FARMERS' PERCEPTION OF LAND DEGRADATION

The Case of Lume Woreda, Oromia Region, Ethiopia

BY

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ABSTRACT

Farmers' Perception of Land Degradation: The Case Of Lume Woreda, Oromia Region

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Addis Ababa University, 2012

Various forms of land degradation are causing serious challenges to the present and future land productivity and sustainable development in Ethiopia. This study was conducted to examine farmers' perception about land degradation in Lume Woreda of East Shoa *Zone of, Oromia Regional Sate. Data were collected using household survey, focus group discussion, key informant interview and observation. The study findings show that about 83% of the respondents perceived land degradation problems in the study area. The major types of land degradation identified were soil erosion, loss of soil productivity, loss of habitats, mass movements of soil (land slide) and salinization. The major causes of land degradation indicated were soil erosion, deforestation, poor farming practices, human population pressure, erratic pattern of rainfall, and climate change. However, the level of perception is influenced by different demographic and socioeconomic factors. Age, education level, farm land size, contact with extension worker, membership in community based organization, number of livestock and off-farm work are found to affect farmers' perception on land degradation. But, the study underlines that there is no evidence that farmers' marital status, sex and family size affect the perception of farmers' about land degradation. Thus, enhancing livelihood diversification and promoting feasible alternative resource conserving technologies than educating about the problems can improve land degradation problems. Finding of this study have important policy implications for controlling land degradation in the study area as well as in the country.*

Key Words: Farmer perception, Development, Land degradation, Land management

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ACRONYMS

BoFED	Bureau of Finance and Economic Development
CBOs	Community Based Organizations
CI	Coefficient of Index
CSA	Central Statistics Authority/ Agency
DA	Development Agent
FAO	Food and Agriculture Organization
FGD	Focus Group Discussion
ha	Hectare
PPS	Probability Proportion to Size
SPSS	Statistical Package for Social Science
SSA	Sub-Saharan Africa
TLU	Tropical Livestock Unit
UNDP	United Nation Development Program
VIF	Variance Inflation Factor

CHAPTER ONE

1. INTRODUCTION

1.1 Background

About 41 percent of the population of SSA (about 300 million people) live on less than one USD per day in 2005—the highest poverty rate of any region in the world (World Bank, 2006). In recent years, there has been some progress in reducing poverty in SSA, but the rate of progress falls far short of the Millennium Development Goal of cutting poverty in half by 2015 (Ephraim *et al*, 2008).

Over 70 percent of the SSA population (of 750 million people) lives in rural areas, and depends heavily on natural resources for their livelihoods (UNDP, 2004). Agriculture is the major sector on which two-thirds of the population depends. Unfortunately, agricultural productivity in most of the region has been stagnant or declining. SSA is the only region in the world where average cereal yields have not significantly increased and per capita food production has declined since the 1980s.

Land degradation represents a serious developmental challenge confronting highlands of Sub-Saharan African. It directly impacts human livelihoods and survival with significant negative implications for sustained socio-economic growth and development. According to FAO (2005), land degradation is one of the root causes of declining agricultural productivity globally.

Land degradation remains an important global agenda in the 21st century because of its adverse impact on agronomic productivity, the environment and its effect on food security and the quality of life (Eswaren, 2001). Due to land degradation in most developing countries in particular, agricultural productivity showed a dramatic decline and reached the level beyond the subsistence requirement of a household (Abalu,1997).

The environment and the natural resource base have been severely degraded in Ethiopia over years. Most of land degradation is the result of human activities. In Ethiopia land is a source of income and means of production on which the livelihood of 85 percent of the population depends. Due to this the development and welfare of the population is directly linked with the exploitation of land.

Different writers have shown that, at the beginning of the 20th century, about 40% of the highlands of Ethiopia have been under diverse forest cover. However, the area of forest has tremendously shrunken to 16% in 1950s, 3% in 1980s and to only 2.7% in 1990s and the annual estimated rate of deforestation currently is 150,000-200,000 ha/year (Fisseha, 1996). Deforestation thus, lives the land surface to accelerated run-off and erosion.

FAO (1986) and Hurni (1993) (cited in Woldeamlak, 2003) stated that, the average soil removal all over the country is about 2 billion tons a year and the highest rate of soil loss occurs in cultivated fields which is estimated at 42 tons /ha a year on average. In many parts of Ethiopia land degradation and related environmental depletion are occurring in great extent (Feyera, 2007).

1.2 Statement of the Problem

The Ethiopian highlands with inherently fertile soil and sufficient rainfall are among those with highest agricultural potential in Africa, and yet they are threatened by accelerated land degradation (Bekele and Holden, 1997; Feyera, 2007). Land degradation coupled with poverty, fast growing population, policy failures, and social unrest poses a serious threat to national and household food security.

Erratic and stormy rainfall, predominantly steep and very steep terrains, and poor land management practices seem to be responsible for the accelerated water erosion in the highland of Ethiopia. Rainfall generally varies in time and space, mostly concentrating over a period of few months (Krauer, 1988) and thus generating a huge volume of runoff. Topographic characteristics of the highlands of Ethiopia form favorable conditions for runoff to initiate concentrate and attain high velocity whenever there is excessive rain.

Land degradation becomes an economic problem when it reduces productivity on individual farm. It is an important contributor to poverty of and backwardness of Ethiopia's rural population. Land degradation reduced food production and even created unproductiveness in some parts of the country. Land degradation at the household level has resulted in economic loss (food, pasture, and fuel wood) and it also has social consequence where farmers are forced to migrate to other areas, which may result in displacement of the household member (Belay, 1992).

Similarly, the present study area, Lume Woreda of East Shoa Zone of Oromia, is experiencing land degradation problem, unless there is a transformation of farmers attitude and practices towards the effect of growing number of population and other socio-economic characteristics on environment, the natural resources are going to be degraded much worse than are at present. Farmers' perception and response to the

impact of socio-economic and demographic features on environmental degradation is indeed important to the sustainability of their environment serves as a basis for any future intervention strategy.

1.3 Objectives of the Study

1.3.1 General Objective of the Study

The main objective of the study is to assess perception of farmers towards land degradation in Lume Woreda of East Shoa Zone of Oromia.

1.3.2 Specific Objectives of the Study

The specific objectives of the study are to:

1. Assess farmers' perception indicators of land degradation.
2. Identify socio-economic and demographic factors that make difference in the perception among farmers.

1.4 Research Questions

1. Do farmers' have perception of the cause and consequences of land degradation?
2. Is there any significant relation between socio-economic and demographic factors of farmers with their perception of land degradation?
3. What are the land management practices used by farmers?
4. What are the sources of information for the farmers with respect to land degradation?

1.5 Significance of the Study

This study focused on assessing farmer's perception of land degradation in Lume Woreda. Therefore, the outputs of the study will provide input to the regional policy makers and planners while designing different development projects related to the environment and to improve the livelihood of the people at micro level towards the land management. Moreover, it will be used to have a better understanding of the kind

of training which is required for farmers in the area and the study will produce empirical findings for further researchers.

1.6 Ethical Considerations

Institute of Population Studies of the College of Development Studies, Addis Ababa University wrote a letter of support for the researcher. The researcher recruited six enumerators, and trained for one day on the research procedures and ethical issues who informed the respondents that their response will be kept confidential and used only for academic purposes. Finally, the respondents' right not to respond for any specific question(s), to stop the interview at any time and stage, and the right not to involve in the research at all was ensure by the researcher as important ethical considerations.

1.7 Organization of the Thesis

The thesis has six chapters. The first chapter described the background and statement of the problem, objective of the research, research questions, and significance of the study and ethical considerations of the study. The second chapter focuses on literature review regarding concepts of land degradation, causes and consequences of land degradation, land management practices and empirical studies. Chapter three and four emphasizes on materials and methods employed and description of the study area. Chapter five presents results and discussion of the data while chapter six deals on conclusion and recommendations.

CHAPTER TWO

2. REVIEW OF RELATED LITERATURE

2.1 Land Degradation: Definition and Concepts

Land degradation is a broad, composite, and value-laden term that is complex to define but generally refers to the loss or decline of biological and/or economic production. It is a concept in which the value of biophysical environment is affected by one or more combination of human or natural induced processes acting upon land.

Soil degradation is a narrower term and a component of land degradation. It refers to a process that lowers the soils current and/or potential capacity to produce goods and services. Soil erosion is the wearing a way of land surface by the action of water or wind. Six specific processes are recognized as the main contributors to soil degradation: water erosion, wind erosion, water logging, excess salts, chemical degradation, biological degradation and physical degradation (MoARD, 2007).Land degradation refers to the process of soil degradation through water erosion and loss of vegetative cover leading to reduced productivity of the land in the densely settled or exploitatively (Daniel, 1998).

A broader definition of land degradation as a "reduction in the land's actual or potential uses" has been adopted by others (Blaike and Brookfeild, 1987). in the same way, Daniel (1988) describes land degradation as a process of "soil degradation through water erosion and loss of vegetation cover leading to reduced productivity of the land in densely settled or exploitatively used regions"(Daniel,1988; cited in Aklilu, 2002).

UNEP (1992) defines 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. Turkelboom (1999) also defined land degradation as a general term as "substantial decrease of biological productivity of a land system as a result of human activity rather than natural events" (Turkelboom ,1999; quoted in Ludi,2002).

Most cost estimates of land degradation do not distinguish between soil erosion, soil degradation and land degradation and many studies have misused soil degradation and soil erosion to be synonymous with land degradation. Understanding the contribution of each component of degradation to the total cost of land degradation is vital, not only for appreciating the type and degree of the problem but also for appropriate policy interventions (MoARD, 2007).

2.2 Causes of Land Degradation

There are multiple interacting forces that cause degradation. The proximate causes include clearing of natural vegetation, unsustainable arable farming techniques, the use of dung and crop residue for fuel and overstocking of grazing lands (Berry, 2003).

2.2.1 Lack of Awareness

Farmers are aware of the problems of land degradation in its different forms in different ways. Tesfaye (2003) reported farmers' view of land degradation problems in terms of soil erosion and soil fertility problem: for farmers, soil movement is not that apparent unless rills and gullies are created. Their concern with soil is fertility that they measure using different indicators i.e. its color (dark or light), compare the crop stand and yield, and they see its physical characteristics such as weight on the plough shear and plough depth and stoniness.

He further elaborated farmers tend to give soil erosion a lower priority than soil fertility when ranking the different forms of land degradation; however, this view does not mean that farmers are not concerned with soil erosion and he conclude in their view,

soil fertility takes precedence over erosion and the entrance point to their minds and heart is through soil fertility.

2.2.2 Degradation of Grazing Land

Degradation of grazing land refers to decrease in its capacity to support livestock. In Africa as a whole, overgrazing is the major factor accountable for half (49%) of the soil degradation (Aklilu, 2001). While livestock does not necessarily cause environmental problems, overgrazing can be a major factor in land degradation, causing half of the damage assessed in Africa and one fourth in other developing regions. The degradation of sparse rangeland vegetation by overgrazing exposes the soil to erosion by wind and water.

2.2.3 Population Pressure

Though there are many arguments about the population growth being the cause of land degradation in Ethiopia it has undoubtedly direct consequences for the environment; growing demand for more land for crop production; for fuel wood; shortening of fallow cycles and contribution to over cultivation. Moreover, because of high population growth, the size of individually owned plots is shrinking in the relatively fertile highland and medium altitudes. Empirical review of the relations between population and productivity in developing countries have indicated that population growth can lead to land degradation or land enhancement or aspects of both (Yohannes, 1999).

