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ADDIS ABABA UNIVERSITY
COLLEGE OF SOCIAL SCIENCES
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**CHALLENGES OF LAND DEGRADATION AND ITS MANAGEMENT: THE CASE OF
MISIRAK BADAWACHO WOREDA OF HADIYA ZONE, SNNPR, ETHIOPIA**

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This is to certify that the thesis prepared by Worku Yohannes Sawore entitled: *challenges of Land Degradation and its Management*: Submitted in partial fulfillment of the requirements of the Degree of Master of Art in Geography and Environmental Studies (Land Resource Management) specialization. Complies with the regulation of the University and meets the accepted standards with respect to originality and quality.

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Acronyms and Abbreviations

AAU	Addis Ababa University
CAADP	Comprehensive African Agricultural Development Program
CSA	Central Statistics Agency
DAs	Development Agents
FAO	Food and Agricultural Organization
FDRE	Federal Democratic Republic of Ethiopia
FGD	Focus Group Discussion
FHH	Female Household
GDP	Growth Domestic Product
HHs	House Holds
IFPRI	International Food Policy Research Institute
ILRI	International Livestock Research Institute
MHH	Male Household
MOA	Ministry of Agriculture
MoARD	Ministry of Agriculture and Rural Development
NAPS	National Action Plans
NEPAD	New Partnership for African Development
NGOs	Non Governmental Organizations
PRSPs	Poverty Reduction Strategy Papers
SLM	Sustainable Land Management
SNNP	Sothern Nations, Nationalities and Peoples
SPSS	Statistical Package for Social Scientists
UNCCD	United Nations Convention to Combat Desertification

UNDP	United Nations Development Programme
USAID	United States Agency for International Development
WARDO	Woreda Agricultural and Rural Development Office
WB	World Bank
WFP	World Food Program
WMO	World Meteorological Organization
WOCAT	World Overview of Conservation Approaches and Technologies

Abstract

In this study questionnaire, interview and focus group discussions were used as a means of primary data collection tools while secondary data were collected from relevant authority reports and records. The data was analyzed both by qualitative method and quantitative method. The findings of the research showed that the study area is suffering from land degradation. It is caused by population pressure, continuous cultivation, free grazing/overgrazing, deforestation, unseasonal heavy rainfall and steep slope cultivation. Land management strategies of farmers include: terracing, soil bunds and contour ploughing are mostly practiced. The educational status of farmers and their access to extension services as well as farmers' training have significant positive impact on farmers to land management practices. The researcher concludes that even though the Woreda have been practicing different types of land management practices, however, the changes on the ground are very less and not continuous. The researcher recommends that Woreda should intensively work on provision of better alternative measures of natural resource conservations like agro-forestry and work on capacity building of farmers to do so. Government, NGOs, Institutions and community at large should work on the issue of land management cooperatively on permanent manner. Different opportunities and supportive activities are recommended for off farm activities and so on.

Keywords: Land management, terracing, soil bunds, contour ploughing, land degradation, population pressure, continuous cultivation free grazing, deforestation, unseasonal heavy rainfall, steep slope cultivation.

CHAPTER ONE

INTRODUCTION

1.1 Background of the study

Land degradation is a major global issue for the 20th century and will remain high on the international agenda even for the 21st century (Working Group on Land Degradation and Desertification of the International Union of Soil Sciences, 1999). Various sources suggest that 5 to 10 million hectares worldwide are being lost annually to severe degradation. If this trend continues, 1.4 to 2.8 percent of total agricultural, pasture, and forestland will have been lost by 2020 (Scherr and Yadav, 1996).

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

Ethiopia is one of the most well endowed countries in Sub-Saharan Africa in terms of natural resources (Gete *et al.*, 2006). However, natural resource degradation in Ethiopia has been going on for centuries (Hurni *et al.*, 2010). Similarly, Berry (2003) also stated that loss of land resource productivity is an important problem in Ethiopia and that with continued population growth the problem is likely to be even more important in the future. The major causes of land degradation in Ethiopia are rapid population increase, severe soil loss, deforestation, low vegetative cover and unbalanced crop and livestock production (Girma, 2001). Topography, soil types and agroecological parameters are also additional factors playing significant role in the degradation

processes influenced by man (Paulos, 2001). To combat land degradation, the Ethiopian government launched a massive soil conservation programme in the middle of 1970's (Hawando, 1997). In addition, afforestation and conservation programs have been made in the last three decades (Badege, 2001). As cited by Desta (2012), what were once considered to be sustainable land management practices such as soil and water conservation, soil fertility management, controlled-grazing and other land management practices were introduced. However, the impact of those efforts did not curb the impact of land degradation in a meaningful and sustainable manner. Various reasons are often given for the lack of success. Among these the most commonly cited factors include failure to consider indigenous land management practices, high initial costs which are not affordable to poor farmers and also trying to apply uniform techniques in different agroecological regions (Aklilu, 2006).

According to Temesgen (2014) cited, success to date has been limited (Badege, 2001; Paulos 2001). Land degradation has reached a severe stage and has become a major root cause of poverty with significant negative impacts on the national economy (Tadesse, 2001). It is caused by the interacting effects of different factors such as biophysical characteristics and socio-economic aspects (ILRI, 2000). The immediate consequence of land degradation includes reduction in crop yield which, in turn, resulting economic decline and social stress. The impact of erosion is particularly severe in the highland parts of the country where farming is practice for many centuries (Lakew, 2000).

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

However, the economic implications of land degradation are particularly severe in Sub-Saharan Africa because 65% of the population is rural and the main livelihood of about 90% of the population is agriculture (Project Development Facility, 2007). The most serious problem of Ethiopia's land resources is soil erosion. Every year the country is losing billions of birr in the form of soil, nutrient, water and agro biodiversity losses (Paulos, 2001). As a result, poverty and food insecurity are concentrated in rural areas (MoARD, 2010). Estimates vary considerably but direct losses of productivity from land degradation in Ethiopia are minimally three percent of

agriculture GDP (Berry, 2003). Land degradation is one of the major causes of low and in many places declining agricultural productivity and continuing food insecurity and rural poverty in Ethiopia (IFPRI, 2005).

The Ethiopian highlands are affected by deforestation and degraded soils, which have eroded the resource base and aggravated the repeated food shortages caused by drought (Tilahun, 2001). Land degradation reduced livestock productivity as a result of reduced grazing resources, loss of nutritious plants and grass species (Fitsum, 1999). Due to land degradation, increased runoff and reduced infiltration contributes to flooding problem (Desta, 2000; Bezuayehu, 2002). Deforestation and desertification adversely affect agricultural productivity, the health of humans as well as of livestock, and economic activities such as ecotourism (UNCCD, 2004). Similarly, Shibru (2010) reported that the loss of soil productivity in Misrak Badawacho Woreda leads to reduced farm income and food insecurity, particularly among the rural poor and thus continuing or worsening poverty. Land degradation can contribute directly to poverty by reducing the availability of other valuable goods and services important to poor households (for example, fuel wood, construction materials, wild foods, and medicinal plants) and by increasing the demands on labor needed to forage for such goods.

1.2. Statement of the Problem

In Ethiopia, the heavy dependence of people's livelihoods on agriculture and inappropriate use of natural resources resulted in fast and vast land degradation (Genene, 2006). On the other hand, development of agricultural sector partly depends on land productivity. However, this resource is seriously threatened by land degradation and aggravates the food insecurity problems in the country through its adverse impact on crop yield (Kruger *et al.*, 1997; Genene, 2006).

Markos (1997) underlined that the areas of rain-fed agriculture most under pressure from ecological degradation in the Horn of Africa lie in the northern and central highlands of Ethiopia. As to the magnitude of the severity of erosion 50% of the highlands are significantly eroded, while 25% is seriously eroded (Alemneh, 2003). In general, the extent of land resources degradation in Ethiopia, especially the degree of soil erosion, nutrient depletion and deforestation in highland areas, above 1500 m.a.s.l of the country is very high. A significant amount of arable land in the highlands of the country soil fertility is lost due to land degradation (Lakew,2000).

This problem is further aggravated by the expansion of agriculture to marginal areas (Gete, 2002). Land degradation particularly soil degradation has significant negative impact on productivity of land. This is because soil degradation and soil productivity are inversely related. It is manifested by a reduction in the actual or potential productivity of soils. This productivity of soil is significantly affected in Ethiopia due to the serious soil degradation in the country (Desta, 2009). It is indicated that the soil in cropping land of Ethiopia is not sufficiently fertile to support the required level of food production. (Abbi 1995, cited in Desta, 2009).

To solve the problems of land degradation in the country, many efforts have been made since 1970s. A large number of soil and water conservation activities were implemented in different parts of the Ethiopian highlands in the 1970s and 1980s with a huge resource obtained from international community, particularly World Food Program (WFP). However, at the end the intervention couldn't be sustainable and able to bring the intended impact (Yohannes, 1999; Yeraswork, 2000; Woldamlak, 2003). Among the very reasons behind the failure were: the top-down nature of the conservation approach itself, improper planning, inadequate resource allocation, recurrent drought, costliness of the structural conservation measures, labor intensive-nature of the technologies, little short-term returns/ benefits gained from the programs, little systematic efforts made to incorporate indigenous conservation practices and political constraints (Alemneh, 2003; Woldamlak, 2003; Aklilu, 2006).

Different researchers have done studies on land degradation in different parts of Ethiopia. These researchers have mainly focused on: nature of land degradation; traditional farmers' land management practices, ongoing soil and water conservation by government and other actors; farmers' perception on soil fertility change and on causes of land degradation (Yeraswork, 2000; Eyasu, 2002; Taffa, 2002; Aklilu, 2006; Genene, 2006). Most of these researchers generally found out that there is high degree of land degradation in Ethiopia in general and in the highland areas in particular. However, there is a research gap concerning to the study area that how social, economic, and institutional factors determine land management practices in general and on consequences of land degradation particularly.

In an attempt to contribute in bridging the above stated gap, this study would focus on consequences of land degradation and land management practices the case of Haddiya Zone, SNNP with specific case of Misrak Badawacho Woreda. The reason why this site is selected is that it is among the Ethiopian highlands that are facing problem of land degradation

problems. In addition, in this area, so far no study has been done on issues related to impacts of land degradation and its management practices.

1.3. Objectives of the Study

The overall objective of this study is to explore the challenges of land degradation and its management in Misrak Badawacho Woreda.

The specific objectives are :

1. To identify causes of land degradation in the study area.
2. To examine farmer's attitudes about land degradation in the study area.
3. To assess challenges of land degradation in the study area.
4. To investigate land management practices of farmers in the study area.
5. To identify the social, economic and institutional factors that determines land management practices.

1.4. Research Questions

This study is tried to seek an answer for the following questions:-

1. What are the major causes of land degradation in the study area ?
2. How the community understood challenges of land degradation
3. What are land management practices being taken by farmers?
4. What are the social, economic, institutional and demographic factors those affect land management practices in the study area ?

1.5. Significance of the Study

Ethiopia is one of the countries of Sub-Saharan Africa, which is affected by serious environmental degradation specially soil erosion. In Ethiopia, however, farmers perception on challenges of land degradation and its management have received little analysis or use in conservation planning. Therefore, this study is believed to contribute in the following way:

- Improve perception of farmers about challenges of land degradation and can thus be use to take remedial actions based on the findings.
- It generates useful information for environmental protection organizations working to combat land degradation and related environmental problems.

- It will also be used as a baseline for those researchers who want to conduct further research on the problem.
- Provides the basis for planning and land management practices in the study area and serves the officials and concerned body as a supplement to their knowledge.

1.6 Limitation of the study

In the course of this study the most challenges and problems faced include:

- A very few respondents were not willing to give reliable information especially on land holding related and economical background questions.
- Absence of very few sample house hold head at the time of interviews.
- Shortage of time and finance for during data collection .
- Shortage of access and knowledge gap for using different soft ware to analyze collected data.

