trend of productivity of land through time? Give justification for your response
4. How did you see land management practice carried out in your area in the past?
5. What is the situation of the practice nowadays?
6. What interventions are there by government and NGOs in the area with regard to land Management practice?
7. What are the constraints to the sustainability of land management practices in your area?
8. What measures do you suggest for the management of degraded land in effective manner?

Checklist for Focus Group Discussion

1. What are the major economic activities of the community?
2. Discuss the cause of land degradation.
3. How do you describe the productivity of land overtime?
4. What mechanisms are used by the farmers to improve the land productivity?
5. How do you describe the status of land degradation in your kebele?
6. If there are problems of land degradation, what are the indicators for the problems?
7. How do you see land management practice carried out in your area in the past?
8. How is the practice nowadays?
9. What problems being encounters in relation to land management practices?
10. What should be done to promote and sustain natural resource conservation in effective manner in your area?
11. Do male and female farmers equally participate in land management and soil conservation practice?