2.2.4 Poor Arable Land Management

In Ethiopia, a continuous cultivation of the land without any improvement in land management occurs. Berry (2003) indicated that most arable land (70%) in the highland is in cereals, with wheat and barley in the higher ground and teff, sorghum and maize

in the lower elevation. All these crops leave bare areas of soil during some or all of the growing season exposing soil to erosion.

2.2.4 Vegetation Clearing

The use of wood and other biomass for fuel and the expansion of agriculture into forested areas fostered a high rate of deforestation and ultimately stripped the land of vegetative biomass exposing it to high levels of soil erosion. Even this remaining forest is being depleted at an alarming rate, partly because nearly 95 percent of the nation's energy consumption is from biomass fuels (MoARD, 2007). Therefore, deforestation had caused and continues to cause environmental degradation in the form of land degradation, water resource deterioration and loss of biodiversity.

2.2.5 Tenure Right and the Problem of Land Degradation

In Ethiopia, insecurity of tenure has been strongly accused of leading to resource degradation. The insecurity prevailing prior to the Revolution is believed to be "one of the main factors responsible for the widespread degradation that occurred in the past" (Tomas, 1984 quoted in Aklilu, 2001). The effects of land tenure on the adoption of land management practices are mainly to the transferability of property rights, which in turn affects the reversibility of land investments and the ability to use land as collateral.

Land tenure is one of the factors that explain lack of wide spread use of environmental management practices in degraded parts of the country. Under the three successive regimes starting from Haile Sellassie government and even before, many rural farm households have never been sure whether they would have same plots of land to use in the coming year (Muluneh, 2003).

The Ethiopian government has been undertaking a program of rural land registration since 2003 and by 2006 more than half of the country's farm households had received

land certificates. The main objective of the program is to address the problem of tenure insecurity and to establish an effective framework for land administration at the local level. Peasants do not have rights of ownership over the land they have, only use right. Land registration and certification merely confirms the right to use of the land for the households livelihood and the documents handed out to peasants are strictly speaking user certificates and not land certificates in the proper sense of term (Dessalegn, 2008).

Many studies agree that insecure land tenure and frequent redistribution of land cause land degradation by restricting farmers from investing on their plot of land. Insecure land tenure affects the quality of land by killing farmer's interest to invest on land (Aklilu, 2006).

2.3 Consequences of Land Degradation

Impact refers to the effects of land degradation on the various land functions such as production, biomass, biological habitat, filtration and buffering, and source of raw material, etc. In general, soil erosion has both on-site and off-site effects. The on-site effect comes due to loss in soil productive capacity, causing either reduced outputs (crop yield, livestock yields) or the need to increase input to achieve the same yield level. Off-site costs refer to the indirect effects of soil degradation, and usually take the form of externalities. Most off-site costs can be traced to the effect of silt; soil nutrients washed in to surface water or leached in to subterranean aquifers by rainfall and irrigation or runoff (Bishop, 1992). Offsite costs arise from the negative impact of agricultural run-off on downstream water users. Increased costs may be associated with changes in the quality or the quantity of run-off.

The on-site effects are more damaging in developing countries while the off-site effects are damaging in developed countries. This is because in developed counties, on-site

damages are regulated by strict adherence to proper land-use and conservation practices and nutrient losses are compensated by intensive use of chemical fertilizers. On the other hand, chemicals from fertilizers, herbicides and insecticides, which are eroded with the soil, aggravate pollution (Whitmore *et al*, 1994).

Soil erosion has major ecological and economic consequences, particularly in populated areas. Soil erosion causes economic loss because of crop destruction and reduced agricultural productivity. Erosion also leads to shortened investment life of water management infrastructures, and greater flood frequency caused by sedimentation and dimensioned infiltration capacity of soil (Yohannes, 1999).

The impact of erosion on crop yield is through changes in soil chemical characteristics and/or changes in soil physical or structural characteristics (FAO, 2005). One of the most widespread examples of the former is the loss of soil nutrients through removal of topsoil due to erosion because the highest concentration of nutrient necessary for plant growth is found in the upper layers of the soil. Therefore, the loss of this layer results in the decrease in soil nutrient reserve. The situation is more serious on soils with low levels of natural fertility, as is the case in much of the tropics (Morgan, 2005).

According to MoARD (2007), land degradation has direct and indirect costs. Direct costs include: the cost of nutrients lost through topsoil erosion (or the cost of replacing these nutrients), the production that is lost because of nutrient and soil losses, the costs of forest removal, the loss of livestock carrying capacity and the decline in cropped area.

Indirect costs mainly include: the loss of environmental service, the silting of rivers and dams, increasing irregularity of streams and rivers, reduced ground water reserves, flooding and other costs, related to social and community losses from malnutrition, poverty and migration.

2.4 Land Management Practice

Land management refers to two sets of inter-linked activities. The first is composed of activities directed at the production of current crop, and therefore has short-term effects. The second includes all activities meant to result in the long-term improvement of the productivity of the land and the creation of assets that mature in the long-run (Blaike and Brookfeild, 1987).

Sustainable land management in the Ethiopian context defined as the use of renewable land resources for agricultural and other purposes to meet individual and community needs, while simultaneously ensuring the long-term productive potential of these resources and the maintenance of their environmental functions through systematic use of indigenous and scientific knowledge/technologies. In this regard, sustainable land management involves more than the use of physical soil conservation measures, it also includes the use of appropriate soil fertility management practices, agricultural water management, forestry and agro forestry practices forage and land management, and the application of these measures in a more integrated way to satisfy community needs while solving ecological problems (MoARD, 2007).

Several efforts have been made to promote sustainable land management in Ethiopia, with mixed success. For example, in most places where soil conservation was implemented in the 1970s, farmers either totally or partially destroyed the conservation structures. Of the total conservation measures implemented between 1976 and 1990, only 30 percent of soil bunds, 25 percent of stone bunds, 25 percent of stone bunds, 60 percent of hillside terraces and 22 percent of the planted trees (Nurhusen, 1995).

A successful implementation of afforestation and reforestation schemes requires an ability to form pressure groups in the community or involve existing local groups.

Activities like starting nurseries in villages, planting and protecting multipurpose trees along roads, on farms and around houses, etc., for instance, call for an ability to garner the knowledge, support, and energy of rural people (Postel and Heise, 1988 quoted in Aklilu, 2001). Moreover there are other practices like conservation oriented crop combination and land management and agroforestry.

2.5 Empirical Studies

People's perceptions whether narrow or broad in scope shape the atmospheres in which environmental struggle are resolved. Therefore, understanding how people consider and perceive environmental issues is one of the areas needed in policy formulation with regard to environmental issues. Public understanding of the general environment-population related issues is crucial for focus of successful conservation efforts (Karen *et al*, 1995).

Yearaswork (1985) in his study on 'farmers' attitude towards land degradation and conservation' revealed farmers awareness on the problems of land degradation. In this case, the farmers identified soil erosion as the main cause of land degradation, followed by drought, deforestation, variability of rainfall and improper farming practices.

The farmers further explained the effects of land degradation by mentioning famine and drought in general and reduction in yield in their farm land by comparison of the trend of crop yield. The farmers' perception of the problems of land degradation is determined by a number of socio-economic and biophysical factors. There are many demographic and socio-economic factors that determine farmers' perception of land degradation and management.

The effect of age of the farmer on conservation decision may be either negative or positive (Bekele and Lars, 2002). As Aklilu (2006), stated regarding the relationship

between conservation decision and age, younger farmers with longer planning horizons are likely to invest more in conservation. In some studies negative correlation between age and perception towards environment is observed.

Regarding to the perception of male and female, Doss and Morris (2001) confirmed that women farmers tend to adopt improved technologies at lower rate than men farmers because of limited access to information and resources. George (1990) and Abiy (2002) have showed that the size of the household has a determinant role in perception. In their finding the size of household has a positive correlation with farmer's perception of soil erosion and deforestation problems.

Education increases a person's awareness of his environment and one's ability to acquire and process information about his environment and to detect changes in it. It also enhances one's ability to identify alternatives and to assess and compare the benefits and cost associated with each of the alternatives possibly under different states of nature (Awoyinka *et al*, 2005).

The ability of farmers to adopt soil conservation measures will depend on their access to all appropriate resources. These may vary from access to knowledge of new systems to an ability to afford the necessary inputs of capital to take them up. The numbers of extension workers with experience of soil conservation, the access of the farmers to extension staff and the perceived relevance whether an extension service is successful or ineffective (Morgan, 1995).

According to other studies (Endrias *et al*, 2005) showed that the higher the frequency of extension contact the more likely a farmer will receive valuable information about the adoption of new techniques for environment management. Moreover, the extension activities should give more attention to farmers with small farm size than farmers with relatively large farm size and the extension coverage should be widened by establishing

additional development centers and increasing the number of extension workers. Mulugeta (1992) also noted that farmers who had contact with conservation agents had a significant association with farmer's response to soil erosion and deforestation problems.

According to Abiy (2002) perception about the effect of population on agricultural land shows higher percentage (87.6 percent) among farmers who have large farm size than farmers with small farm size (82 percent). However perception has not shown any statistical significant differences as far as farm size concerned. Another studies indicated that farmers with small farm size make an effort to utilize their limited resources more efficiently and thus adopt new technologies at faster rate than those farmers who have large farm size.

Farmer's participation on farm activities, they have better knowledge on the perception and response of environmental degradation. Households with low income are capable of investing in conservation measure. Household with low income abstains from mobilizing resources for improving the environment (Alemu, 2003). Others correlate household income positively and argued that households with relatively high income are even risk takers to implement new technique than households with low income (Bekel and Lars, 2002).