Moreover, shortage of adequate secondary data at the study area was also another limitation of this study. Due to shortage of time the researcher did not conduct pre-test or pilot study to check the quality and validity of tools.

1.7. Scope of the Study

The scope of this study is to investigate the challenges of land degradation and its management at local level i.e. rural kebeles of the study area. And to assess some of the factors that determine farmers' perception on land management practices. There are a number of factors that affects farmers' perception and knowledge of land management activities such as demographic, socio-economic, political, cultural and psychological factors. Even though, those factors are many in number they are interrelated and multiple.

From the determining factors such as demographic, socio-economic and access to information are taken into account to the study. This is due to the time and budget constraints for further study of the rest of the factors. In addition, the study is confined to small geographical area, i.e. thirty eight rural kebeles and one town administration . From these two rural kebeles were surveyed in Misrak Badawacho Woreda of Hadiya Zonae, SNNP, Ethiopia.

1.8. Organization of the Study

The thesis is organized in to six chapters. In first chapter introduction of the paper is presented. This section covers background of the study, statement of the problem, objective of study, research questions, and significance of the study, scope and limitation of the research. Chapter two represents review of related literature, which encompasses definition of concepts, empirical literature related to consequences of land degradation and land management practices and analytical frame work. Chapter three provides the physical and socio-economic features of the study area and the research methodology and procedures of the study. Chapter four presents and deals with the discussion and analysis of the survey data and interpretation of major findings focused on practices of land management and consequences of land degradation. Chapter five dedicated to summary, conclusion and policy implications and recommendation based on the results of the findings.

CHAPTER TWO

2. LITERATURE REVIEW

2.1 Land Degradation and Land Management: Definition and Concepts

At present, land use practices in many developing countries are resulting in land, water, and forest degradation, with significant repercussions for the countries' agriculture sectors, natural resource bases, and eco-environmental balances. Land degradation can be defined as the loss of land productivity through one or more processes, such as reduced soil biological diversity and activity, the loss of soil structure, soil removal due to wind and water erosion, acidification, salinization, water logging, soil nutrient mining, and pollution (World Bank, 2006)

Land degradation also results in the loss of ecosystem services, which further undermines the sustainability of both managed and natural ecosystems. Blaikie and Brookfield,(1987) observed that land and water degradation may be unintentional and unperceived; it may result from carelessness or from the unavoidable struggle of vulnerable populations for the necessities of survival. Land degradation is a global phenomenon that endangers the livelihoods of rural farmers indeed, of the population at large as well as a country's ability to produce crops, livestock, and products from other natural resources. Population pressure, disparities in access to the more productive lands, and civil strife have all pushed farmers into cultivating ever-steeper slopes for small-scale food crop production. For example, in many African, Central American, and Southeast Asian countries 50 to 70 percent of total agricultural output value comes from hillside farms, a semi-subsistence regime whose practitioners are among the smallest and poorest farming households. Farming on sloping lands is difficult and the soils are more prone to erosion and degradation than on level land. In many regions, deforestation of hillsides and mountains coupled with increasing soil tillage has led to increased land degradation, soil erosion, and in some cases, landslides.

Programs, incentives, and expenditures to mitigate the factors causing land degradation and reverse its more harmful manifestations are important components of SLM.

Land degradation may result from policies that distort input markets (land, labor, capital, fertilizer, and machinery) or output markets (agriculture versus other land uses and relative crop

prices). Although farmers use a variety of means to maintain the productivity of their lands, land degradation may occur where there is a disparity between private and social costs or when public policy results in less than optimal soil management. Factors such as insecure tenure, extreme poverty, and lack of access to credit often result in inadequate investment in maintaining soil capital (World Bank, 2006).

Despite the efforts to reverse environmental degradation in the past many years, rampant degradation of natural resources continued to be a serious environmental problem in Ethiopia distressing land/agricultural productivity and slowing down economic progress. Agricultural production in the country is largely rain-fed and practiced by small-holder farmers, which is heavily affected by land degradation resulting in food insecurity and rural poverty, The Federal Democratic Republic of Ethiopia Sustainable Land Management Project II (FDRE SLMPII, 2013).

The concept and definition of sustainability is broad and varies depending on the problems to be addressed. There is a need to give clear working definition of sustainability in the context of our problem. According to (Hurni, 1996), sustainable land management is defined as “a system of technologies and/or planning that aims to integrate ecological with socio-economic and political principles in the management of land for agriculture and other purposes to achieve intra- and intergenerational equity (WOCAT, 2005), define SLM in more specific term as “the use of renewable land resources, including soils, water, animals and plants, for agricultural and other purposes to meet changing human needs, while simultaneously ensuring the long-term productive potential of these resources and the maintenance of their environmental functions”.

According to these definitions, Sustainable land management is thus composed of the three development components, i) use of different technologies/practices and integration among them to solve ecological and socio-economic constraints, ii) the need for participatory land management planning to meet community needs and use of the renewable natural resources sustainably without compromising their environmental functions, iii) and the need for an appropriate policy environment to undertake the above major tasks on an equitable basis (Gete, 2006).

2.2 Land degradation in Ethiopian: A General Overview

About 50 percent of Ethiopia can be defined as mountainous, be it because of altitude above about 1500m, or because of steep slopes. The country's highland areas include about 90% of its arable lands and are occupied by 90 percent of the human population and 60 percent of all livestock (Hurni, 2010) Since 150,000 years ago population has expanded all over the highland parts of Ethiopia as they are very suitable places for living and agriculture than the malaria infested harsh lowland areas surrounding the highlands. The Ethiopian Highlands, once endowed with rich natural resources, are agriculturally used since millennia and now heavily degraded (Gete, 2010). The interplay between the physical environment and population distribution in Ethiopia explains, to a great extent, the ever worsening problem of environmental degradation (Aklilu, 2001). Environmental management in Ethiopian highlands is therefore not only closely related to the improvement and conservation of ecological environment, but also to the sustainable development of Ethiopia's agricultural sector and its economy at large. In Ethiopia, efforts towards this conservation goal were started since the mid-1970s and 80s (Aklilu, 2006). However, some of the management approaches were successful and other not. Therefore, the study identify opportunities to promote and scales up the successful best management practices and identify challenges to put into practice different management practices which give preparation for environmental managers (Adugna, 2014).

2.3 Causes of Land Degradation in Ethiopia

The causes of land degradation in Ethiopia are complex and diverse. It is the result of complex interaction between physical, chemical, biological, socio-economic and political issues of local, national or global nature. Among the cause of land degradation, some are population growth, expansion of agriculture to forests and marginal lands, poverty, land tenure and government policy, political instability, land administration, overgrazing, inappropriate agriculture, and large scale expansion of irrigated agriculture (Taffa, 2002; Gete, 2002; Betru, 2003; Aklilu, 2006).

The heavy reliance of some 85 percent of Ethiopia's growing population on an exploitative kind of subsistence agriculture has greater contribution to the current state of land degradation. This is partly explained by the fact that agriculture in the country is characterized by a subsistence rain-fed production system with simple traditional methods of production and has prevailed for

thousands of years with little or no modification. In addition, the farming system, particularly in the highlands, is dominated by cereal crop production, which accounts for about 73% of the total cultivable area (Markos, 1997). Most of these cereals, particularly *teff* and wheat, need fine seedbed preparation and provide little groundcover during the most erosive storms of June, July and early part of August. This situation, combined with poor land management practices and the consistent push of cultivation towards increasingly marginal areas, contributes to the current level of land degradation and to significant decreases in agricultural production (Gete, 2006). In general, the major causes of land degradation categorized into different groups as follows.

2.3.1 Woodland Clearing

Deforestation and land degradation in Ethiopia impairing the capacity of forest and the land to contribute to food security and to provide other benefits such as fuel wood and fodder (Anteneh, 2010). In the past ten decades, particularly after the 1950s, there was an increasing trend of degradation of local natural resources, such as farmland, forest and pasture, has been witnessed in Ethiopia (Getachew, 2005). For instance, deforestation remained as a major problem in Ethiopia, since it is one of the main causes of the prevailing land degradation (via facilitating soil erosion). The use of wood and other biomass for fuel and the expansion of agriculture into forested areas accelerated a high rate of deforestation and ultimately exposed the vegetative areas to high levels of soil erosion (Fikadu, 2009).

2.3.2 Poor Farm Land Management

Mekuria (2006) stated that many Ethiopian farmers still continuing implementing subsistence way of cultivation, and this paved the way for land degradation and soil erosion via wind and heavy rain. As a result, in Ethiopia a continuous cultivation of the land without any improvement in land management and farming practice has led to severe soil erosion. It is widely believed that land degradation is mainly caused by poor cultivation techniques. As a result of erosion, water could not percolate into the soil; instead it is caused for removal of nutrients in the form of runoff. Therefore, the soil cannot maintain the required amount of soil moisture and finally resulted into depletion of soil moisture and soil nutrients. So that the soil cannot be sustain plant growth (Mekuria *et al.*, 2006).

Different researchers have different views on the level of soil loss based on land resources are used for and season. According to (Hurni, 2007), soil loss on cultivated land is estimated to be 4-10 times higher than grazing land, and 80% of the eroded annual soil loss occurs in month of plowing in the first month than after planting in different crops in country sides of developing countries. Shiferaw (2008) also indicated in his finding that most arable land about 70 percent is exposed to erosion due to over cultivation than non arable land. He further explained that in Ethiopia many farmers produce the annual crops which are mainly planted after the rains begin, allowing early rains to directly expose the soil nutrient to high erosion levels.

Additionally, Liniger (2010) explained that population escalation aggravates pressure on farm lands and more fragile marginal lands are frequently used. This reduces the practice of fallow periods in some areas from five year rotation to a two-year and even shorter rotation. So agricultural activities can cause land degradation if practiced without adequate fallow periods. Moreover, absence of soil conservation measures, cultivation of fragile marginal lands and a host possible problem arising from quality planning or management of resources mainly causes for land degradation (Liniger *et al.*, 2010).

2.3.3 Land Degradation Because of Overgrazing

Different studies revealed that livestock density and improper grazing patterns lead to overgrazing, which is one of the major causes of land degradation. As stated by Legesse (2008) that overgrazing occurs when livestock density becomes excessive and too many animals are grazed at the same area of rangeland. This can be leading to degradation of vegetation and the compaction and erosion of the soil. The uncontrolled use of trees and shrubs is another aspect of overgrazing and obvious cause of deforestation, leading to flooding and eroded soil .

Therefore, overgrazing is one of the causes that lead to soil erosion or land degradation. The degradation of meager rangeland vegetation by overgrazing exposes the soil to erosion by wind and water. Livestock pressure and poor stock management (Mainly based on the free grazing system) are other major sources of land degradation (ILRI, 2009). For instance the previous study show that at the highland region, there is an expansion of grazing beyond the land's carrying capacity at the expense of the remaining natural vegetation and promote land degradation (Aklilu, 2006). He also identified that the scarcity of grazing land and livestock feed

has forced the widespread use of crop residue to feed livestock. When crop residues are removed for feed, the soil loses organic matter and nutrients.

Not only this but also the peasants are using cow dung for cooking food rather than using for composting particularly poor farmers. This breach in the soil nutrient cycle seriously depletes soil quality, increases erosion, and eventually reduces soil productivity (MoARD, 2007). Similarly the above listed problems are common problem in the study area.

2.3.4 Population Pressure and Land Degradation

Though there are many arguments about the population growth being cause of land degradation in Ethiopia, it has definitely direct consequences on the environment due to growing demand for crop production; for fuel wood; shortening of fallow cycles and this contributes to over cultivation and land degradation (Legesse, 2008). Moreover, because of high population growth, the size of individually owned plots is shrinking relatively in fertile highland and medium altitudes (Anteneh, 2010). This diminution will lead to over cultivation, which will inevitably result in a loss of soil fertility in particularly and cause for land degradation in general. In general, this diminishing land lead to reduction of soil fertility and subsequently a decline in both water carrying capacity of soil and capacity to resist erosion.