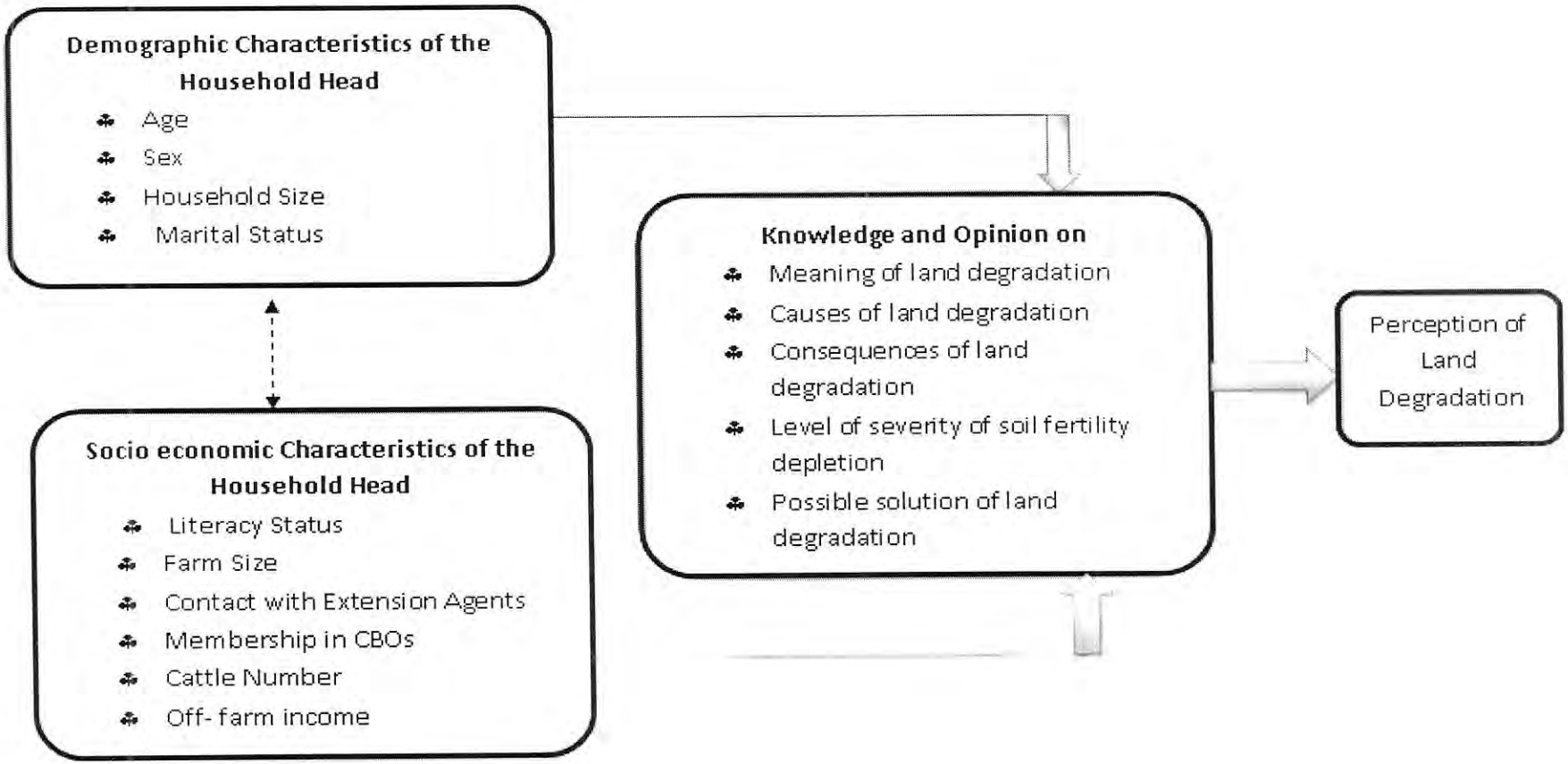
2.6 Conceptual Framework

There is a long and rich tradition of empirical research that seeks to explain farmers' perception–adoption of particular agricultural innovations. As outlined by Feder *et al.* (1985), researchers typically select a number of potential independent variables for inclusion in an analysis based on prior theorizing and they test, usually via logistic logit

or probit regression, which variables correlate with perception or adoption in some statistically significant sense.

Typically, these variables are categorized into four groups: farmer and farm household characteristics including age, education, household size and marital status (Ervin and Ervin, 1982; Gould *et al*, 1989), farm biophysical characteristics including farm size, area planted and farm fragmentation, farm financial/management characteristics including farm income, off-farm income and risk aversion (Gleeson *et al*, 2002) and exogenous factors such as extension services and program participation.

The farmers' perception of land degradation is being influenced by their current status of demographic and socio-economic characteristics. The dependent elements that include the framework for the present study are perception of farmers to land degradation. The demographic characteristics include household head, age, sex, household size and marital status. Literacy status of the household head, farm size, contact with extension agent, membership in CBOs and off-farm work of farmers are important socio-economic factors included in this model.



_____ Path of investigation

---------- Path not investigated

Figure 1: The conceptual framework for the study of farmers' perception towards land degradation in relation to socio economic and demographic characteristics.

CHAPTER THREE

3. DESCRIPTION OF THE STUDY AREA

In this part, the physical and socio-economic characteristics of the study area are described. It included the location and area; topography and drainage; climate and vegetation; soil; land use\land cover; population size and density and socio-economic characteristics of the study area.

3.1 Location and Area

Lume Woreda is located in East Shoa Zone of Oromia Regional State. It is located in central part of Ethiopia extending from 8^0 12'N to $8^0$50'N and from $39^0$01'W to $39^0$17W with total land area of 703.03 square kilometers. The Woreda constitutes 38 kebeles of which 35 rural and 3 urban kebeles. (East Shoa Zone Bureau of Finance and Economic Development, 2012).

3.2 Topography and Drainage

Lume district is one of the ten districts found in East Shoa Zone which found in rift valley zone. Most of Lume Woreda altitude ranges from 1500-2300m, except a small portion in the northern part being over 2300m.

Table 3.1: Topography and Area of Lume Woreda

Topography type	Area in square kilometers	Percent of the total area
Plain	421.818	60
Mountainous	231.999	33
Gorge	49.212	7

Source: BoFED, Lume Woreda, 2012

Modjo is an important river in the Woreda. Awash river flows in the south western part of the Woreda. Part of lake Koka is in the Woreda and has different natural lakes such as, Lake Awash, Lake Gumbuu, Lake Tulu, Lake Koka, Lake Sayo, Lake Abboo, Lake Kille, Lake Osole, Lake Wakayo, and etc. These lakes provide the society with different services such as, irrigation and drinking water.

3.3 Climate and Vegetation

3.3.1 Climate

As the result of the effect of variations in altitude, the Woreda is divided in to three major agro-ecological zones. The Woreda has 30 percent of its land in the Dega (Cold) zone, 45 percent in the Weina dega (Sub moist cool) zone and 25 percent in the kola (Sub moist warm) zone. The Woreda receives an average annual rainfall of 850 mm, varying between the lowest 500 mm and a maximum of 1,200 mm. The average temperature in the Woreda is 15°C, varying between 10° and 20°C.

3.3.2. Vegetation

The vegetation cover of the Woreda is mainly the result of the climatic variations and human activities. Since Lume is one of the areas where agricultural activities has been practiced for a longer period of time and it is one of the densely populated areas of East

Shoa; hence, the extent of the natural vegetation in the area has been much reduced. Cutting of trees for fuel wood and arable land expansion in to natural vegetation are the major factors affecting. The dominant vegetation cover of Lume district is sub-tropical grasslands.

Table 3.2: Forest Cover of Lume Woreda

Ownership Types	Name of the forest	Area it covers per hectare	Types of tree Found
Government	- Dabojo forest - DabaGojo forest	1559.95	Acacia Salinga
Community	- Gara biyyoo - Tade - Bola buta - Kolba gude - Dhaka bora	284	- Acacia Salinga - Eculaptus - different types of trees

Source: Lume woreda office of agriculture and rural development, 2012

3.4 Soil

According to BoFED (2012), Food and Agricultural Organization identify nine different types of soils that are found in east shoe zone. Among these soils, the major soil types of the district are Vertisols (44.8 percent), Randzinas and Phaeozems (36.8 percent) and Cambisols and Luvisols (11.4 percent).

3.5 Land use/ Land Cover

According to the report from Woreda agricultural office, the land use in Lume Woreda describes in Table 3.3.

Table 3.3: Land Use / Cover in Lume Woreda

Land use type	Area (hectare)	Percentage
Intensively cultivated land	51830.41	68.9
Degraded land	6740.21	8.96
Rural settlement	3490.47	4.64
Urban	1504.51	2.0
Small holder irrigated farm	1424.27	1.89
Water body	6604.8	8.78

Source: Lume Woreda, office of agriculture and rural development, 2008

3.6 Population Size and Density

Based on figures published by the Central Statistical Authority in 2010, this Woreda has an estimated total population of 116,501 of which 59,836 (51.36 percent) were male and 56,665 (48.64 percent) were female. Out of the total population about 67 percent live in rural area while the ramming (33 percent) live in urban area. The average family size of the Woreda is 4.2 for urban and 5.3 for rural persons. The average population density for the year 2007 has been 138 persons per sq.km about 43 percent of the population are children below the age of 15 and 4 percent are above the age of 64 while the remaining 53 percent are within the age group of 15-64.

3.7 Socio-Economic Characteristics

About 96 kilometers of all-weather roads and 89 kilometers of dry-weather roads were available in Lume Woreda. Agriculture is the dominant economic activity pursued by

almost all households in the Woreda. However, some members in the community are engaged in certain off farm activities like petty trading, fuel wood-selling, daily laborers selling of sand, local beverage, sewing etc. The averages farm size in ha and numbers of farm oxen per household were 3.75 and 2.12 respectively. Aphids, grasshopper, red teff worm, rats and hippopotamus are crop pests, while smut and powdery mildew are crop diseases.

The agricultural activity of the Woreda could be described as mixed farming that heavily depends on crop production with rearing animals such as cattle, sheep, and goat. Subsistence cropping of rain fed production with little irrigation use typifies the agricultural activity.

Cereals such as Teff, wheat, barley, sorghum and maize are dominantly grown. In addition pulses such as lentils, horse beans, chick peas, field peas, and vetch and haricot beans are grown. Niger seed and linseed are the major oil crops produced in the Woreda. Livestock production in Lume Woreda is indicated by the Table 3.4 below.

Table 3.4: Livestock Population of Lume Woreda 2002E.C

Types of animals	Frequency
Cattle	80,099
Sheep	21,922
Goat	21,489
Horse	260
Mule	764
Donkey	20,510
Total	145,044

Source: BoFED, Lume Woreda, 2012

CHAPTER FOUR

4. DATA AND METHEDOLOGY

4.1 Data Sources

Both primary and secondary sources of data were used for this study. Primary data was collected through household survey, focus group discussion, key informant interview and observation. Secondary sources include published and unpublished materials i.e. books, journals, project, reports maps etc. The eligible people for household survey and focus group discussion were the members of the community and should be household heads.

4.2 Sampling Method

The study primarily focused in Lume Woreda of East Shoa Zone of Oromia. There are 35 rural kebeles in Lume Woreda. Among these kebeles 3 kebeles(Muda Senkele, Kurma Fatole and Ejersa Joro) were selected by using purposive sampling technique with the help of agricultural and rural development office experts. They were selected because of they are relatively considered more degraded areas than the rest. In all selected kebeles, household listing were undertaken. Further to identify the sample households random systematic sampling procedure was employed. In all selected households, population listing with filtering variable household head was conducted by the data collectors. It later served as a sample frame for the study. After listing systematic random sampling was used to select the sample respondents. The sample distribution among the kebeles was done using probability proportion to size (PPS) method.

Table 4.1: Distribution of sample household heads in the three kebeles

Kebele	Total household head		Sample household head	
	Frequency	Percent	Frequency	Percent
Muda Senkele	443	28	118	28
Kurma Fatolle	643	41	172	41
Ejersa Joro	492	31	132	31
Total	**1578**	**100**	**422**	**100**

Source: Lume Woreda BoFED, 2012

4.3 Sampling Design

4.3.1 Sample Size Determination

To determine the sample size, the following formula was employed (Kothari, 1997).

$$n = \frac{\left(P \times (1.00 - P)\right) \times Z^2}{e^2}$$

Where: -

n = Sample size

P= Estimated proportion of respondents. As the proportion was not known, 0.5 was used as P value to obtain maximum number of the respondents.

Z= The number of standard error corresponding to 95 percent confidence interval which is 1.96.

e = Margin of error that the researcher tolerates which is 0.05

Therefore: The total number of sample will be included in the study

$$= \frac{0.5*(1.00- 0.5)* 1.96^2}{0.05^2}$$

$$= 384$$

With 10 percent contingency, the total number of the respondents were= 384+38= 422

4.3.2 Sampling Procedure

In order to facilitate the survey work, six enumerators (3 female and 3 male) were employed. They were given a one day fully fledged explanation on how to administer survey questionnaire. All of the enumerators have completed grade ten. In order to maintain the quality of data collected, meetings were held with enumerators at the end of each survey day to discuss problems encountered. The researcher has randomly checked the data collected by the enumerators. Additional visits were made particularly on weekends and other convenient times for interviewing household heads who were absent at the regular time of interviewing and re-interviewing was needed for corrections. The survey was conducted from 14-26 February, 2012.

A total of 397 respondents were interviewed and three FGD from 3 kebeles were formed. The number of each FGD participants was ranges from six to eight. And the general direction pursed in the discussion was left for the researcher to trigger issues for discussion and promote active group participation. The key informant interview was conducted. The selected key informants were local government officials and Woreda's agricultural and rural development office experts.

4.4 Tools of Data Collection

Structured questionnaire: To obtain information on demographic and socio- economic characteristics of the study population structured questionnaire was used. The questionnaire was administrated for 397 household head. In the first part of the main body of the questionnaire farmers were requested to supply background data on age, sex, education status etc.

The second part of the questionnaire focuses on issue of perception. Farmers' perception of the causes and consequences of land degradation and land management practices was measured through their free response question which includes:

- the cause of land degradation,
- the consequence of land degradation, and
- the land management practices.

Whereas the third part consists of questions about institutional capacity and farmers perception of the importance.

Focus group discussions: Three FGDs each group consisting of six to eight were used. The discussants were elder, youth, women and religious leaders in order to avoid biasness. The researcher presented various open-ended questions to the discussants to express their own perceptions regarding the research problem under investigation. This technique enabled the research to explore what they have perceived or think about the research problem that the questions would cover, and then to verify, confirm and add depth to the results of the household survey.

4.5 Methods of Data Analysis

Quantitative data from household surveys were entered into computer for analysis. Statistical Package for Social Science (SPSS) software version 20 was used for the purpose of analysis. Descriptive statistics like averages, percentages and ratios were presented through tables.

Cross tabulation and chi-square statistical methods were used in order to find out the degree of association of each independent variable to the dependent variable. In addition, multiple regression analysis was employed to depict a dependent variable explained by the independent. Logistic regression was used to predict a dependent

variable based on independent variables as well as to determine the amount of total variation explained by the independent variable. This method also enabled the researcher to rank the relative importance of each independent variable.

The qualitative data, generated from key informants interviews, observation and focused group discussions were described and presented thorough discussion to supplement the household survey and to clearly understand the issue.

4.6 Variable Description

Table 4.2: Description, measurement and hypothesized effects of the variables specified in the model

No.	Explanatory Variables	Variable Description	Ho Sign	Rational For inclusion
1.	Age	Age of the household head	+	Older household heads are less likely to perceive land degradation
2.	Sex	1 = male HHH 0 = female HHH	-	Men are more likely to access information to perceive land degradation
3.	Household Size	Family size	±	Households with large numbers have more labour and need more food, both of which increase the tendency to conserve the soil and to perceive land degradation
4.	Marital Status	1= in union 0= not in union	±	Marital status has an important bearing on the size and structure of families and households.
5.	Literacy Status	Years of schooling	+	Education might improve the ability to perceive Land degradation
6.	Farm Size	Land size	+	Small farm holders are more likely to perceive land degradation
7.	Contact with Extension worker	1 = yes 2= no	+	Extension creates awareness on land degradation
8.	Membership in CBOs	1 = belong 0 = not belong	+	Participated in CBOs enables farmers to perceive land degradation
9	Off-farm income	Involvement in off – farm activity for the past 12 months	+	Off-farm activities reduce pressure on land and perceive land degradation
10	Cattle number	Number of cattle owned in TLU	-	Large number of cattle increases availability of manure and generates income

HHH- Household head

CHAPTER FIVE

5. RESULTS AND DISCUSSION

5.1 Characteristics of the Respondents

This part of the study deals with certain selected demographic and socio-economic characteristics of the respondents. Out of the planned sample of 422 farmers, the study achieved a sample of 397 with 94.07 percent response rate. Hence, fore front analysis only based on 397 respondents.

5.1.1 Demographic Characteristics of the Respondent

SEX

According to the field survey the distribution of sample household heads by sex constitute 279 (70.3 percent) male and 118 (29.7 percent) female.

AGE

Table 5.1 revealed the age distribution of the respondents. The mean age is 42.79; the mode 45, maximum and minimum age of the participants are 87 and 20 respectively. More than 70 percent of the respondents are below age 49.

Table 5.1: Age of the respondents, in Lume Woreda

Age Group	Frequency	Percent
20-29	56	14.1
30-39	120	30.2
40-49	111	28.0
50-59	65	16.4
60+	45	11.3
Total	**397**	**100**

Source: Field Survey in Lume Woreda, 2012.

Family Size

Family size is one of the factors that influence perception of farmers on land degradation. Survey result illustrated that the average house hold size of the sample household was 6.65; with a range of 2 to 15 persons per household. Table5.2 shows that most respondents are farmers having 4 to 6 family member.

Table 5.2: Distribution of sample households by family size, in Lume Woreda

Family size	Frequency	Percent
1-3	23	5.8
4-6	182	45.8
7-9	141	35.5
10+	51	12.8
Total	**397**	**100**

Source: Field Survey in Lume Woreda, 2012

Marital Status

Out of the total interviewed farmers 57.4 percent were married, 19.9 percent were widowed, 13.1 percent were divorce and the remaining 9.6 percent were single. Due to loss of productivity of most cultivated lands and shortage of cultivated lands, some male household members in the study area migrated to other place like Modjo town and Qoqa to search for work. These caused increment in the number of female headed households in the study area. .

5.1.2 Socio-Economic Characteristics of the Respondents

Ethnicity

The result in Table 5.3 revealed participant ethic group. A significantly higher percentage (76.3) of the respondent was from Oromo ethnic group.

Table 5.3: Distribution of sample households by Ethnic group, in Lume Woreda

Ethnic group	Frequency	Percent
Oromo	303	76.3
Amhara	73	18.4
Guraghe	12	3.0
Other	9	2.3
Total	**397**	**100.0**

Source: Field Survey in Lume Woreda, 2012

Educational status

Educational status is one of the socio economic factors that influence the perception that Farmers could have on land degradation. As educational status of a household head increases, it is assumed to increase the transfer of significant information and as a result increase farmers' knowledge about the cause and consequence of land degradation. Table 5.4 illustrates that 302 (76.1 percent) of the respondents were found to be illiterate or can only read and write. Farmer who has completed their primary education accounts 6 percent of the sample population.

Table 5.4: Distribution of sample households by educational status, in Lume Woreda

Educational status	Frequency	Percent
Illiterate	202	50.9
Read and write	100	25.2
primary school(1-4)	62	15.6
Primary School (5-8)	24	6.0
Secondary School (9-12)	9	2.3
Total	**397**	**100.0**

Source: Field Survey in Lume Woreda, 2012

Farm land size

The land holding size is another socio economic variable considered in the study to influence farmers' perception on land degradation. Table 5.5 indicate that the farmland size of the respondent in ha. The result shows that average farm land size was 1.63. But

more than half of them have holdings less than 1.5 hectare. Thus, most of them are small-scale farmers. Moreover the land is fragmented into a number of small separate plots, often located at distant from each other. Hence, this can adversely affect agricultural performance and land management because travel to and from home requires longer time and effort.

Table 5.5: Distribution of sample households by land size, in Lume Woreda

Grouped land size	Frequency	Percent
<0.5	76	19.1
0.5-2.03	220	55.4
2.04-4.03	91	22.9
≥4.04	10	2.5
Total	**397**	**100.0**

Source: Field Survey in Lume Woreda, 2012

Contact with Extension Agents

Respondents were asked question about their contact with extension Agents. Among the surveyed farmers, only 77 (19.4 percent) of them have no contact with extension worker. The majority 320 (80.6 percent) of the respondent have contact with extension workers.

Membership in community based organization

Being a member may expose individual to better access to information. Farmers' participation in farmer association such as formal or informal organization is expected to increase their chance to discuss about environmental issues. Table 5.6 depict that the proportion of farmers who are and are not a member of any community based organization.

Table 5.6: Distribution of sample households by member of any community based organization, in Lume Woreda

Member of community based organization	Frequency	Percent
Yes	320	80.6
No	77	19.4
Total	**397**	**100**

Source: Field Survey in Lume Woreda, 2012

Off- farm Work

Data on off- farm work revealed that the majority 54.6 percent of the respondents had off- farm income for the last twelve months, whereas 45.6 percent of the farmers had no off- farm income. The type of work they were engaged in includes working in plantation agriculture, selling fuel wood and other type of work like road construction.

Cattle Number

Livestock production is considered as a part of agricultural production, and makes substantial contribution to Ethiopia's economic development. The country generally considered to have the largest population of livestock of any country in Africa (FAO, 2004). The livestock unit used was tropical Livestock Unit (TLU). About 57.2 percent had less or equal to seven livestock and 42.8 percent of the respondents had above seven livestock.

5.2 Farmers` Perception of Land Degradation

About 251(63.2 percent) of respondent reported that they had heard the term land degradation before. About 58.2 percent believed that they know the meaning of the term land degradation. Table 5.7 describes the source of their knowledge.

Table 5.7: Distribution of sample households by source of the term land degradation in Lume Woreda

Source of Information	Frequency	Percentage*
Friends and Relatives	61	26.4
Radio	131	56.7
Extension Worker	142	61.4
Television	17	7.3
Others	4	1.7

Source: Field Survey in Lume Woreda, 2012 * Participants may give multiple answers.

Table 5.8 provides responses of the "examples of land degradation" in Lume Woreda

Table 5.8: Frequency of respondents by the example of land degradation, in Lume Woreda.

Land degradation examples	Frequency	Percentage*
Soil erosion	220	87.56
Loss of soil productivity/soil fertility loss	194	77.21
Loss of habitats and diversity of plants	138	54.92
Mass movements of soil(land slide)	22	8.75
Salinization of soil (salty soil)	20	7.96
Pollution of soil from liquid waste	52	20.69
Others	24	9.55

Source: Field Survey in Lume Woreda, 2012 * Participants may give multiple answers.

Farmers' perceptions of causes of land degradation are presented in Table 5.9. The most repeatedly cited causes of land degradation were soil erosion 181 (72.1 percent), Deforestation 130 (51.8 per cent) and poor farming practices 85 (33.9 percent). Other important causes were human population pressure and erratic pattern of rainfall. Only 7.9 percent of the respondents were declared others (inadequacy of cash to buy mineral fertilizers and lack of crop rotation) as a cause for land degradation. The finding revealed that soil erosion was the most frequently cited cause of land degradation across the study area implies that application of technologies that add nutrients to the soil should be complemented by measures that reduce nutrient losses through runoff and soil erosion.

Table 5.9: Distribution of sample households to the question of the main cause of land degradation in Lume Woreda

Causes of land degradation	Frequency	Percent*
Soil Erosion	181	72.1
Deforestation	130	51.8
Poor Farming Practices	85	33.9
Human Population Pressure	76	30.3
Erratic Pattern of Rain Fall	68	27.1
Absence of Crop Rotation	51	20.3
Climate Change	48	19.1
Rugged Topography	45	17.9
Others	20	7.9

Source: Field Survey in Lume Woreda, 2012 * Participants may give multiple answers.

Different studies also have shown the same result. For example, Mbagwan (1984) reported about 85 percent of the causes of land degradation worldwide are due to soil erosion by wind and water. This is in line with the idea of focus group discussants; in all the three cases the participant mentioned soil erosion was as a main cause of land degradation. Other study done in Kenya regarding farmers' perception of soil fertility also concluded erosion is the main source of soil depletion (Odendo *et al*, 2010).

Farmers perceived that soil erosion was taking place on their landscape. Out of the interviewed 397 farmers the overwhelming percent (73.3) said yes for the existence of soil erosion. Farmers were also asked about cause of soil erosion. The survey result showed that 73.6 percent of the farmers thought that the main cause of soil erosion was caused by poor farming practice, while 68 percent reported that soil erosion was affected by loss of biodiversity. According to focus group participants the main causes of soil erosion were farming practice and loss of biodiversity. The discussant said almost all farmers are farming without following the natural topography, these poor farming practice leads to soil erosion by wind and water. Regarding the poor farming practice the focus group discussant also said, since there is no reserved grazing land for livestock there foot path damaged and exposed the top soil for erosion.

Table 5.10 shows participants perception of bad effects of land degradation among those who think they know the meaning of the term.