2.3.5 Socio-Economic Related Causes

There are many socio-economic and physical constraints that hinder once decision to invest and sustain SLM practices in the country. The major constraints raised were identified by Mahmud and Pender (2005) one by one. They stated that Poverty is one of the fundamental problems affecting SLM, which most of the Ethiopian population frequently suffering from. So that the poor are forced to mine rapidly deteriorating natural resource in their surroundings like charcoal making (Ermias, 2003 as cited in Gete, 2006). Thus, there is a strong nexus between land degradation and worsening poverty in the country. In rural areas poverty is typically linked to loss of soil productivity and forces the poor to depend more on scavenging the remaining natural resources, inducing more degradation and damage to the ecology.

The majority of the poor are concentrated in rural areas, where their livelihoods depend on smallholder crop-livestock production activities. Moreover, they often supplement their daily subsistence by charcoal making and fuel wood collection from the remnant communal bush or

shrub lands. This leaves the poor people with very limited time, options and capacity to apply sustainable land management practices. Hence, the part and parcel of land that the poor owns is exposed to land degradation and the productivity of land decreases over time. The poor do not only lack the ability to invest but also lack access to innovations to improve productivity and/or cope with the impacts of climatic and other shocks (Gete *et al.*, 2006).

However, some evidences show that there are different dimensional impacts of poverty on land management practices. This mainly takes into account the types of land management technologies and the nature of poverty (Mahmud and Pender *et al.*, 2005). This resulted into the deterioration of the soil and intensified land degradation, with ultimate impacts of serious decline in agricultural productivity. As a result, considerable damages have been done to the ecology in many parts of the country and even it becomes beyond recovery stage in some areas of northern part of Ethiopia (Gete *et al.*, 2006).

2.4 Challenges 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 (Getachew, 2005 and Bishop, 2007). According to (Bishop, 2007), 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. Whereas 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. Therefore, off-site costs arise from the negative impact of agricultural practices run-off on downstream water users. Increased costs may be associated with changes in the quality or the quantity of run-off.

In general, land degradation has already resulted in noticeable and wide ranging effects on the Ethiopian community both at rural and urban area. The effects of land degradation bring impact on the individual, the community or the nation as a whole (Aklilu, 2006). He identified some effects of land degradation by classifying into: loss in water resource, loss in Livestock production and Unemployment and outmigration

2.4.1 Loss in water resource

Due to depletion of forests and the resultant increase in runoff, the storage of water has greatly diminished and a large number of water points for human and animal use have dried up.

2.4.2 Loss in Livestock production

Land degradation leads to decrease both in the quality and number of livestock; any change in livestock sectors has tremendous effects on the living standards of the rural people as a whole: - First, in places where the wheel has not yet penetrated, animal transport still provides a reliable and well suited mode of transport. Second, oxen are extensively used for traction power. Therefore, the loss of livestock has negative impact on livelihood of farmers in particular and the whole societies in general.

2.4.3 Unemployment and out-migration

Where agricultural and livestock production reach very low levels are a result of reduced agricultural land yields, a situation will be created where there is insufficient land leading to shrinkage of average farm size which, in turn, creates a disguised unemployment. Ethiopia may stand number one in Africa (perhaps in the world) to witness the power of land degradation deriving people out of their homes. In 1984/85 more than half a million people were forced to leave their homes mainly in the highly eroded northern regions to the south-western parts which are less degraded so far.

When degradation is serious, the plots may be either abandoned temporarily or permanently, or converted to inferior value uses, e.g. cropland being converted to grazing land, or grazing land left to shrubs and lastly shrubs converted to bare lands (ILRI, *et al.*, 2009). The impact of erosion on crop yield is through changes in soil structural characteristics (FAO, 2010). One of the most widespread examples of soil structure 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 and fertility of soil used for agricultural practices become deteriorate and reduce the agricultural production and productivity.

According to the study of (FAO, 2010), land degradation has economic costs. Economic costs of land degradation could be estimated based on productivity loss and replacement cost. Production loss refers to reduce productivity of the soil as a consequence of soil erosion, as a percentage of production from non eroded land/soil. So that the report of (FAO, 2010) identified that the estimation of this productivity loss ranges from of 5-19% for a light degree of degradation, 20% for the moderate and 75% for severe degradation. Replacement cost is the cost of additional inputs (primarily organic fertilizer) used by farmers in order to maintain production levels on the degraded soils (Tesfaye , 2013).

2.4.4 Decline of Arable land and Grazing land

In general, the global extent of arable land and grazing land continues to decline due to degradation emanating from urbanization, unsustainable agricultural practices and deforestation. Moreover, a significant portion of the remaining arable and grazing land is under considerable pressure due to compaction of livestock and farm implements, salinization, alkalization or acidification, depletion of nutrients, water and wind erosion and deterioration of drainage. Especially, sub Saharan Africa where Ethiopia is found is facing serious environment and development problem (Taffa, 2002). In Ethiopia, the issue of land degradation is so vital since the livelihood of the biggest portion of the country's population and the overall economy of the country depend on agriculture.

2.4.5 Decline of Agricultural production

Land degradation is seriously affecting agricultural production and food security of the country's population. Nowadays, it is becoming one of the most important problems of food security in the country (Aklilu, 2006). This is for the reason that, the high degree of land degradation in Ethiopia, especially the degradation in the form of soil erosion is one of the major environmental problems that have negatively affected the performance of agricultural sector as the overall economy. Accordingly, the livelihood of Ethiopian population is threatened by the increasing trend of land degradation (Aklilu, 2006; Habtamu, 2006). The impact of land degradation on Ethiopia's agricultural economy is very large. Ethiopia is losing 30,000 hectares of land on annual basis due to degradation and so far more than 2 million hectares have already been severally damaged (World Bank, 2007b). The country is losing a significant volume of soil every

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

2.5 Responses to Land Degradation

2.5.1 Land management Practices in Other Countries

At the regional and country levels, several strategies have been formulated to reduce poverty and land degradation. Of 49 African countries, 38 have developed National Action Plans (NAPs) under the United Nations Convention to Combat Desertification (UNCCD), and 18 countries have incorporated the NAPs into their Poverty Reduction Strategy Papers (PRSPs) (Anonymous, 2007a). The Comprehensive African Agricultural Development Program (CAADP) of the New Partnership for African Development (NEPAD), in collaboration with African governments and donors, places high priority on promoting sustainable land management (SLM) in its investment plans. CAADP has emerged as one of the important programs for coordinating country and regional level agricultural and SLM investments in collaboration with international donors who are currently seeking to harmonize their support through the Paris Declaration. A global partnership to scale up, mainstream, and finance country-driven SLM approaches in Africa, is currently working in partnership with CAADP to coordinate country- and regional-level SLM investments.

2.5.2 Land Management Practices in Ethiopia

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, 60 percent of hillside terraces, 22 percent of the planted trees of the reserve areas were still in place of 1994 (Nurhusen, 1995).

In Ethiopia, since the 1970s, considerable efforts have been made to reverse the problem of land degradation. What were once considered to be sustainable land management practices such as soil and water conservation, soil fertility management, controlled-grazing and other land

management practices were introduced. However, the impact of those efforts did not curb the impact of land degradation in a meaningful and sustainable manner. Various reasons are often given for the lack of success. Among these the most commonly cited factors include failure to consider indigenous land management practices, high initial costs which are not affordable to poor farmers and also trying to apply uniform techniques in different agro ecological regions (Aklilu, 2006). Traditionally through time, farmers have developed different soil conservation and land management practices of their own. With these practices, farmers have been able to sustain their production for centuries. Even up to now, it has been acknowledged that these technologies, which include ploughing of narrow ditches on sloping fields to control run-off, farmland terraces, traditional ditches and furrows, contour ploughing, fallowing, crop rotation, farmyard manure and agroforestry continue to play a significant role in the production of subsistence agriculture (Betru, 2003).

Several soil and water conservation measures were introduced in the early 1970's to improve land management practices. These projects were supported by development food aid USAID and the World Food Program (WFP). The main activities under those projects were reforestation and soil and water conservation in the drought prone areas of the country. In the 1980s, the WFP consolidated its support to include rehabilitation of forest, grazing and agricultural lands. On government's part, the watershed or catchment approach became its key strategy. The major elements of the soil conservation activities were a range of physical structures such as farmland and hillside terracing, cut-off drains and waterways, micro-basins, check dams, water harvesting structures like ponds and farm dams, spring development, reforestation, area closure and management and gully rehabilitation (Betru *et al.*, 2003).

However, efforts made up to the early 2000 were considered inadequate as they covered only 7% of the total land area that needed treatment, and at that rate, it was estimated that treating all the remaining land could take seven decades. Evaluations of efforts made concluded that the interventions were ineffective, insufficient and unsustainable (Woldeamlak, 2003).

2.5.2.1 Afforestation and Reforestation

Girma (1988) states, that the most important measure to restore the disturbed rural ecology is the implementation of afforestation and reforestation... on a scale large enough to cope with the problems of soil erosion and wastage (Girma, 1988; as quoted in Aklilu, 2001). Many

countries now have afforestation programmes aimed at arresting erosion and regulating floods (Morgan, 1995).

Afforestation trials were also successfully implemented, with bamboo, teak and eucalyptus as the promising species (Tejawani, 1981 quoted in Morgan, 1995). The role of eucalyptus is unclear because of evidence that when planted in wet areas they result in a reduction of water supply in springs and rivers (Gosh, Kaul and Sobbarao, 1978 quoted in Morgan, 1995) yet when grown in drier areas they do not consume large quantities of water (Morgan, 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).

2.5.2.2 Conservation Oriented Crop Combination and Land Management

The underlying principles include making conservation part and parcel of the farming work cycle; and making farming practices involve not only a few new inputs but also provide farmers with short-term economic benefits (Wood, 1990; Naire and Muschler, 1993; quoted in Aklilu, 2001).

➤ Agronomic Measures

For soil conservation use the protective effect of plant covers to reduce erosion. Because of differences in their density and morphology, plants differ in their ability to protect the soil. Generally, row crops are the least effective and give rise to more serious erosion problems. This is because of the high percentage of bare ground, particularly in the early stages of crop growth, and the need to prepare a seed bed. In designing a conservation strategy based on agronomic measures, row crops must be combined with protection effective crops (Morgan, 1995).

➤ Structural soil conservation methods

Which control erosion by shortening the length and minimizing the gradient of the ground slope. This technique involves construction of tied ridges, bunds, fanya juu terraces, bench terraces, hillside terraces, diversified ditches (cut-offs) water ways and special water harvesting

structures (MOA, 1986 quoted in Aklilu, 2001).

Certain farming practices which are believed to conserve the natural resource base and at the same time raise productivity are noted. These include inter cropping and relay or regulation cropping crop rotation; integration of livestock farming with arable cultivation the cut and carry method of using degraded pasture, controlling grazing and tethering; wide spread use of semi permanent crops like enset (false banana) and cassava- or self- seeding and volunteering crops, such as legumes and sweet potatoes. It is not surprising that emphasis has now been put on agro- forestry (Mair and Muschler, 1993; Black Well, 1991; MOA, 1986 quoted in Aklilu, 2001).

2.5.2.3 Agro-forestry

Trees can be incorporated within a farming system by planting them on land. Where trees are deliberately integrated with crops or animals or both to exploit expected positive interactions between the trees and other land uses, the practices is defined as agro-forestry. Trees help to preserve the fertility of the soil through the return of organic matter and the fixation of nitrogen. They 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. Trees are also attractive to the farmer where they provide additional needs; especially fuel, fodder and fruits multipurpose trees and shrubs are thus fundamental to agro-forestry (Morgan, 1995).

Agro-forestry is being encouraged in many countries as a way of modifying existing farming systems to promote soil fertility, erosion control and a diversified source of income. Furthermore, agro-forestry systems require carefully selected of both crops and tree species of beneficial interactions to be obtained.

2.5.3 Land Management Practices in Misrak Badawacho Woreda

According to Addise (2014), in the study area, as many parts of Ethiopian highlands, farmers have a pool of indigenous knowledge with which they use and manage their land resources. They make efforts to conserve their soils against erosion by applying a range of conservation techniques. Farmers at individual level practice different land management activities mainly to increase agricultural yields and conserve the farming plot. They practice a short-term benefit oriented soil fertility management and long-term benefit oriented land resource management

activities. For short term effort, farmers apply chemical fertilizers to obtain high agricultural yield. Crop rotation is one of the widely practiced system of soil fertility improvement in the study area which helps to improve outputs from the cultivated land. The rotation system mostly consists of cereals, legumes (haricot bean) and root crops like potatoes in the farm land in different seasons and years of cultivation. Manure is also used for promoting the fertility status of the soil. Its application to farmland raises the nutrient level of the soil, increases water infiltration and reduces soil erosion.

Long-term benefit oriented land resource management activities include contour ploughing, traditional ditches, availability of banana plants and *enset* in the omestead, oxen-plough deep into the ground, prepare water ways at the top of the slope, hillside terracing and check-dams are most frequently used.

2.6. Determinants to land Management Practices

2.6.1 Economic factors

Farmers will adopt soil conservation practices if they have the necessary labor, capital and technological inputs to do so and if they perceive an immediate economic benefit (Morgan, 1996). Individuals with few current incomes and inability to obtain capital for conservation investments may not be willing or able to forgo income to maximize expected net returns over a long period. Similarly, individuals in uncertain economic situations will be inclined to use short planning horizons because they are unable to predict future costs and prices (Ervin, 1982).

As poor farmers generally possess less land, they are more often engaged in off farm activities such as petty trade. This can decrease their interest to invest on soil conservation practices. According to Hagos (1999), small farm holdings and land fragmentation may undermine farmers' interest in undertaking some kind of land improvement. For example, farmers may find the cost of hauling manure or other organic materials to distant and small plots not worth the considerable effort required. In addition, investment that can be easily damaged by free ranging livestock or subject to theft (such as trees) are less likely to be made far from the household where it is difficult to protect them.

2.6.2 Policy/Institutional Support Factors

Appropriate policy environment is the pre requisite for being able to implement natural resource management process that satisfy the objectives specified by the interested profits. Government policies are not translated in to action unless there is the political will to make them work. Therefore, the situation in many countries today is that plans are made for the conservation of natural resources but they have little practical effect.

Whatever the historical background, many developing countries have sizeable portion of land that was previously reserved. As the authoritarian management has decline, population pressure and land hunger have increased. So has the chance of evading punishment for illegal encroachment on reserved land.

2.6.3 Socio-cultural factors

In the past, there was enough land for everyone to have some, and an increase in population just means to bring more land in to use. Getting this new land is not a simple task and it resulted in the expansion of farming activities to erosion prone marginal areas, serious deforestation, and a decrease in fallow period and continues cultivation (Habtamu, 2006; Hussen, 2006).

Many people in developing countries can barely eke out a living from their land by hard work such as a hard tillage. They know that traditional management has kept them and their predecessors alive, and that they have nothing to spare for gambling on a new method. It is difficult for them to change their techniques even for immediate benefits such as higher yields and less soil loss. It is still more difficult for them to adopt a practice that requires an investment, especially if the benefits are delayed or disturbed over several years. The establishment of conservation practices under such conditions requires a reliable guarantee that those people will not starve to death if the new practice fails (Napier and Summers, 1993 cited in Troeh, 1999).

Short - term tenancy prevents the adoption of many desirable practices. Theoretically, the land owners should be willing to invest in sound long term practices, but many owners are too far removed from the land to realize what practices are needed. Short- term tenancy makes it easy for both tenants and owners to overlook problems, when those problems reach a critical stage.

Another constraint to the sustainability of conservation practices is social significance of cattle population. The part played by livestock in adding pressure on the land resource base varies a great deal from one country to another. In area where cattle are symbol of status, evidence of wealth and have religious significance, focus is given to quantity than quality. Associated with this are low standards of livestock management and low level of production. The total effect of these combined factors is unnecessary stress on the ecological system.

2.7 The Analytical Framework

As it is stated in section 2.5, there are different factors that could affect land management practices. These factors are interlinked with one another and operating at different scales. Among these factors, some have direct influence on land management practices whereas others have indirect influence. For this research, the analytical framework illustrated in Figure 2.1 is adopted. It is adopted since it shows the factors that are determining land management practices in comprehensive way. It indicates that land management policy/institutional practices are affected by socio-cultural, economic, support, and environmental factors. Socio-economic factors include population pressure, family members' motive to involve, assistance from outside, and participation of youth. The socio-economic factors include, farm productivity, involvement in off farm activities and availability and access to labor outside family. The policy/institutional support related factors include access to extension, access to credit, efforts of government and NGOs. Similarly, the environmental factors include topography, climate, soil and vegetation cover. The framework generally indicates how the factors are complex and how they affect the practice of land management in a given area (Hudson, 1986; Troe et al., 1999).

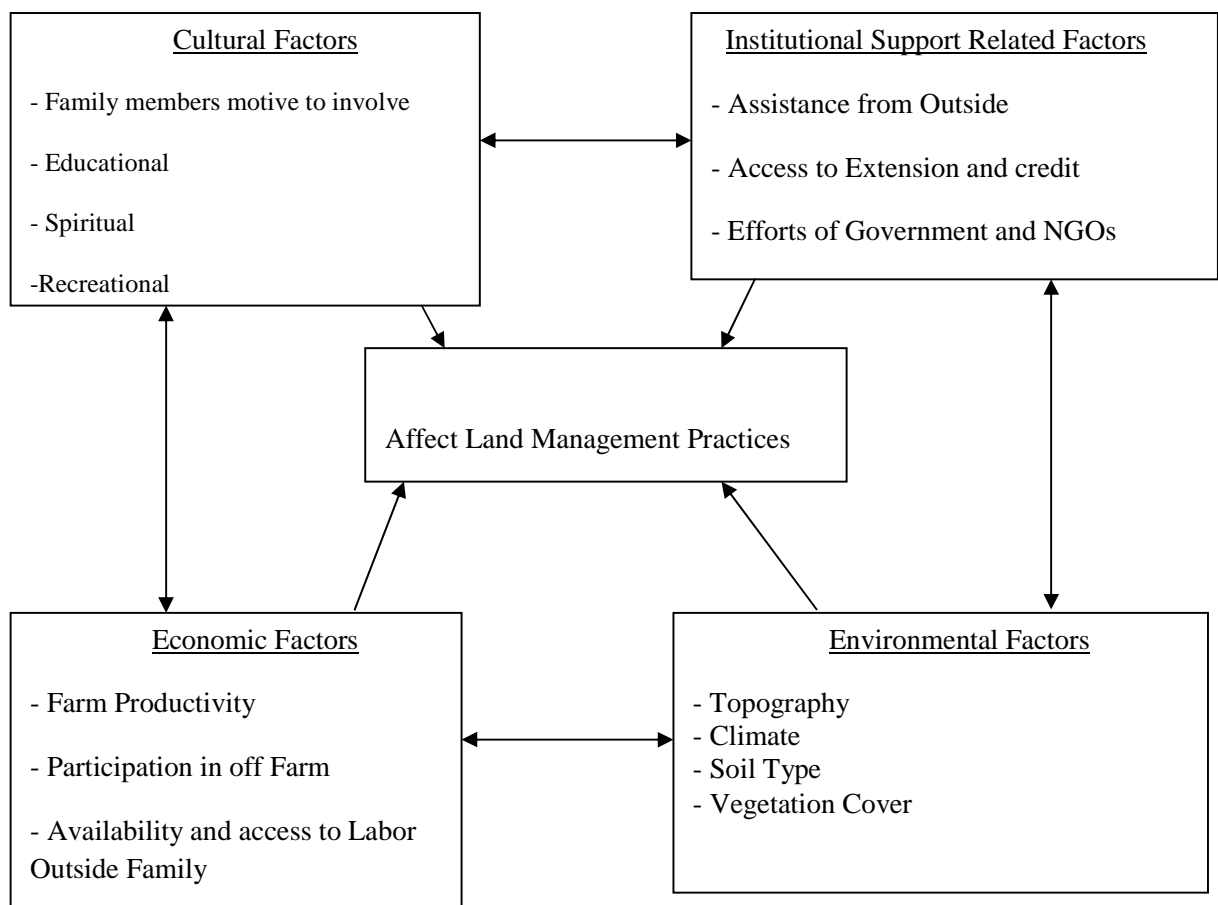


Fig.2.1 Conceptual framework of sustainable land management practices, Source:Modified from Hudson(1986) and Troe et al., (1999)

CHAPTER THREE

3. RESEARCH METHODOLOGY

The chapter provides the methodology used in the study. It starts with the description of the study area and followed by the sources of data, methods of data collection and sampling design as well as the qualitative and quantitative techniques used for analysis. In addition background information about the physical background, population conditions, land use and land cover, drainage system, soil type, agricultural activities, social service and land management activities of Misirak Badawacho Woreda.

3.1 Description of the Study Area

3.1.1 Location

Misirak Badawacho Woreda is found in Hadiya Zone of SNNPR, Ethiopia. Astronomically, it is located between $7^{\circ} 9'$ to $8^{\circ} 15'$ North latitude and $37^{\circ} 5'$ to $40^{\circ} 00'$ East longitude. The Woreda is bounded by Halaba Special Woreda to the north, Wolaita Zone to the south, Kembata Tembaro Zone and Mirab Badawacho Woreda which was former part of Badawacho Woreda to the west and Oromia region to the east. Woreda's capital, Shone, is situated at about 345 kms away from Addis Ababa on the asphalt road running from Shashemene to Arbaminch and 274 kms on the new asphalt road running from Addis Ababa to Halaba town across Butajira and Worabe. The special feature in terms of location of East Badawacho is that no part is bounded with other woredas of Hadiya Zone since it is separated by the presence of Kembata and Tembaro zone between east Badawacho and other woredas of Hadya Zone.