About 86 percent of the farmers who perceive land degradation reveal that reduction in crop production is the major consequence of land degradation. About 49 percent of them mentioned loss of income or livelihood as a bad effect of land degradation. From the interviewed farmers a devastating proportion (327) of them said there crop production is decreasing from time to time. This was also supported by the focus group discussion.

Farmers were also asked about the emergence of unpalatable plant species signifying the degradation land. About 161 farmers are aware of the emergence of unpalatable plant species and the remaining130 not aware. The following plant species were given by local names, Nechilebash, Ebay, Amakita, Amirita, Fremosisa and Torserawit, Gerebi and Kuramara as unpalatable species.

Reduction in crop production and appearance of unpalatable plant species are indicators of the farmers to see whether there existed land degradation on their land. The participant in the focus group discussion pointed out some indicators of land degradation; they mentioned presences of unpalatable plant, reduction in crop yield, change in soil color and thickness and amount of chemical fertilizer that the land need. The discussant said that "..... to get yield from farming we are obliged to use more chemical fertilizer because the land is corrupted".

Table 5.10: Frequency of respondents by the bad effect of land degradation, Lume Woreda

Consequences	Frequency	Percent*
Reduced crop yields (productivity)	216	86.1
Loss of income/livelihoods	124	49.4
Loss of soil (soil erosion)	107	42.6
Loss/depletion of soil nutrients	95	37.8
Increased vulnerability to natural hazards (e.g. drought)	79	31.5
Decreased water supply	74	29.5
Migration	68	27.1
Siltation (pollution) of water bodies	57	22.7
Loss of habitats and biodiversity	54	21.5
Food insecurity	52	20.7
Others	9	3.6

Source: Field Survey in Lume Woreda, 2012

* Participants may give multiple answers.

Land Tenure

About 89 percent reported that they owned farm land. Other reported that they don't have any land (10.3 percent). Amongst the farmers who owned farm land the majority (69.3percent) don't feel secure that the land they cultivate belongs to them. The most frequently cited reason was the growing attention and support given to plantation agriculture will push them to sell their land. The average farm land size owned by a household is about 1.57 ha, and 1.72 ha excluding the land rented. It is smaller than the

average area per holder of Oromia State, about 2.4 ha. And the average farm size of the Woreda is 3.75 ha per household.

5.3 Main Source of Living

Table 5.11 shows participants' main source of living. The majority of respondents (83.1%) revealed cropping is their main source of living.

Table 5.11: Frequency of respondents by main source of living in Lume Woreda

Main Livelihood Dependency	Frequency	Percent
Cropping	330	83.1
Livestock	9	2.3
Cropping and Livestock	58	14.6
Total	**397**	**100**

Source: Field Survey in Lume Woreda, 2012

5.4 Source of Energy

Out of total interviewed farmers, 77.1 percent of them use animal dung as their source of energy. About 73.3 percent of the respondents reported that fuel wood is the second most frequently used source of household energy. The reconnaissance survey and the household questionnaire revealed that farmers' perceived deforestation mainly through an increasing scarcity of tangible forest products such as fuel-wood and building poles.

Table 5.12: Distribution of respondents' source of energy in Lume Woreda

Source of Energy	Frequency	Percentage*
Fuel Wood	291	73.3
Crop Residual	59	14.9
Dung	306	77.1
Kerosene	32	8.1
Others	7	1.8

Source: Field Survey in Lume Woreda, 2012 * Participants may give multiple answers.

5.5 Land Management Practices

Most farmers (73 percent) in Lume Woreda perceived the problem of soil erosion on their land. Out of the perceived farmers' about 84.2 percent reported they are practicing some type of conservation measure to deal with the problem of soil erosion.

Table 5.13: Types of soil conservation measures being practiced, Lume Woreda

Measures	Frequency	Percentage*
Terracing	197	67.7
Cultivation along the contour	112	38.5
Check dams	110	37.8
Tree planting	68	23.4
Strip-cropping along the contour	32	11
Bunding	30	10.3
Windbreaks	23	8
Others	8	2.8
Vegetative and crop cover	5	2

Source: Field Survey in Lume Woreda, 2012.

* Participants may give multiple answers

The results indicate that terracing and cultivation along the contour were the most widely used traditional soil conservation measures. A significant proportion of farmers constructed check dams to refill and prevent further development of rills and gullies near their farm boundaries. Soil bunds were only adopted by a small percentage of the interviewed farmers (10 percent). Least recognized as conservation measure was the vegetative and crop cover practices. The focus group results also support this idea.

Respondents were asked how they perceive their land soil fertility status. More than half (60.7 percent) expressed that the fertility is decreasing from time to time. Whereas 35.8 percent reported the fertility is remaining the same. Only 3.5 percent of the farmers observed increased soil fertility status. Out of the interviewed farmers 257 of them do

some kind of practice to maintain or enrich soil fertility of their cultivated land. The table below illustrates distribution of farmers by method for improving the fertility status of the land.

Table 5.14: Farmers' perception on status of soil fertility of their land, Lume Woreda

Soil Fertility	Frequency	Percentage
Increasing	14	3.5
Decreasing	241	60.7
Remain the same	142	35.8
Total	397	100

Source: Field Survey in Lume Woreda, 2012.

A significant higher proportion of farmers (71.2 percent) reported that they were using chemical fertilizers, which is a popular practice among the farmers to improve productivity of soil. This is followed by construction of the ridges across the slope with 48.6 percent of adoption by farmers. Development of compost is the result of the extension system. Focus group discussant farmers and development agents of kebeles proved that, almost all of the farmers use chemical fertilizer to develop the production capacity of their land.

Table 5.15: Responses to "What do they do to improve fertility of soil", Lume Woreda

Method	Frequency	Percentage*
Use of chemical fertilizer	183	71.2
Compost	125	48.6
Use of Manure	116	45.1
Intercropping	88	34.2
Agroforestry	73	28.4
Others	38	14.8

Source: Field Survey in Lume Woreda, 2012.

* Participants may give multiple answers

Agroforestry

Trees help to preserve the fertility of the soil through the return of organic matter and the fixation of nitrogen. Farmers improve the soil's structure and help to maintain high infiltration rates and greater water holding capacity. As a result less runoff is generated and erosion is better controlled. The findings of this study also suggest that agroforestry is rarely used as a means of maintaining soil fertility (Table 5.15). In the study area, scattered trees on crop land are also found, but the trees are widely spaced and probably have little effect in maintaining soil fertility. Even when inorganic fertilizer is available, a minimum amount of organic matter is required for its efficient use. Given that external inputs may continue to be unaffordable agroforestry could be useful in maintaining soil fertility.

Major Uses of Crop Residue

The ways in which crop residues are utilized in a farming system has important implications for nutrient recycling and soil and water conservation. In the study area most farmers use crop residues as livestock feeds. The most important use of crop residue was using the residual as feed for animals (91.9 percent). The results indicated that use of crop residues for animals feeding were common practices in the study area. Discussion with extension agents revealed that crop residue are transported from the crop field to the home compound and stored for animal feed due to chronic feed shortage. About 18.1 percent of the interviewed farmers said they sell the residual to earn money. It implies that soil fertility is declining most rapidly in the main fields, as crop residues from these areas are used for livestock feed and animal dung is also used as source of energy.

Table 5.16: Distribution of respondents' use of crop residue in Lume Woreda

Use of plant residual	Frequency	Percentage*
Bum them	25	6.3
Use them as feed	365	91.9
Cooking	48	12.1
For natural fertilizer	37	9.3
Burn it on farm	2	0.5
Other	72	18.1

Source: Field Survey in Lume Woreda, 2012

* Participants may give multiple answers

Mulching, covering soil surface with crop residues, is another potential measure to reduce soil/nutrient loss. Through mulching, the hydraulic force of the raindrop on the soil particle will be reduced, thereby soil detachment is minimized. On the other hand, mulch is not practiced in the study area because of unavailability of crop residue. In the subsistence farming system in study area, where inorganic fertilizers are unaffordable, and crop residues play a major role in soil fertility restoration. However, poor management and unwise use of crop residues may have reduced the quality and availability of residues to be used for soil fertility restoration field by working

5.6 Bivariate and Multivariate Results of Factors Influencing Farmers' Perception of Land Degradation

5.6.1 Bivariate Results of Factors Influencing Farmers' Perception of Land Degradation

This section examined the association between the dependent variable farmer's perception of land degradation and the independent variables. Bivariate data analysis was made to test presence of relationship between the dependent variable and each of the independent variables using SPSS software and 95% confidence interval.

5.6.1.1 Demographic Factors

Table 5.17 summarizes the result of chi-square test of the demographic characteristics of the respondents. The result revealed that of the total 397 farmers 48.4 percent are found to have high perception of land degradation while the rest 51.6 percent have low perception of land degradation. Among the demographic characteristics of the respondents' sex, age, marital status and household size were examined.

The percentage of male farmers having low perception was 48.4 percent the remaining 51.6 percent have high perception of land degradation. And for female respondents 59.3 percent of them have low perception whereas 40.7 percent of them have high perception. This indicates that sex of a farmer and their perception of land degradation has an association ($X^2 = 3.97$, $p<0.05$ and df =1).

Table 5.17 indicates that among farmers who are younger than 40, 43.2 percent and 56.8 percent has low and high perception of land degradation respectively. Among old age group farmers who accounted of 58.4 percent have low perception and 41.6 have high perception. The chi square result shows there exist significant association of age with the perception of land degradation ($X^2 = 9.05$, $p<0.01$ and df=1).

Among respondents who are currently in union 46.9 percent of them have low and the remaining 53.1 percent high perception of land degradation. And for those currently not in union 58 percent of them have low perception while 42 percent of them have high perception. The existence of an association between marital status of farmers and their perception of land degradation is indicated by the result of the bivariate analysis($X^2 = 4.753$, $p<0.05$ and df=1).

About 47.8 percent and 52.2 percent of farmers with family size of 1-3 have low and high perception respectively. About 47.8 percent of farmers with family size 4-6 have low perception while 52.2 percent of farmers with the same family size have high perception of land degradation. And also 51.8 percent and 48.2 percent of farmers with family size of the 7-9 have low perception and high perception respectively. Among respondents who have family size above 10, 66.7 percent of them have low perception and 33.3 percent have high perception. The chi square result illustrate there is no significant association between house hold size and perception of land degradation (X^2 = 5.81, $p>0.05$ and 3).

Table 5.17: Chi –Square Result for Demographic Variables that Affects Farmer's Perception of Land Degradation in Lume Woreda

Background Character		Perception Level		Total	X^2(df)	P value
		Low Perception	High Perception			
Sex						
Male	Count (%)	135(48.4%)	144 (51.6%)	279 (100.0%)	3.97 (1)	0.046
Female	Count (%)	70 (59.3%)	48 (40.7%)	118 (100.0%)		
Total	Count (%)	205 (51.6%)	192 (48.4%)	397 (100.0%)		
Age						
<40	Count (%)	76 (43.2%)	100 (56.8%)	176 (100.0%)	9.05 (1)	0.003
≥40	Count (%)	129 (58.4%)	92 (41.6%)	221 (100.0%)		
Total	Count (%)	205 (51.6%)	192 (48.4%)	397 (100.0%)		
Marital status						
Currently in Union	Count (%)	107 (46.9%)	121 (53.1%)	228 (100.0%)	4.753	0.029
Currently not in Union	Count (%)	98 (58.0%)	71 (42.0%)	169 (100.0%)		
Total	Count (%)	205 (51.6%)	192 (48.4%)	397 (100.0%)		
Household Size						
1-3	Count (%)	11 (47.8%)	12 (52.2%)	23 (100.0%)	5.82 (3)	0.121
4-6	Count (%)	87 (47.8%)	95 (52.2%)	182 (100.0%)		
7-9	Count (%)	73 (51.8%)	68 (48.2%)	141 (100.0%)		
10+	Count (%)	34 (66.7%)	17 (33.3%)	51 (100.0%)		
Total	Count (%)	205 (51.6%)	192 (48.4%)	397 (100.0%)		

Sources: out put

5.6.1.2 Socio-Economic Factors

Regarding literacy status, 63.7 percent of illiterate farmers have low perception and the remaining 36.3 have high perception of land degradation. Literate farmers with low perception constitute 39.3 percent and the rest 60.7 percent have high perception. The chi square test be evidence for the existence of significant association between literacy status and perception of land degradation ($X^2 = 23.65$, $p<0.01$ and $df=1$).