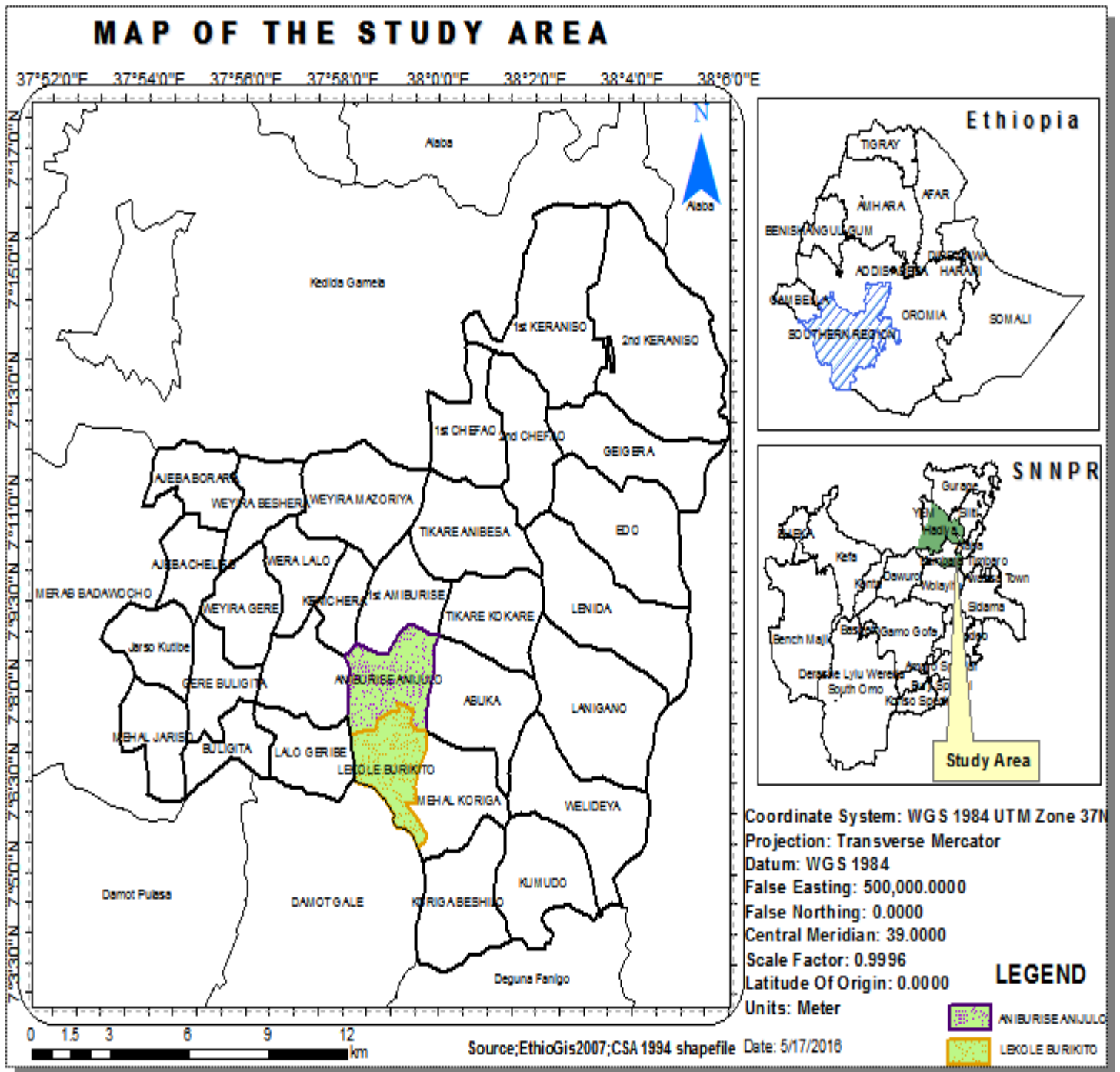


Fig.3.1 The map of study area Amburse Anjulo and Lakole Burkito Kebele, Misirak Badawacho Woreda, Hadiya Zone, SNNPR, Ethiopia

3.1.2. Topography and climate

According to the Misirak Badawacho Woreda Agricultural and Rural Development Office, the topography ranges from 1580 m. a. s. l around Bilate river to 2071 m. a. s. l at the peak of mount Engide in the Woreda capital Shone. Having this altitudinal range, the whole Woreda is divided into dry and moist *weina degas* agro-ecological zones. According to the newly produced sketch map prepared by the Financial and Economic office of the Woreda (2015), most part of the study area was situated in the dry *weina dega*. The total kebeles situated at the woreda are 39 out of these 20 are found in dry *weina dega* having large sizes, while 19 kebeles are belong to the moist *weina dega* with smaller sizes. Dry *weina dega* constitutes 51.2% of the total area whereas the moist *weina dega* constitutes the remaining 48.8%.

According to Addise (2014),the average annual rainfall ranges from 800mm to 1500 millimeters. The rainfall is characterized by erratic and uneven distribution throughout the year. The highest rainfall occurs from the beginning of spring season to the end of autumn season (Rain season from March to October and dry season from November to February). The rainfall reaches its peak in the month of August. Extreme fluctuation in rainfall, both in its annual totals and the distribution throughout the year, are the primary constraints for agriculture particularly under rain fed conditions. That means within the Woreda, in each of the cropping seasons the rain usually either begins lately or quits very early before the crops get mature. On the contrary, unusual and intense heavy rains cause serious damage leaving no chance for farmers to salvage the losses. The mean annual temperature of the area ranges from 17.60 to 22.60 C (WARDO 2013).

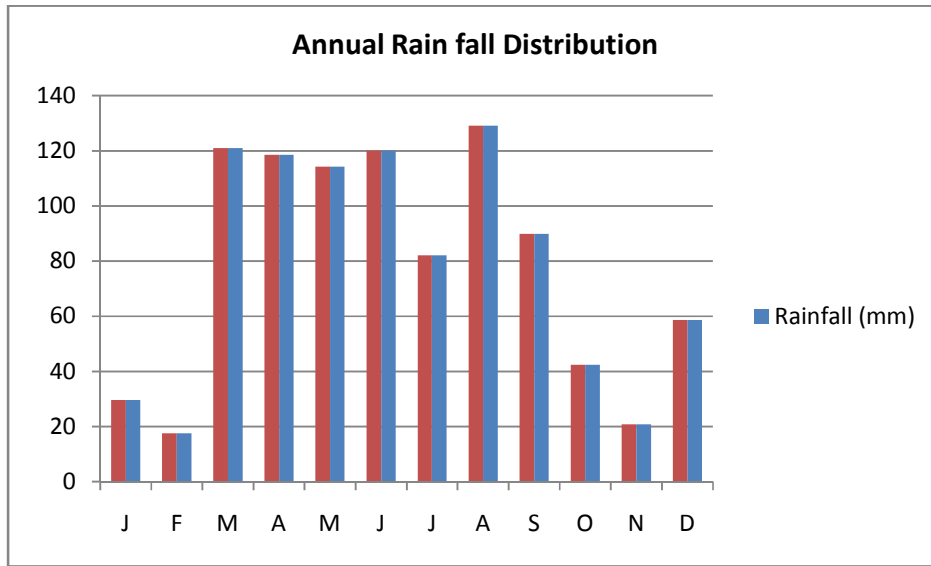


Fig. 3.2 Average annual rain fall of Misirak Badawacho Woreda, Source: National Meteorology Agency, South Zone Hosanna, February 2014

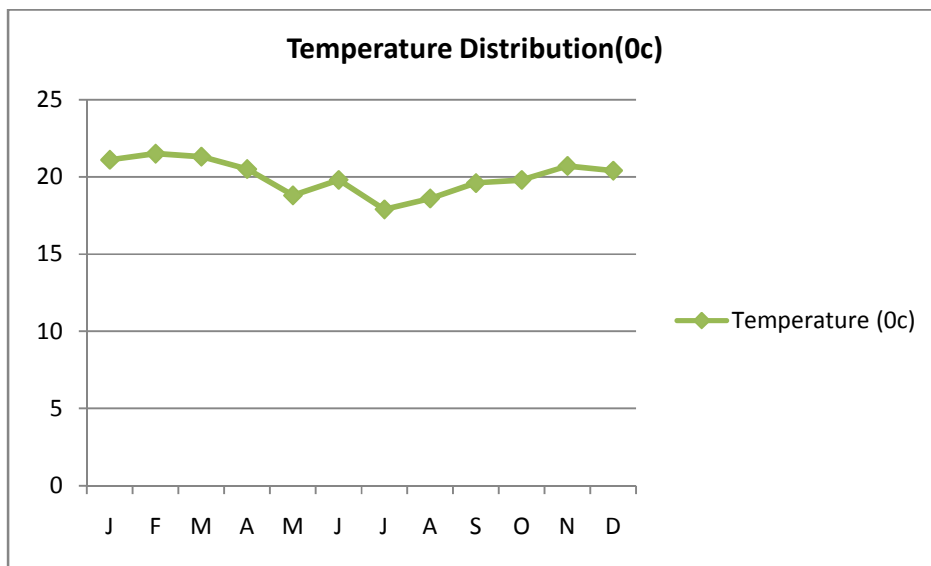


Fig. 3.3 Average annual temperature of Misirak Badawacho Woreda, Source: National Meteorology Agency, South Zone Hosanna, February 2014

3.1.3 Land-use/ land cover

According to Addise (2014), the study area has an old history of land use with high degradation, associated with especially increasing human population. As the scattered remnant tree species

depict, the area has been once covered by dense forest. However, the vegetation cover has been removed, and replaced by cultivation fields, grazing land and plantation of exotic species such as Eucalyptus and Gravelia. As the analysis of forest coverage by watershed management experts, particularly in Misirak Badawacho Woreda moist *weina dega* agro-ecological zone, forest covered area was 55% before 1974. Between 1974 and 1991, the forest coverage declined to 32% and rapidly went down to 15% between 1991 and 2008 mainly due to the population growth and expansion of cultivation land. Thus, like other parts of the country, natural vegetation of the area has been influenced by human activities (WARDO, 2013).

The remnant tree species in the study area witness the dynamics of the land cover/ land use due to the impact of human activities. Like the forestlands, grassland area and bush lands area overgrazed and then gradually changed into farmland. Common grazing land exists in pocket areas and farmers graze their animals near to homestead. Because of this shortage of grazing field, farmers have owned small numbers of animals. As a result, accelerated land degradation and soil fertility decline become the main problem of the area on following the land use/ land cover change.

3.1.4 Drainage system

Misirak Badawacho Woreda area is widely drained by Bilate river in the eastern part of the Woreda from north to south direction and reaches to Lake Abaya. According to Agriculture and Rural development office report of the Woreda (2014), about 92% of the Woreda is drained by the Bilate River. In addition to Bilate River. Though, this river is permanently flowing with lesser volume of water during the drier months there is no attempt to use the river for irrigation, fishing (which have potential around Finchawa Fall of the river) and for recreational purpose ...etc to reduce food insecurity particularly in the dry *weina dega* parts of the Woreda. The precious top soils are highly eroded and contributing for the increasing silt deposits in Bilate riverbanks, see (Fig.3.4).

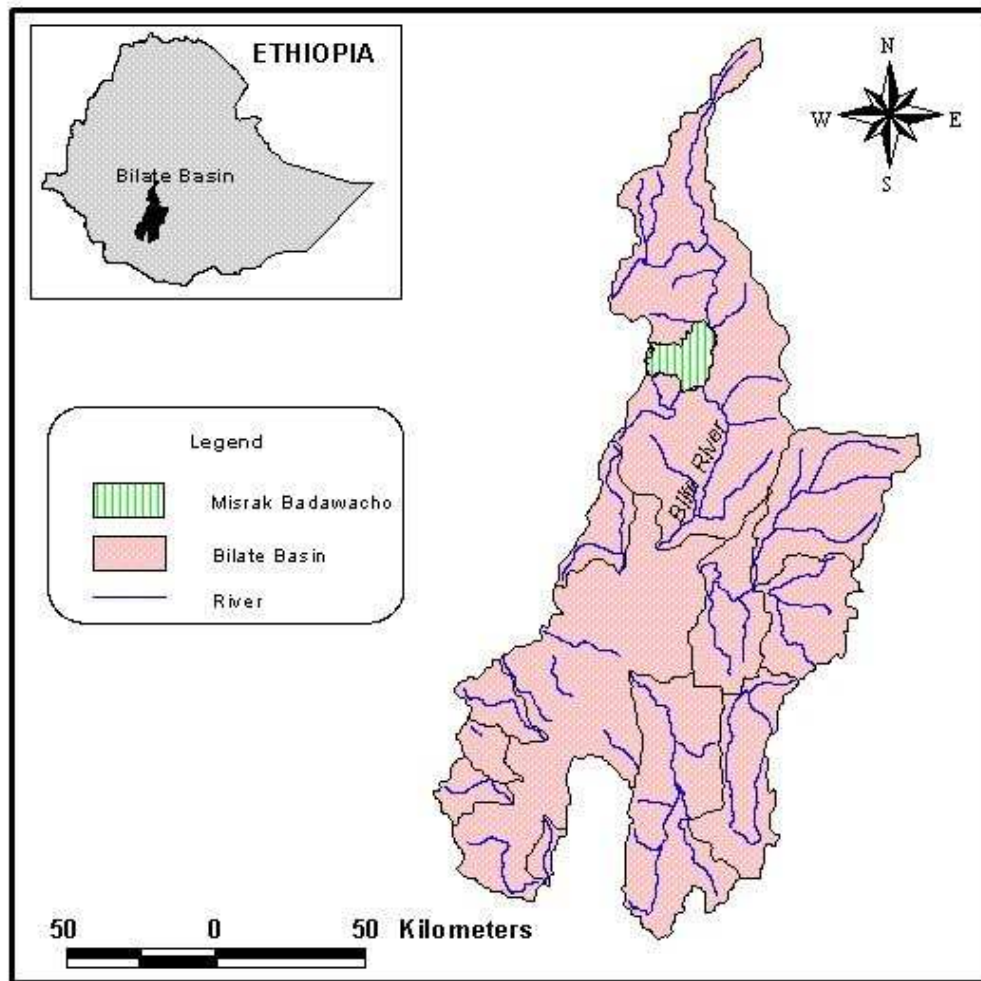


Fig. 3.4 Bilate River Drainage system

3.1.5 Soil types

It is understood that the type of a given soil is a function of the interplay of a variety of factors (FAO, 2006). Among other things topography, climate and vegetation cover are the major factors that determine the structure and composition of soils. According to FAO (2006) soil classification, the most commonly found soil types of the study area are black basaltic soils (Vertisols) and in some parts of the Woreda sandy and alluvial soils are common.

According to WARDO (2013) report about 90% of the Woreda soils are infertile mainly due to domination of less preferred soil types, over cultivation and limited soil conservation measures against soil erosion. These soils are found in both agro-ecological zones. Fertile soils are found

only in about 10% of the land area of the Woreda. This indicates that to obtain optimum crop production, either modern inorganic fertilizers or organic manure or compost need to be used. Application of modern chemical fertilizers is also very costly for the poor farmers, even more costly under erratic rainfall condition as they can simply incur costs with no adequate harvest.

3.1.6 Farming system

Agriculture, mainly composed of crop production and animal husbandry, is the main source of livelihood of the population in the Woreda. Traditional oxen-plough and hoe culture are practices in the area. The drier *weina dega* is mostly dependent on cereal crops such as maize, teff, haricot bean and sorghum are the most common agriculture products. To some extent, they also grow commercial crops like coffee while the moist agro-ecology is relatively diverse in terms of crops grown as they grow cereals, root crops like sweet potato and taro, tubers like *enset*, fruit trees like avocado, etc. Coffee is the main source of cash mostly for moist agro-ecology. The dry *weina dega* area is characterized by large land holding size compared to the moist one. However, due to scarcity of moisture and absence of irrigation activities the area is not as such productive. Thus, it is difficult to practice intensive agriculture in this area. Livestock production is important in both agro-climatic zones as one type of mixed farming.

The productivity of the major cereal and root crops vary from year to year. Moreover, when the land coverage increased in size the productivity also increased. In 2008 sweet potato was totally destroyed by the pests and drought. As the WARDO (2013) report, little effort has been made to recover the damage of the area. The crop is very crucial gap filling crop during the hunger months as sweet potato is mainly harvested between April and June in the Woreda.

3.1.7 Livestock production and productivity

Ethiopia holds the largest livestock population in Africa estimated at about 43.1 million heads of cattle, 23.6 million sheep, 18.6 million goats, 4.5 million donkeys, 1.7 million horses, 0.33 million mules, 34.2 million chicken and 4.9 million beehives . Similarly, contributions of livestock to cash income of the smallholders accounts for up to 87% and, subsistence of some pastoral communities is entirely based on livestock and livestock products. Despite these roles, the productivity of livestock in general is low and compared to its huge resource its contribution to the national economy is below expected (Belay *et al.*, 2012) . The distribution of livestock

covered high land areas where mixed farming activities held. In the low lands animal husbandry is the dominant source of income (Tedla *et al.*, 1989). Misrak Badawacho is one of the central high land part of SNNP region accommodates large production of live stock. According to WARDO (2013) data, milk yield of the local cow reaches 3 liters per day during the first two to three months of lactation. This is still very low compared to the world standard.

Table: 3.1 Livestock population number of Misirak Badawacho Woreda.

No	Name	Livestock population number
1	Cattle(cow and ox)	88800
2	Sheep	14735
3	Goats	14608
4	Poultry	73346
5	Horse	353
6	Mule	44
7	Donkey	8164

Source: Financial and Economic office of Misirak Badawacho woreda (2015)

As indicated in table 3.2, livestock population is relatively high in the woreda. However, livestock productivity is very low. According to the key informants, the breeds dominate the cows and the average daily milk yield is between 1 and 1.5 litters for a maximum of 6 months of lactation. Livestock provide food such as meat, milk, cheese and non food products such as hide and skin. Indirectly livestock supplying essential nutrient inputs such as manure for replenishing soil fertility and restoring nutrients. Animals are as well used for traction and power for halving, and threshing. It is the main source of income for periods of distress time when crop failure happened due to erratic nature or seasonal drought occurred in rural areas. However, they are also victims of recurrent drought in the area.

3.2 Demographic and Socio-Economic Aspects

3.2.1 Population Settlement

According to CSA (2007) population and housing census result, the population of Misirak Badawacho Woreda was 142,823, of whom 71,180 are men and 71,643 women; 15,616 or 10.93% of its population are urban dwellers excluding the population of 5 kebele's of Oromia. But as the Woreda Finance and Economic Development Office (2015) report, the total population of the Woreda including the 5 kebeles estimated to be 234,649 of which female population constitute 101,183 and male population 133,466.

3.2.2 Population density

The woreda is among the densely populated Woredas of the country with crude density of about 453 persons per square kilometers and agricultural density of about 512 persons per square kilometers. Though there is no reliable data disaggregate the calculations, population density is higher in the moist *weina dega* parts of the Woreda than the drier *weina dega*, which can easily be seen from the residential houses very close to one another. As a result, scarcity of land and over cultivation are among the major causes of land degradation and chronic food insecurity particularly in the moist *weina dega* parts of the Woreda (Addise 2014).

3.2.3 Age and Sex ratio of the population

Population of the Woreda is almost proportional in terms of male to female ratio with having 56.8 percent of male and 43.2 percent female. Age is a determinant factor that affects food security activities. The productive age population constitutes about 53.8. Most productive age populations in most developing countries do not have job opportunities. Thus, most of the productive age populations are economically dependent. Misirak Badawacho Woreda has large proportion of young population that constitutes about 46.2 % of the total population and even, those productive age population require extra job to survive because no more job opportunities are not created to accommodate these people except competing over the existing limited arable land. As a result, significant number of youngsters seasonally migrates to the nearby towns and state farms of the rift valley areas looking for job opportunities. It is also common to see many youngsters from Badawacho area working as share croppers in the neighboring Hlaba and Silte areas where the land holding is relatively better (WARDO, 2013). Besides, large numbers of

households were recently resettled in areas away from their home such as Basketo and Dawro (WARDO, 2013).

3.2.4 Social services in Misirak Badawacho Woreda

3.2.4.1. Education

According to Woreda Finance and Economic Office report (2015) current status of Misirak Badawacho Woreda in terms of educational facility it has primary and secondary levels. According to Misirak Badawacho Woreda Education Office, 46 percent of the students are composed of female. Compared to Male the participation of female both as a student and as teacher in education is lower. Inadequate supply of textbooks and classroom furniture, lack of laboratory or inadequate supply of equipment, shortage of chemicals and lab-technicians, shortage of qualified teachers, and high dropout and repeaters characterize most of the schools in Misirak Badawacho Woreda.

3.2.4.2. Health

Health is among key indicators for a socio-economic development. According to Woreda Finance and Economic Office report (2015), one newly built primary hospital in Shone town administration capital of Misirak Badawacho and about six health station at different parts of woreda are available. But in the recent past there is only one health station at the woreda capital, Shone. The real access to health services is limited especially in the rural area due to several reasons, of which lack of transportation, lack of infrastructure, physical facilities, drugs and other consumable supplies are the major ones. Predominant health problems in Misirak Badawacho Woreda are communicable diseases such as malaria, intestinal parasites and malnutrition.

3.2.4.3. Ethnicity, language and religion

Hadiya is the dominant ethnic group with its distinct language and culture. The other ethnic groups living in the woreda include Amhara, kambata, wolaita, and guraghe. The main language spoken in the woreda is Hadiyisa. In terms of religion, protestant is the dominant one of the woreda.

Table 3.2 Population by Religion

Types of Religion	M	F	Total
Protestant	48,029	48,340	96,369
Islam	14,398	14,260	28,658
Catholic	5,581	5,872	11,453
Orthodox	2,939	2,573	5,112
Traditional	32	36	68
Others	601	562	1,163
Total	71,180	71,643	142,823

Source: CSA 2007 population and housing census result.

3.3 Selection of the study site

According to Agriculture and rural development of Misirak Badawacho Woreda report of (2013), Misirak Badawacho Woreda is divided in to two agro-ecological zones. These are moist *weina dega* and dry *woina dega*. According to the above mentioned report, the woreda is divided in to 38 rural kebeles and 1 town administration. Therefore, the researcher has selected two rural kebeles namely Amiburise Anijulo and Lakole Burkito from dry *weina daga* by purposively technique, because the two kebeles selected because there is high land degradation.

3.3.1 Sampling technique

The study site Amiburise Anijulo kebele has a total number of 648 land holder household inhabitants and Lakole Burkito kebele has 531 land holder household inhabitants. Stratified sampling technique was used to select male-headed households and female-headed households. After categorization of households in to male-headed and female-headed, 65 households from Amiburise Anijulo kebele and 55 households from Lakole Burkito were selected as sample size. Based on principle of proportionality to size, from Amiburise Anijulo kebele 51 male and 14 female, from Lakole Burkito 50 male and 5 female land holder household headed were selected by using systematic random sampling as it is believed that the households are similar with respect to the characteristics that influence the research output.

Table 3.3 Indicates the sampled kebele and total size of households' heads that were included in the sample.

Name of sample kebeles	Total number of land holding household heads by sex			Number of sample households					
	MHH	FHH	Total	MHH		FHH		Total	
				Number	%	Number	%	Number	%
Amiburse Anijulo	512	136	648	51	79	14	21	65	100
Lakole	483	48	531	50	91	5	9	55	100
Total	995	184	1179	101	84.2	19	15.8	120	100

Source: Sample Kebeles administration office, February 2016.

3.4 Source of data

The relevant data used for this study were obtained from both primary and secondary sources. The primary data were acquired from households, key informant interview and focus group discussion participants. In addition, secondary sources were also gathered from office document reference.

3.4.1 Data collection instruments

The following instruments were employed to generate the primary data.

3.4.1.1 Household survey

Structured survey questionnaire was used to obtain information from selected samples of 65 households from Amburse Anjulo kebele and 55 households from Lakole Burkito kebele. In this survey, households' demographic characteristics, socio-economic characteristics, issues related to land degradation, land management practices and the existing challenges of degraded lands were obtained. In order to conduct the household survey, four enumerators from Amiburise Anijulo kebele and four enumerators from Lakole Burkito were assigned in the data collection process. Data collectors were who have educational background of diploma in different departements

and they were oriented by the researcher before launching the survey to make them understand the purpose of the survey and to familiarize them with the questionnaire.

3.4.1.2 Key informant interviews

A key informant interview is particularly important in getting information about land management practices by government, NGOs, institutions and farmers . Through such instrument, information regarding the views of experts from Woreda Agriculture and Rural Development Office, Officials of NGOs working on environmental conservation, Development Agents, Kebele administrators and community elders of the respective sample kebeles were included.