With regard to farm size, 57.5 percent and 42.5 percent of farmers who own a size of farm land which is less than 1.75 ha have low and high perception of land degradation respectively. Among farmers who own 1.75 ha and more ha of size of farm land 44.3 percent have low perception and 55.7 have high perception of land degradation respectively. The association between size of farm land and perception of farmers on land degradation is indicated in the result of chi square test ($X^2 = 6.78$, $p<0.01$ and $df=1$).

Of the respondents who have contact with extension workers 58.9 percent of them have high perception and 41.1 percent have low perception of land degradation. Among those who don't have contact 72.4 percent and 27.6 percent have low and high perception of land degradation. Table 5.1 indicates that there is an association between contact with extension workers and level of perception ($X^2 = 34.88$, $p<0.01$ and $df=1$).

As the bivariate result indicated in table 5.18 farmers' level of perception of land degradation and membership in CBOs have an association ($X^2 = 45.63$, $p<0.01$ and $df =1$). Among the farmers who belong 39.5 percent and 60.5 percent have low and high perception. About 75.4 percent and 24.6 percent of farmer have low and high perception of land degradation, among farmer who is not belonging to CBOs.

Regarding livestock number, 63 percent of farmers who have less than seven cattle have low perception and the remaining 37 percent have high perception of land

degradation. About 36.5 percent and 63.5 percent of farmers with cattle number above seven have low perception and high perception respectively. The chi square test be evidence for the existence of significant association between livestock number and perception of land degradation ($X^2 = 27.39$, $p<0.01$ and $df=1$).

Table 5.18 reveals that there is an association between off-farm income and perception of land degradation ($X^2 = 111.91$, $p<0.01$ and $df=1$). Among respondents who have no off-farm income 22.7 percent of them have low and the remaining 77.3 percent high perception of land degradation. And for those who do have off-farm income75.9 percent of them have low perception while 24.1 percent of them have high perception.

Table 5.18: Chi –Square Result for Socio-economic Variables that Affects Farmer's Perception of Land Degradation in Lume Woreda

Background Character		Perception Level		Total	X^2(df)	P value
		Low Perception	High Perception			
Literacy Status						
Illiterate	Count (%)	128 (63.7%)	73 (36.3%)	201 (100.0%)	23.65 (1)	000
Literate	Count (%)	77 (39.3%)	119 (60.7%)	196 (100.0%)		
Total	Count (%)	205 (51.6%)	192 (48.4%)	397 (100.0%)		
Farm size						
<1.75	Count (%)	127 (57.5%)	94 (42.5%)	221 (100.0%)	6.78 (1)	0.009
≥1.75	Count (%)	78 (44.3%)	98 (55.7%)	176 (100.0%)		
Total	Count (%)	205(51.6%)	192 (48.4%)	397(100.0%)		
Contact with extension workers						
Yes	Count (%)	108 (41.1%)	155 (58.9%)	263 (100.0%)	34.88 (1)	000
No	Count (%)	97 (72.4%)	37 (27.6%)	134 (100.0%)		
Total	Count (%)	205 (51.6%)	192 (48.4%)	397 (100.0%)		
Membership in CBOs						
Belong	Count (%)	104 (39.5%)	159 (60.5%)	263 (100.0%)	45.63 (1)	000
Not Belong	Count (%)	101 (75.4%)	33 (24.6%)	134 (100.0%)		
Total	Count (%)	205 (51.6%)	192 (48.4%)	397 (100.0%)		
Livestock number (TLU)						
≤7	Count (%)	143 (63.0%)	84 (37.0%)	227 (100.0%)	27.39 (1)	.000
>7	Count (%)	62 (36.5%)	108 (63.5%)	170 (100.0%)		
Total	Count (%)	205 (51.6%)	192 (48.4%)	397 (100.0%)		
Off - farm income						
Yes	Count (%)	164 (75.9%)	52 (24.1%)	216 (100.0%)	111.91 (1)	.000
No	Count (%)	41 (22.7%)	140 (77.3%)	181 (100.0%)		
Total	Count (%)	205 (51.6%)	192 (48.4%)	397 (100.0%)		

Sources: out put

5.6.2 Multivariat Results of Factors Influencing Farmers' Perception of Land Degradation

The chi- square test or the bivariate analysis is only used to show whether there is association between variables or not. But it doesn't indicate the net effect of the

independent variable contribution in explaining variation on the dependent variable. Multivariate analysis was conducted in the form of logistic regression to predict the likelihood of farmers' perception of land degradation versus explanatory variables.

Before fitting the model, the problem of multicollinearity among independent variables was checked by using variance inflation factors (VIF), condition index (CI) and contingency coefficient. The VIF test confirms that no multicllinearity problem is observed between the independent variables.

The result of logistic regression on perception show in the table below indicates that age, literacy status, farm size, contact with extension workers, membership in CBOs, livestock number and off-farm income are significantly associated with level of farmers perception to land degradation at 99% ($P<0.01$) confidence level. Two variables: sex and marital status were not significant in the model.

Table 5.19 Multivariate Result for Demographic and Socio-economic Variables that Affects Farmer's Perception of Land Degradation in Lume Woreda

Background Variables		B	S.E	Exp(β)	Sig.	95% C.I.for EXP(β)	
						Lower	Upper
Sex	Male(RC) Female	0.391	0.427	1.478	0.361	0.64	3.413
Age	<40(RC) ≥40	1.27	0.361	3.562	.000	1.755	7.23
Marital Status	Currently in union(RC) Currently not in union	0.478	0.39	1.613	0.221	0.75	3.465
Literacy Status	Illiterate(RC) Literate	-1.188	0.338	0.305	.000	0.157	0.591
Farm land size(in ha)	<1.75(RC) ≥1.75	0.78	0.304	1.805	0.01	1.253	2.832
Contact with extension workers	Yes(RC) No	1.681	0.346	5.37	.000	2.726	10.579
Membership of CBOS	Belong(RC) Not belong	1.64	0.354	5.155	.000	2.577	10.311
Livestock number(TLU)	≤ 7(RC) >7	1.077	0.301	1.34	.000	1.189	2.614
Off-farm income	Yes(RC) No	-2.886	0.331	0.62	.000	0.375	0.994

Source: Output

B- regression coefficient

S.E-standard error

RC- reference category

df- degree of freedom

5.6.2.1 Demographic Factors

Sex of the household head was expected to have an influence on the perception of land degradation. As it can be seen from Table 5.19, sex of a farmer doesn't significant influence their perception of land degradation (df=1, Exp (β) = 1.478 and p=0.361which is greater than 0.005). That is for this particular study the association between sex of a farmer and their perception of land degradation is not significantly manifested. This could be due to little number of female headed household in the area. As large number of males was included as household heads, the model can fail to indicate the effect of sex for perception of land degradation. This finding contradicts with the work of Tadele (2008) who studied the socio-economic determinants of land degradation. That study had found that sex of household head had relation with perception of land degradation.

The result of multivariate analysis as indicated in Table 5.19 age significantly influence perception of a farmer on land degradation (df=1, Exp (β) = 3.562 and p=0.000). The result implies young farmers (<40) are more than two times more likely to perceive land degradation than the old age (≥40). This may be due to the fact that young farmers are relatively better in participation of conservation activities, contact with conservation agents, more likely to be educated, access to information and thus they had higher percentage of perception about land degradation. Chizana *et al.* (2007) found the same results that young farmers are more concerned about environmental problems.

As it can be seen from Table 5.19, marital status of a farmer doesn't significant influence their perception of land degradation (df=1, Exp (β) = 1.613and p=0.221which is greater than 0.005). That is for this particular study the association between marital status of a farmer and their perception of land degradation is not significantly manifested.

5.9.2.2 Socio-Economic Factors

The result of multivariate analysis as indicated in Table 5.19 above shows that education significantly influences perception of a farmer on land degradation (df=1, Exp(β) 0.305= and p=0.000) at p value less than 0.01. The result implies, illiterate farmer are 69.5 percent less likely to perceive land degradation than literate one. Different studies also have shown the same result, for example, in their study about farmer perception, Chizana *et al.* (2007) reported education raise awareness of the farmers about environmental problems. According to them, it is possible to conclude that well educated persons tend to be more concerned about environment quality than less educated. Awoyinka *et al.* (2005) found the same results that educated individuals express greater recognition of and concern for environmental problems.

The result of multivariate analysis also asserts that farmers perception of land degradation is significantly influenced by the size of farm land that they own (df=1, Exp(β) = 0.305 and p=0.000 value less than 0.001). The variable, farm size was associated with perception of land degradation, indicating that a unit increases in farm size decrease the odds of degradation by a factor of 0.305. The possible explanation for this could be, it is the poor who have closer relation with nature, since they heavily depend on the natural capital for their survival. Different studies also have shown that rural population in poor countries pay the highest price for environmental degradation, as their livelihood depends on land (Koziell and McNeil, 2002).

The logistic regression model clearly revealed the existence of positive and significant association between contact with extension workers and perception of farmers about land degradation (df=1, Exp (β) = 5.37 and p value which is less than 0.001). As indicated in the table farmers who have contact with extension workers are four times more likely to perceive land degradation than who don't have contact. Mulugeta (1992)

also noted that farmers who had contact with conservation agents had a significant association with farmer's perception and response to soil erosion and deforestation problems.

The result of multivariate analysis as indicated in Table 5.19 above show, the variable of membership in CBOs had a strong significant positive relation with perception of `land degradation. The result of multivariate analysis shows that membership in CBOs significantly influences perception level of a farmer on land degradation (df=1, Exp (β) = 5.155 and p value which is less than 0.001). The result confirms that, farmers who belong to farm association are nearly five times more likely to perceive land degradation than those who are not belong. The finding corroborates the result reported by Awoyinka *et al.* (2005).

The result of logistic regression also confirmed that the existence of significant association between Livestock number (TLU) and perception of farmers about land degradation (df=1, Exp (β) = 1.34 and p value which is less than 0.001). The odds ratio implies that those who have more than seven TLU are 66 percent less likely to perceive land degradation problem than the reference category. The direction was negative, and as livestock was increasing the probability of perceiving land degradation decrease. This means that as the number of livestock increase, peoples' tendency to perceive land degradation decrease.

The finding that livestock holding is negative related to land degradation is consistent with the finding of Pender *et al.* (2003) , ILRI (2003) and Tegbar (2007). The effect of the size of livestock holding on land degradation shows that size of livestock holding is an important determinant of farmers' behavior to improve soil fertility through manuring, fallowing and more capital investment in soil water conservation.

The logistic regression model clearly revealed the existence of significant association between off-farm income and perception of farmers about land degradation (df=1, Exp (β) = 0.62 and p value which is less than 0.001). As indicated in the table farmers who have off-farm income are 38 percent less likely to perceive deforestation than who don't have off- farm income. Farmers' off-farm work is closely related with the perception of the existence of land degradation. It is clear that farmers who are practicing agricultural activities are expected to know much more about the current situation of their land.