3.4.1.3 Focus group discussion

Two groups were used for focus group discussion in Amburse Anjulo and Lakole Burkito kebeles as one critical source of primary data in addition to the household surveys. For the focus group discussions, checklist and interview guides were prepared and people with different socio- economic background are included in the discussion. The people included in the discussion were the teachers, local elders, poor women and men, youth and adult men and women. Data collected through focus group discussions include about challenges of land degradation, land management practices and related issues.

3.4.1.4 Field observation

Direct personal observation encompassed visit of cultivated and uncultivated land, topography, vegetation cover, settlement pattern and the overall aspects of land management practices of the study area. Thus the researcher's opinion based on his visit of the study area was included in the analysis.

3.5 Method of data analysis

Data those available through household survey were analyzed using quantitative techniques by using Statistical Package for Social Scientists (SPSS) software. Descriptive statistics like percentage and frequency distribution were used to analyze quantitative data.

Qualitative data generated from key informant interview, focus group discussion, personal field observation and secondary sources were analyzed by narrative description. Accordingly, information obtained from key informant interview with Woreda agriculture and natural resource development office workers and focus group discussion with different elderly people,

teachers, DAs, religious fathers, kebele administrators and woman association leaders were organized mostly in the form of verbal/narrative information. These were written down during the survey and summarized. This information is more qualitative in nature and will be used to support the coded quantitative data analysis.

The tendency of misinformation and exaggeration about challenges of land degradation and the its management were noticed during the field observation have been settled through triangulation of information and careful interpretation of data.

CHAPTER FOUR

4. RESULT AND DISCUSSION

This chapter presents and discusses the results of the survey conducted in Amburse Anjulo and Lakole Burkito kebeles of Misrak Badawacho Woreda. After description of household and farm characteristics the consequences of land degradation and farmers' land management practices are presented. This is followed by farmers' perceptions on the causes of land degradation and consequences of land degradation as well as on aspects of soil fertility change. Finally, farmers' knowledge and use of land management measures are discussed based on the data generated from the study areas via questionnaire, interview and focus group discussion.

4.1 Socio-economic characteristics of the households

4.1.1 Demographic characteristics

The demographic characteristics indicates, 84.2% of the respondents were male households (MHHs) and 15.8% were female households (FHHs) mainly divorcees, widows, and unmarried women. This indicates FHHs are not proportional with number of MHHs in land holding characteristics. As the result participation of FHHs in land management is also less. During FGDs (Focus Group Discussions) the main reasons why women households are not involved in the land holding is cultural influence (even after husband died the land is owned and named by her elder male child at any age) , female heads have limited access to the information and that other socio-economic issues related to traditional social barriers limit women's involvement. Women are also more involved in regular household activities than men. In the area, a woman takes most of the household responsibilities (child care, food processing and harvesting, weeding and bringing water from long distance). Considering the marital status of the sampled households, 81.7% of the respondents were married. The rest of the respondents 7.5%, 5.0% and 5.8% were unmarried, divorced and widowed respectively,(Table 4.1).

The majority (79.2%) of the respondents are grouped into the age between 30 and 55. About 6.7% of the respondents are below 30 years while 14.1% are above 56 years old. This indicates most of the households are adulthood, which could have positive implication in terms of availing and coordinating family labor for land management practices. As it is indicated in Table 4.1, the majority of the sample households have large family size. Of the total, 62.5% of the respondents

have a family size of five to nine, 18.3% have family size ten to twelve and 4.2% have twelve and above. Whereas only 15% have moderate family members one to five. This indicates that population number in house hold level is increasing which can be the source population pressure. The FGDs gave information on why the family size is increasing. Accordingly, most uneducated families believe that the larger the family size the higher to manage their land, animal production and it is preferable source of labor for household activities.

Table 4.1 Demographic characteristics of the household heads

Demographic characteristics of HHs		Respondents	
		Freq.	%
Sex	Male	101	84.2
	Female	19	15.8
	Total	120	100.0
Age	0 - 18	2	1.7
	19-29	6	5.0
	30-55	95	79.2
	56-60	16	13.3
	> 60	1	0.8
	Total	120	100.0
Marital status	Married	98	81.7
	Single	9	7.5
	Divorced	6	5.0
	Widowed/er	7	5.8
	Total	120	100.0

Family size	1-5	18	15.0
	6-9	75	62.5
	10-12	22	18.3
	>12	5	4.2
	Total	120	100.0

4.1.2 Educational status of the households

In the study area, 41.7% of the sampled household heads are illiterate whereas, the literate HHs in 1-4 (lower grade) are 9.2% . Grade 5-8 (29.2%), 9-12 (10.8%) and >10+1 (9.2%), (see table 4.2). In the study area whatever the amount of literate household heads are greater than unable to read and write household heads, still education is deeds for the HHs. As it is underlined during the focus group discussion, education is important for the farmers to cope with land management practices in the study area, why because, to understand newly introduced land management practices and to adopt technologies in good manner. On the other hand FGDs participants and key informant interviewee indicated that farmers those educated have better understanding for their environment and practicing in progressive manner but their effort is hindered by those who are not educated, because the land management work become fruit full sum total participation of all farmers.

Table 4.2 Educational status of household heads

Educational status of HHs		Respondents	
		Freq.	%
Educational status	Unable to read and write	50	41.7
	grade 1-4	11	9.2
	grade 5-8	35	29.2
	grade 9-12	13	10.8
	>10+1	11	9.2
	Total	120	100.0

4.1.3. Land holding, occupation and income

As it is indicated in Table 4.3 almost all of the respondents (100%) replied that they have their own farming plot. However, there is a significant variation in the size of land holding among householders. Of the sampled households, the majority (74.2%) have 0.5 up to 0.75 hectare. About 20% of HHs have less than 0.5 hectare. A few number of HHs (0.8%) and (5%) have 1 hectare to 1.5 hectare and > 1.5 hectare respectively (Table 4.3). This indicates that there is acute shortage of land in the study area which deters farmers' ability to produce enough crops to feed the fast growing population. This is similar to the national level land holding size. According to CSA (1995), some 80% of the Ethiopian farmers in the highlands (above 1500 meters) cultivate less than one hectare of farming plot. Even worse, the number of households with small holdings will increase with time owing to the increasing rural population and limited land resource availability. In this manner the HHs farm land is exposed to high frequently cultivated which can led to land degradation.

In the study area 76.6% of HHs are practicing mixed farming, crop production accounts 19.2% , animal husbandry 4.2% and no one is practicing on fruit and vegetation work. This indicates that most HHs are exhaustively using their land for mixed farming which pave the way for land degradation. However, this indicates that almost all HHs are not practicing off-farm activities. So, this have negative consequences on land management unless they participate in different work activities rather than cultivating land exhaustively.

The annual income of some HHs (36.7%) is between 7001-10000 birr, but this amount of income is not proportional for increasing number of family as it is seen in table 4.1. On the other hand HHs those have annual income between 1000-4000 birr (10.8%) have very low potential for their survival as a result decrease land management practices. Those who have high income are only (20%) by owning >10000 birr. From this we can assume that in the study area family income is very low.

Table 4.3 Landholding size, main occupation and income of the households

Land holding of the HHs		Respondents	
		Freq.	%
Do you have farm land?	Yes	120	100.0
	No	-	-
	Total	120	100.0
Land in hectare	< 0.5 ha	24	20.0
	0.5 ha - 0.75 ha	89	74.2
	1ha - 1.5 ha	1	0.8
	> 1.5 ha	6	5.0
	Total	120	100.0
Occupation	Crop production	23	19.2
	Animal husbandry	5	4.2
	Mixed farming	92	76.6
	Fruit and vegetable	-	-
	Total	120	100.0
Annual income	1000-4000	13	10.8
	4001-7000	39	32.5
	7001-10000	44	36.7
	> 10000	24	20.0
	Total	120	100.0

4.2 Perception of HHs on Land Degradation

5.8% HHs (due to no erosion on their land and no crop decline on their land they said no land degradation), but almost all or 94.2% respondents perceived that there is land degradation in their locality, which can be a negative constraint for crop production, animal production and human life as a whole. (see table 4.4). As a 38.1%, 32.7%, 29.2% relatively proportional response for the types of erosion like sheet erosion, rill erosion and gullies in the farm respectively, indicates the study area is exposed to land degradation and farmers have perception about land degradation. The remained 5.8% realized that there is no land degradation on their farm land. Also 33.3% of HHs replied that climate is becoming hot (climate change is happening due to removal of forests, depletion of water, carbon dioxide emission to the atmosphere and the like), for crop and animal production in the study area. The remained 25.8%, 23.3% and 17.5% responded that the indicators of land degradation are decreasing of soil fertility, unemployment as well as out migration and drought respectively, see (table 4.4). As the farmers FGDs participants indicated, the rainfall pattern in recent times had become more unreliable. This observation agrees with those of Bewket and Sterk (2002) in the western Ethiopian highlands, Dejene et al; (1997) in Tanzania, and Visser et al; (2002) in Burkina Faso, and reflects the recent drought in many parts of sub-Saharan Africa. However, although soil erosion can cause a reduction in infiltration and the water holding capacity of the soil as well as a loss of plant nutrients, few farmers attributed productivity decline to erosion as sighted by Aklilu (2006).

Table 4.4 Perception of HHs on Land Degradation

Perception degradation in the study area		Respondents	
		Freq.	%
Is there erosion on your farm?	yes	113	94.2
	no	7	5.8
	Total	120	100.0
What type of erosion seen on your farm regularly ?	Low erosion	43	38.1
	Medium erosion	37	32.7
	High erosion	33	29.2
	Missing	7	5.8
	Total	120	100.0
What seems to be major indicators of land degradation in your locality?	climate is becoming harsh	40	33.3
	Decreasing soil fertility	31	25.8
	Unemployment and out-migration	28	23.3
	drought	21	17.5
	Total	120	100.0

4.3 Causes of Land Degradation in the Study Area

As it is indicated on (table 4.5), 98.3% of HHs respondents witnessed that crop production or yield is decreased on their farm, while the only 1.7% HHs respondents said "no". This indicates there is a problem behind crop production either on their land due to land degradation or the method of crop production system. So, this problem is further discussed on indicators of land degradation that what practices that farmers undertaking on their farm, such as crop type they produce, for what purpose they use crop residue and the like. Accordingly almost all (84.2%) of HHs respondents produce maize particularly and the remained 12.5% and 3.3% HHs produce *teff* and sorghum respectively. There is no legume and pulses at all. As a result this indicates that

their land is mostly used to produce the same crop year to year. This practice in turn makes the land to decrease its fertility. The other point is, how they collect crop residues from their farm land and for what purpose they use crop residues. As 60.8% HHs respondents replied, they use residues for fuel 30%, 3.3% , 4.2% and 1.7% use crop residue for, livestock feed/fodder, thatching, fence and multiple response respectively.

In general, as it indicated in fig.4.5, using the land for the same activities such as cultivating similar crops , not applying animal dung and crop residues on farm land is exacerbating the nutrient cycling of the farm land. Such activity is considered as causes for loss of soil fertility in the study area.

Table 4.5 Land and Land Use Practices of the HHs on their farm land

Land use information of the HHs		Respondents	
		Freq.	%
Is crop production decrease on your farm?	Yes	118	98.3
	No	2	1.7
	Total	120	100.0
Crop type you mostly cultivated	Maize	101	84.2
	<i>Teff</i>	15	12.5
	Sorghum	4	3.3
	Pulses	-	-
	Total	120	100.0
Most frequently for what purpose you use residues?	For livestock feed/fodder	36	30.0
	For fuel	73	60.8
	Thatching	4	3.3
	Fence	5	4.2
	multiple response	2	1.7
	Total	120	100.0

According to 32.8% of the respondents stated that, land degradation is caused by over cultivation to feed highly increasing family members which resulted in shortage of farm land as indicated in. About 49 respondents (41.2%) responded that deforestation is one of the main causes of land degradation in the study area. This is due to expand farm land and for fuel wood. As 109 respondents (90.8%) responded, in the study area population pressure is root cause of land degradation. By this case, the household heads have the responsibility to share their farm lands with their children. This ultimately resulted in fragmentation of farm land and followed by repetitive cultivation which reduces soil fertility and exacerbates soil erosion. On the other hand the highly increasing population enforced to own a little communal lands in the study area, grazing lands, forest areas and public lands directly or indirectly.