CHAPTER SIX

6. CONCLUSIONS AND RECOMMENDATIONS

6.1 Conclusions

Farmers are aware that land degradation, in various forms, is taking place on their farms as well as in surrounding areas. This awareness is largely based on their perceptions and interpretation of indicators regarding conditions on their crop land. The major physical and biological land degradation indicators farmers cited include soil erosion, soil fertility loss, change in crop yield, emergence of unpalatable species and loss of habitats and diversity of plants.

The result of the farmers` perception can provide useful information for the resolution of land degradation as well as environmental problems. Farmers in the study area had perceived and concerned of the problems of land degradation and had well known on the types and cause of degradation of their land. They perceived that soil erosion and decreasing of soil fertility as is more serious for the farmland. The main cause of these problems had poor farming practice and loss of biodiversity.

Independent variables such as sex, marital status and household size were not significantly affect land degradation in the study area. For the variable of age, education, contact with extension agents, membership in CBOs, farm size , livestock number and off-farm income were major requirement for against land degradation. According to the results, it can be concluded that there is a need to control farm size and livestock number. The findings of this study are:

- Assessment of the source of information of farmers in land degradation problem shows that large proportion of farmers use radio as a source.

- There exist significant associations between age of household head with the perception of land degradation. Young farmers with age group less than 40 are relatively having better perception of land degradation than the older.
- Education of farmers determines their perception of land degradation. Literate farmers are better in perception of land degradation than the illiterate one.
- The farmers with smaller farm size (less than 1.75 ha) have much better perception of land degradation than their counter parts.
- Farmers who are not involved in off-farm income were better in a position to perceive the existing land degradation than farmers with no off–farm income.
- Findings of this study revealed that perception of farmers with larger number of livestock (more than 7 TLU) decreased by 66 percent compared to farmers with smaller livestock.
- The extension service could enhance farmers' awareness about these changes and guide them regarding the appropriate response to new, unfamiliar situations. Furthermore, the extension service does not systematically reach the kebele level, there are few extension agents at the kebele level and visits from the extension service are infrequent.
- There are introduced measures of conservation practices. Some of the conservations measures employed in soil and water resources include manure, compost and chemical fertilizer application and crop rotation. Structural conservation measure including terracing, cultivation along the contour and check dams are also employed. However, various socio-economic and environmental conditions have limited the performance of these measures. Thus resource degradation is still serious problem in the study area.

6.2. Recommendations

Based on the findings of the study, the following recommendations are proposed:

- ✓ As education is one of the mechanisms to provide awareness on perceiving land degradation and using conservation practices, educating the society is necessary. However, as the farmers are engaged in farming activities alternative basic education is recommended.
- ✓ Though sex of farmers didn't significantly shape the perception of land degradation in this area, to involve and encourage females' farmers from household members to take part in productive works for prevention of land degradation in their farmland is needed. This paves the way the females to get more information about land degradation.
- ✓ In the study area, the majority of the farmers are dependent on plowing than livestock. Therefore encouraging the farmers to create diversify income sources is beneficial which may reduce alternative income generation is beneficial as an income source which may reduce the stress of the land.
- ✓ There is a need for more development agents (DAs) to lay more emphasis on sustainable practices and also to disseminate information to farmers and address the needs pertaining to sustainable land management practices. Extension services must create mechanisms to increase the capacity for independent innovation within farming communities, while working with farmers to develop appropriate technologies to combat soil degradation.
- ✓ Farmers are crucial for this intervention program; understanding their needs is important. Training programs should be prepared specifically for their need and the knowledge gaps.
- ✓ In order to enhance the population's perception related to land degradation, the most trusted source of information should be effectively utilized.

- ✓ From the empirical finding of this study, multidimensional factors of demographic and socio-economic characteristics had responsible for farmers' differential in perception to land degradation. However, further research in this area should be conducted widely at micro level.

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Appendix I: Questionnaire to be completed by household head

Survey on Farmers' Perception of land Degradation: Household Questionnaire

Kebele/PA		Household ID No		

Quality Assurance – Field work			
	Name	Date	Signature
Data Collector			
Supervisor			

Informed Consent

Good morning/afternoon. My name is _____. I am a post graduate student at Addis Ababa University, College of Development Studies, and center for Population Studies. Currently, I am undertaking study on the perception of land degradation in this Woreda. Thus your cooperation is very valuable to achieve the objective of the study. You have been selected for interview by means of a random or chance selection process, much like picking an orange out of a basket without looking. If you agree to participate in the study, I will ask few questions if I may, but you can refuse to answer and question I ask. You may end the interview at any time. You can also refuse to participate in the study entirely. The interview will take about thirty to forty minutes. The interviews/discussions are strictly confidential so your responses will not be shared with anyone.

Are you willing to participate in the study? Yes ☐ No ☐

_____ _____

Signature of interviewer Date

PART I: Demographic and Socio-economic Characteristics of Household Head				
Q.No	Questions and Filters	Codes and Answers		Go to Q.
101	Sex	01	Male	
		02	Female	
102	How old are you?	☐☐	In full years	

103	What is your marital status?	01	Never Married	
		02	Married	
		03	Widowed	
		04	Divorced	
		05	Separated	
104	What is your educational status?	01	Illiterate	
		02	Able to read and write	
		03	Primary education (1-4)	
		04	Primary education (5-8)	
		05	Secondary education (9-12)	
		06	Collage/ university	
105	Ethnic group	01	Oromo	
		02	Amhara	
		03	Guraghe	
		98	Other, Specify_____	

106	Family Size	Age	Male	Female	
		0-14			
		15-64			
		65+			

PART II: Land Holding and other Related Issues

Q.No	Questions and Filters	Codes and Answers	Go to Q.
201	In 2003/04 E.C, How much arable land did you have?	In hectares _____	
		In timad, _____	

202	How much of the land did you own?	In hectares _____		
		In timad, _____		
203	How much of the land did you rent?	In hectares _____		
		In timad, _____		
204	For what purpose have you used your land?	01	Annual Crop	
		02	Perennial Crops	
		03	Grazing land	
		04	Renting the land	
		98	Other, specify _____	
205	Are all your fields in one unit?	01	Yes	207
		02	No ----------☞	
206	If your answer for question 205 is no, in which agro ecology your land found?	01	Kola	
		02	Dega	
		03	Weynadega	
207	Has the size of your cultivated land changed?	01	Yes	211
		02	No ----------☞	
208	If your answer for question 207 is yes, has your land....	01	Decreased	210
		02	increased ----------☞	
209	If your answer for question 208 is 'decreased', what are the reasons?	1._____ 2._____ 3_____		
210	If your cultivated land has expanded, is the newly cultivated land as productive as the previous one?	01	Same	
		02	More productive	
		03	Less productive	
211	Do you feel secure that the land you	01	Yes ----------☞	213

	cultivate belongs to you?	02	No	
212	If your answer for question 211 is yes, what are the reasons?	1._____ 2._____ 3_____		
213	Is investment on land profitable?	01	Yes	215
		02	No ----------☞	
214	If your answer for question 213 is yes, what are the profits?	1._____ 2._____ 3_____		
215	Were there conflicts related to grazing land usages?	01	Yes	217
		02	No ----------☞	
216	If your answer for question 215 is yes, who were the participants?	01	Pastoralist	
		02	Farmers	
217	In the past 12 months, does your family or one of your family member participated in off farm activities for additional income?	01	Yes	To part III
		02	No ----------☞	
218	If your answer for question 215 is yes, please mention three of the main activities.	01	Government / civil service	
		02	Firewood and charcoal sell	
		03	In mechanized farms	
		04	Privet farm with salary	
		05	Road constriction	
		06	Tea, 'Tela' and 'areke' sell	
		98	Other, specify _____	

Part III Availability of household energy				
Q.No	Questions and Filters	Codes and Answers		Go to Q.
301	What is the primary source of your fuel?	01	Fuel wood	
		02	Crop residue	
		03	Dung	
		04	Kerosene	
		98	Other, specify _____	
302	Indicate the time and distance you travel to collect the primary source of fuel?	01	_____ o'clock	
		02	_____ hours	
303	If you are buying these energy sources locally, have the prices you pay been:	01	Increasing	
		02	Decreasing	
		03	Remains the same	
304	Have you faced fuel wood shortage?	01	Yes	To part IV
		02	No --------☞	
305	If you face fuel wood shortage, what are the reasons?	1._____ 2._____		
306	What measures are you taking to deal with this problem?	01	agro forestry	
		02	Private tree planting	
		03	Communal tree planting	
		04	natural regeneration	
		05	use of energy saving devices	
		98	Other, specify _____	

Part IV Farming practices			
Q.No	Questions and Filters	Codes and Answers	Go to Q.
401	What are the major crops grown on	_____	

	your farm in order of importance?			
402	Do you grow each of these crops alone or do you mix them with other crops?	01	Alone ----------☞	404
		02	With other crops	
403	If your answer for question 402 is 'with other crops' name the most common combinations.	_____		
404	Do you plant the same crop every year or change to other crops or practice fallowing?	01	Plant the same crop each year	
		02	Change to other crops	
		03	Practice fallow	
		04	Change to other crops and then practice fallow	
405	What do you do with your crop residue?	01	do noting	
		02	Use it as feed for animals	
		03	Use it for cooking	
		04	Use it as a natural fertilizer	
		05	Burn it	
		98	Other, specify _____	
406	Do you use irrigation in any of your plots?	01	Yes	408
		02	No ----------☞	
407	If your answer for question 406 is yes, what crops do you cultivate?	01	Vegetables	
		02	Maize	
		03	Sugarcane	
		98	Other, specify _____	
408	Your livelihood mainly depends on:	01	cropping only	
		02	livestock only	
		03	both cropping and livestock	

409	Did/Does the household own livestock?			
	Type of livestock owned		Size in number	
	1. Oxen	01= Yes 02= No		
	2. Cows	01= Yes 02= No		
	3. Heifer	01= Yes 02= No		
	4. Sheep	01= Yes 02= No		
	5. Goats	01= Yes 02= No		
	6. Donkeys	01= Yes 02= No		
	7. Mules	01= Yes 02= No		
	8. Horses	01= Yes 02= No		
	9. Chicken	01= Yes 02= No		
410	Do you grow trees on your farm?	01	Yes	412
		02	No ----------☞	
411	If your answer for question 410 is yes, what crops do you cultivate?		Propose	Tree type
		01	Fuel wood	
		02	Building materials	
		03	Fodder	
		04	Soil fertility maintenance	
		05	Fruits or nuts	
		06	Windbreaks	
		07	shades	
412	Do you have shortage of pasture or feed for livestock?	01	Yes	415
		02	No ----------☞	
413	If your answer for question 412 is yes, which month is difficult?	_____		
414	How do you solve shortage of pasture	1._____		

	or feed for livestock	2._____		
415	Do you observe the emergence of unpalatable pasture species in the grazing areas?	01	Yes	418
		02	No ----------☞	
416	If your answer for question 415 is yes, please mention.	1._____ 2._____		
417	Do you use chemical fertilizers to improve agricultural production?	01= Yes	02= No	
420	Do you use insecticide to improve agricultural production?	01= Yes	02= No	
421	Do you use pesticide to improve agricultural production?	01= Yes	02= No	
422	Do you use natural fertilizers to improve agricultural production?	01= Yes	02= No	
423	Do you use improved seed to improve agricultural production?	01= Yes	02= No	

Part V Land degradation / Problem

Q.No	Questions and Filters	Codes and Answers		Go to Q.
501	Have you ever heard of the term land degradation?	01	Yes	503
		02	No ----------☞	
502	If your answer for question 501 is yes, please mention where.	01	Friends and relatives	
		02	Radio	
		03	Extension agent	
		04	Television	
		98	Other, specify _____	
503	In your opinion you know the meaning of the term land degradation?	01	Yes	508
		02	No ----------☞	
504	Which of the following do you consider examples of land degradation?			

504.1	Soil erosion	01= Yes	02= No	
504.2	Loss of soil productivity (yield)	01= Yes	02= No	
504.3	Loss of habitat and diversity of plants	01= Yes	02= No	
504.4	Mass movement of soil (e.g. landslides)	01= Yes	02= No	
504.5	Stalinization of soil (salty soil)	01= Yes	02= No	
504.6	Pollution of soil from liquid waste	01= Yes	02= No	
504.7	Other,	98	specify _____	
505	Are you aware of the causes of land degradation in your area?	01	Yes	507
		02	No ----------☞	
506	In your opinion what do you think are the main causes of land degradation in your area?	01	Soil erosion	
		02	Over cultivation	
		03	Over grazing	
		04	Human population pressure	
		05	Rugged topography	
		06	Deforestation	
		07	Poor farming practices	
		08	Erratic pattern of rainfall	
		09	Absence of crop rotation	
		10	Climate change	
		98	Other Specify _____	
507	In your opinion what do you consider to be the consequence of land degradation?	01	Loss of soil (soil erosion)	
		02	oss/depletion of soil nutrients	
		03	Reduced crop yields (productivity)	
		04	Loss of income/livelihoods	
		05	Siltation (pollution) of water	

			bodies	
		06	Decreased water supply	
		07	Increased vulnerability to natural hazards (e.g. drought)	
		08	Loss of habitats and biodiversity	
		09	Food insecurity	
		10	Migration	
		98	Other Specify _____	
Soil erosion				
508	Do you perceive the problem of soil erosion on your land?	01	Yes	515
		02	No ----------☞	
509	If your answer for question 508 is yes, what are the indicators?	1._____ 2._____ 3_____		
510	In your opinion what do you think are the main causes of soil erosion in your area?	01	Loss of habitats and biodiversity	
		02	Poor farming practices	
		03	Rugged topography	
		04	Erratic pattern of rainfall	
		98	Other Specify _____	
511	Do you observe appearances of plant species that signify the severity of erosion?	01	Yes	515
		02	No ----------☞	
512	If your answer for question 511 is yes, what are the names of these species?	1._____ 2._____ 3_____		
513	Do you use some kind of measure or practice to control soil erosion?	01	Yes	515
		02	No ----------☞	

514	If your answer for question 511 is yes, which of the following measures do you practice?	01	cultivation along the contour	
		02	terracing	
		03	strip-cropping along the contour	
		04	bunding	
		05	windbreaks	
		06	vegetative and crop cover	
		07	tree planting	
		08	check dams	
		98	other (specify) _____	
515	Have you taken any of the following measures because of erosion?			
515.1	Abandoned your cultivated land?	01= Yes	02= No	
515.2	Expanded to marginal land?	01= Yes	02= No	
515.3	Have taken off-farm employment?	01= Yes	02= No	
515.4	other	98	(specify) _____	
Soil fertility				
516	Do you perceive the problem of soil fertility decline on your cultivated land? Is it ...	01	Increasing	519
		02	Decreasing ----------☞	
		03	Unchanged	
517	If your answer is 'increasing' What features leads you to believe that such problem exists?	1._____ 2._____ 3_____		
518	Do you observe change in the level of crop yield on your cultivated land? Has it been increasing or declining?	01	Increasing	520
		02	Decreasing ----------☞	
		03	Unchanged	
519	If your answer is 'increasing' What are the main reasons?	1._____ 2._____		

		3_____		
520	If your answer is 'decreasing' What are the main reasons?	1._____ 2._____ 3_____		
521	Do you use some kinds of practices to maintain or enrich soil fertility of your cultivated land?	01	Yes	523
		02	No ----------☞	
522	If your answer is yes, which of the following practices do you use?	01	use of fertilizer	
		02	use of manure	
		03	intercropping	
		04	mulch or compost	
		05	agroforestry	
		98	others (specify) _____	
523	If you use fertilizer, what kind of fertilizers do you use?	01= urea	02= dap	

Part VI: Institutional capacity

Q.No	Questions and Filters	Codes and Answers		Go to Q.
601	Do you belong to a farmer association or some kind of local association?	01	Yes	603
		02	No ----------☞	
602	If your answer is yes, please indicate names and their main activities.	1._____ 2._____		
603	Do you find advice from extension agents?	01	Yes	606
		02	No ----------☞	
604	What kind of advice do you get from extension agents?	1._____ 2._____		
605	If your answer is yes for 603, How	1._____		

	do extension agents visit you?	2._____		
606	How much helpful is the advice you get from the extension agents about soil and water conservation?	01	Very helpful	
		02	Don't get help	
607	If not helpful, what is the reason?	01	lack of interest	
		02	lack of knowledge	
		03	small in number	
		98	Othrs(specify) _____	

Appendix II: Focus Group Discussion

1. What are the common land degradation problems in your area? What do you think are the possible causes of land degradation in your area
2. Do you think that the rural communities do perceive the existence of land degradation in your area? If yes how do you know their perception?
3. What do you think are the major consequence of land degradation in your area?
4. Do you think that the individual or the communities are actively responding to this problem?
5. Are there any governmental or nongovernmental organizations which are working on land degradation issues? If yes, what are their contributions to the rural community?

Appendix III: Questions for Key Informant Interview

1. Name:_____
2. Educational background_____
3. What is your position in this organization? _____
4. For how long have you been working in this position_____
5. i. Is land degradation occurring in Lume Woreda?

   ii. How is soil fertility change through time in Lume Woreda?
6. What do you think are the possible causes of land degradation in Lume Woreda?
7. i. What do you think are the major consequence of land degradation Lume Woreda?

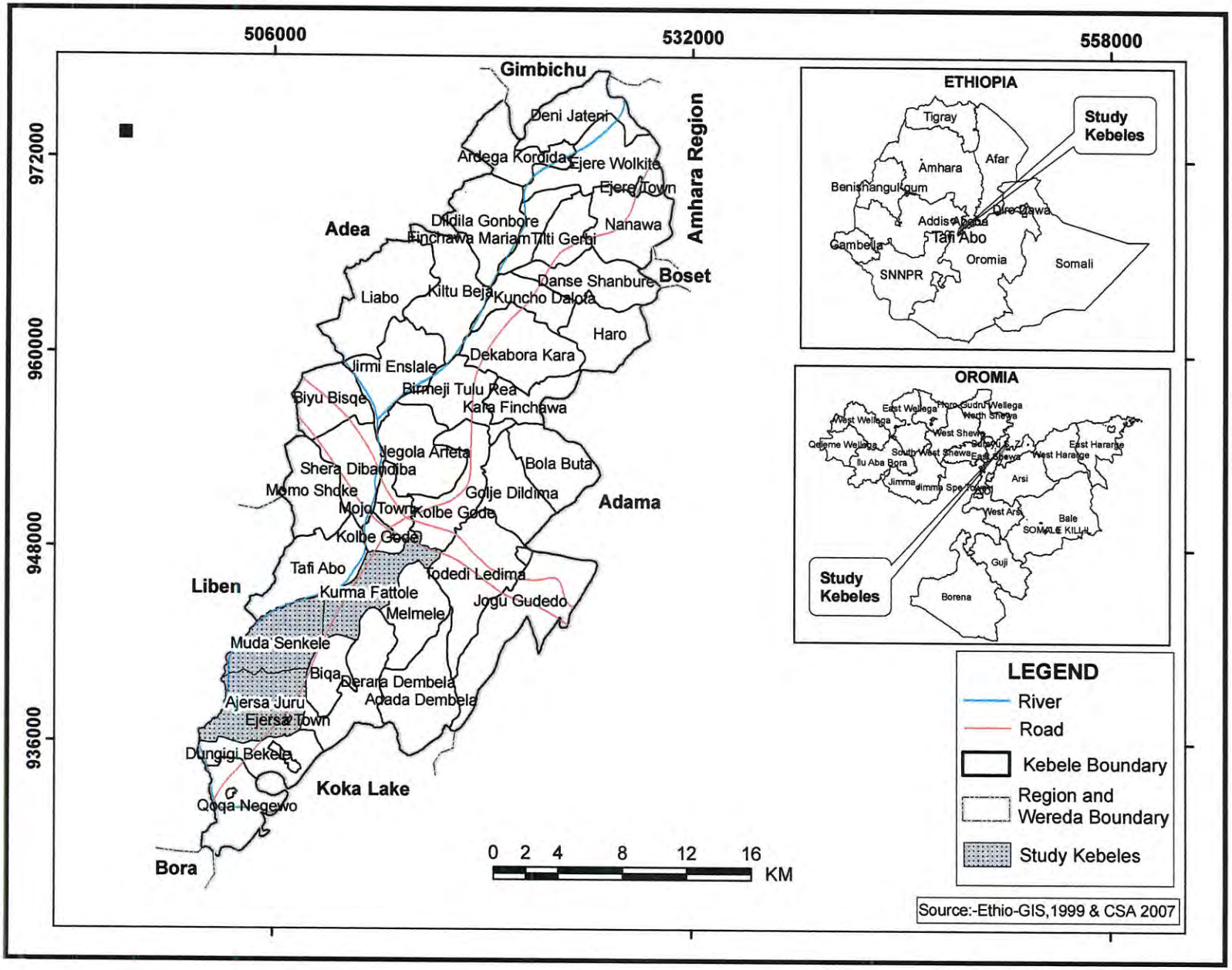
   ii. How often drought and famine occur in Lume Woreda?

   iii. Do farmers in Lume Woreda have shortage of pasture or feed for livestock?
8. What do you do to solve these problems?
9. How often extension workers visit the farmers?
10. What is the level of rural community perception of land degradation?
    - Is there gender variation?
    - Is there age variation?
    - Is there household size variation?
    - Is there educational status variation?
    - Is there farm size variation?
    - Is there cattle size variation?
11. What is the contribution of your institution for Soil and Water conservation activities
12. Do farmers accept Government Soil and Water conservation technologies? If not what criteria need to be considered for adopting the technology?

Appendix IV: Conversion Scales to compute Tropical Livestock Unit

Animal Type	Unit
Oxen	1.00
Cow	1.00
Heifer	0.75
Calves	0.25
Sheep & Goat	0.13
Horse and Mule	1.10
Donkey	0.70
Chicken	0.013

An animal having a live weight of 250kg is reckoned as one Tropical Livestock Unit (TLU)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Finchawa Mariam
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Nanawa
Boset
Danse Shanbure
Liabo
Kiltu Beja
Kuncho Dalota
Haro
Dekabora Kara
Jirmi Enslale
Birmeji Tulu Rea
Biyu Bisqe
Kara Finchawa
Jegola Areta
Bola Buta
Shera Dibandiba
Momo Shdke
Golje Dildima
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Mojo Town
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Tafi Abo
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Tafi Abo
Gambella
Oromia
Somali
SNNPR
OROMIA
East Wellega
Horo Gudru Wellega
North Shewa
West Wellega
West Shewa
Qeleme Wellega
South West Shewa
East Shewa
East Hararge
West Hararge
Ilu Aba Bora
Jimma
Arsi
West Arsi
Bale
Guji
Study Kebeles
Borena
LEGEND
River
Road
Kebele Boundary
Region and Wereda Boundary
Study Kebeles
Source:-Ethio-GIS,1999 & CSA 2007

DECLARATION

I, the undersigned declare that this thesis is my original work and has not been presented for a degree in any other university and that all sources of materials used for the thesis have been duly acknowledged.

Declared by:

Name: Etsegenet kebede

Signature: _____

Date: June/2012