In addition, about 26.8 and 4.2 percent of respondents responded that land degradation is taking place because of over grazing and steep slope cultivation practices respectively, see (Table 4.6). Unseasonal high rainfall as responded by 5% HHs respondents it one of the root cause for the land degradation in the study area. All problems mentioned above have negative impact on sustainability of ecosystem and the study area is highly victimized by these problems.

As the result of the study revealed that there are different causes of land degradation. These include population pressure, overgrazing, over cultivation, and misuse and mismanagement of natural resources like deforestation. The respondents have forwarded their views related to causes of land degradation in their perspective farmland.

Table 4.6 The response of farmers on the causes of land degradation in the study area

Causes of land degradation in the study area		Respondents	
		Freq.	%
What cause erosion in your locality mainly?	Deforestation	49	41.2
	overgrazing	32	26.8
	continuous cultivation	39	32.8
	Total	120	100.0
Root causes for land degradation	heavy rainfall	6	5.0
	steep topography	5	4.2
	population pressure	109	90.8

The result of interview made with the Woreda agricultural and natural resource conservation officers also showed that, erosion(land cancer), deforestation, poor land management, overgrazing, over cultivation and steep slope cultivation are the main causes of land degradation.

There are also problems of soil nutrient management practices in the study area. The result of key informant interview made with development agents (DAs) showed that among factors that causes for loss of soil nutrient is insufficient of open nutrient cycle. An open nutrient cycle is the process of organic nutrient development through decomposition of crop residues and animal dung. But these materials are frequently used for energy consumption in the respective study area. The absence of this activity is negatively affecting the process of nutrient cycling in the study area.

In general, as 65% HHs responded, a large portion of the residents in the study area are directly dependent on natural resource forest for their energy sources. The intensive consumption of these energy sources has serious problems on natural forest and thereby indicates that it is one of the major causes for land degradation in the study area. To have more information see, (Table 4.7) illustrates the response of HHs on the use of main sources of fuel in the study area, accordingly,

20.8%, 11.7% and 2.5% get their fuel wood from homestead, purchasing and collecting from community forest.

Table 4.7 The main sources of fuel for household and its purposes

Source of energy		Respondents	
		Freq.	%
Sources for your fuel in you village	Natural forest	78	65.0
	Homestead	25	20.8
	Purchasing	14	11.7
	Colleting from community forest	3	2.5
	Total	120	100.0

The response of sample study show that the farmers have been using wood, cow dung and crop residues as the main source of energy for different purposes like food preparation. As it is depicted in Table 4.7, about 46.7% of HHs respondents responded that wood is the main source of energy whereas 18.3% and 35% percent of respondents responded that cow dung and crop residues are another main source of energy respectively. As it is indicated by FGDs the norm of how they get and use fuel wood is depended on their farm land and community forest. The collection of fuel wood from the forest is the responsibility of children who have no knowledge about forest conservation. Since these resources are intensively used by the farmers, the role of erosion protection, nutrient recycling and maintaining fertility of soil is diminishing from time to time. Lastly, this leads to land degradation in the study area.

Moreover, currently crop residues are used for different purposes such as livestock feed, thatching roof and source of income. As it is shown in (Table 4.4,) about 30% of respondents responded that crop residue is used for livestock feed while 3.3% HHs respondents revealed that crop residue is used for thatching roof. So that using crop residue for animal feed is a major causes of nutrient removal. Almost 61% of HHs respondents in the study area use crop residues

for animal feed in dry seasons. The remaining 4.2% and 3.3 used for fence and thatching roof purposes (See Figure 4.4).

Table 4.8 Energy Source of HHs

Materials being used for fuel		Respondents	
		Freq.	%
Specially what energy source is being used for your house hold?	Wood	56	46.7
	Animal dung	22	18.3
	Crop residues	42	35.0
	Total	120	100.0

4.4. Consequences of land degradation in the study area

In general, the respondents in the study area realized that land degradation is seriously affecting the livelihood of rural people. They stated that land degradation has multi dimensional effects on human livelihoods; a reduction of agricultural production and productivities, resource depletion and expansion of diseases are some of them. Here the consequence of land degradation on crop production and livestock production is discussed in detail.



Fig.4.1 Condition of Land degradation in Amburse Anjulo Kebele, Source: Photo taken during field survey, March 2016

4.4.1 Challenges of Land Degradation on Livestock Production

As FGD and key informant interview information , Livestock are integral components of the farming system in the study area. Since cash crop is less produced and insufficient for generating additional income in the locality, the majority of the rural farmers are dependent on cereal crops and livestock. Therefore, the study area is predominantly dependent on livestock in addition to crop production. The predominant livestock in the study area include: cattle, sheep, goat, equines and poultry. However, due to the consequence of land degradation animal production is become difficult in the study area. This is because of shortage of grazing land and dependency of extremely poor farmers on charcoal making in order to lead their life. The key informant interview discussion participants forwarded their views that these challenges are exacerbating land degradation in the study area. According to Addise (2014), the main cause for animal production is problem of farm land expansion towards marginal forest area.



Fig.4.2 Livestock problem due to land degradation in Lakole Burkito kebele, Source: Photo taken during field survey, March 2016

4.4.2. Consequences of Land Degradation on Crop Production

To obtain sufficient crop production, it requires appropriate land management practices. A decline in crop production might be obvious phenomenon of land degradation and inappropriate land management practices. The result of interview and FGD revealed that farmers in the study

area are frequently observing the decline of crop yields as an indicator of land degradation. The decline in crop production might be obvious phenomenon of land degradation and inappropriate land management practices. The result of interview and FGD revealed that farmers in the study area are frequently observing the decline of crop yields as an indicator of land degradation. Therefore, majority of surveyed households responded that the decline in the fertility of farm land is one of the main reasons for the reduction of yield.

As information given by HHs, key informant interview, focus group discussion (FGD) and field observation on the study area impacts of land degradation are challenging ecology in general and human life and animal life in particular. Accordingly, 62.5% HHs respondents responded that after land degradation seen in their locality, soil fertility is decreasing. On the other hand FGDs participants witnessed that this is a big problem for their life as well for crop production, animal life and plant development as whole. Additionally, 30.8% replied that the farm land preparation becomes difficult for cultivation and the remained 6.7% answered that their farm land is being reduced after the land degradation, see (Table 4.9). According to FGDs and key informant interview, erosion decreases not only quality of the farm land but also the quantity. Even, the higher the erosion the after long time the lower will be farm land and washed down and become out of function.

As data gained from key informant interview land degradation is one of challenging problem of the study area. In the ecology as one is depend on the other, they need positive environment. Plants growth depend soil type, water quality and quantity as well as good climate type. But in the study area ecological imbalance is becoming difficult for living condition, as a result from the study area wild animals migrated to search food and shelter, children and youths are migrating to search work and drought is expanding. This is also an alarming issue in the study area which is becoming difficult for living condition of animals and human beings.

Table.4.9 Consequences of land degradation in study area

Consequences of land degradation in study area		Respondents	
		Fre q.	%
What seems to be major consequences after land degradation in your locality?	Soil fertility is decreasing	75	62.5
	Farm land preparation becomes difficult	37	30.8
	Reduced farm land	8	6.7
	Total	120	100.0

4.5. Land management Practices in the study area

4.5.1. Land management Practices of Farmers

As shown in (Table 4.10), about 86.7% of HHs respondents responded that they are practicing to protect their land from erosion working terraces on their land while the remain 10% and 3.3% of HHs respondents reported that protecting their land from erosion contour plough and stone bunds respectively. On the other hand FGDs indicated that there is also biological activities those practiced by farmers such as planting trees and applying animal dung in the home stead only. However, as discussed in the previous paragraph, even though different measures are taking place, there is a conservation problem due to free grazing and charcoal making as well as expansion of agricultural lands.

Table 4.10 Measures taken by the HHs in the study area

Measures taken by the HHs in the study area		Respondents	
		Freq.	%
Which measures did you take to reduce land degradation mostly?	Terraces	104	86.7
	contour ploughing	12	10.0
	stone bunds	4	3.3
	Total	120	100.0

At the time of focus group discussion (FGD), they raised that measures should be taken by community as well as by government. But there is still a problem by each and every farmers, NGOs and institutional level. Accordingly measures taken by some farmers only cannot bring change or protect land from degradation. If the upper land holder did not take land management measure to protect his/her land from damage, the lower land holder land management measure cannot bring sustainable land management.



Fig.4.3 Farmers land management practices in Amburse Anjulo kebele, Source: Photo taken during field survey, March 2016

On the other hand during the FGD of the Lakole Burkito the participants raised the issue that sustainable land management is the result of coordination of all responsible bodies, such as individual farmers, government, NGOs, community organizations and institutions those work on the issue. They discussed as big problem the absence of NGOs and institutions those work on the sustainable land management. This is because the magnitude of the land degradation is beyond the capacity of the local farmers HHs.

4.5.2 Community land management practices

According to key informant interviewee, the community participation in land management practice is one of the most important activity to bring ecological sustainability. So, government is working in restless manner to make awareness among the community .Any new agricultural practices in particular area need adequate mechanism for transmitting information. Lack of relevant and up-to-date information can prevent a widespread practice of natural resource conservation activities. Access to extension services helps community to gain better understanding of the potential effects of soil erosion and benefits of soil and water conservation practices as well as enhancing knowledge on the application of soil and water conservation technologies in the study area. This is what the Ethiopian working to improve livelihood of the citizens in collaboration with multi-donor groups and has launched a fifteen year national initiative named Ethiopian Sustainable Investment Framework for Sustainable Land Management (ESIF-SLM) Project that seeks multi-sectoral partnerships among different stakeholders committed to harmonize and align their investments in order to alleviate rural poverty through restoring, sustaining and enhancing the productive capacity, protective functions and bio-diversity of Ethiopia's natural ecosystem resources. The overall goal of SLMP is to provide an integrated holistic framework to effectively address poverty, vulnerability, and land degradation in order to improve the livelihoods of land users while restoring ecosystem functions and ensuring sustainable land management. In line with this the Misrak Badawacho Woreda government and Agricultural and Natural Resource Office working with within all 39 kebeles. As key informant interview information, the land degradation and its impact is becoming difficult life of animals, human being and natural resources.



Fig.4.4 Stone bunds (left) and soil bunds (right) constructed by community participation, Source: WARDO 2015.

From the HHs respondents 75% responded that the community organizes labor for the land Management activities. However 20.8% and 4.2% HHs respondents answered as manages and controls the uses of resources and regulates the use and management of land resources at local level respectively, see (Table 4.11).

Table 4.11 Roles of community participation on land management practices

What roles do community play?	Respondents	
	Freq.	%
Organizes labor for the land Management activities	90	75.0
Manages and controls the uses of resources	25	20.8
Regulates the use and management of land resources at local level	5	4.2
Total	120	100.0

Based on the information obtained from focus group discussion and key informant interview, there was less involvement of community before a years in sustainable land management, natural resource management and natural forest or agro forestry conservation practices . However,

currently to some extent there is a community based sustainable natural resources management and the like being practiced by government, NGOs and community organizations. They have been planting and protecting planted trees from the intervention of people and animals. But this attempt is not successful because of free grazing, collecting fuel wood and illegal practices like charcoal making. Even though the community has been working on rehabilitating hillside areas with terraces, afforestation and reforestation, it requires further work and technique on the conservation of both natural forests and planted trees.

Moreover, the HHs respondents stated that there is problem on management of communal lands which resulted in environmental degradation and soil erosion in the study area. For instance, free grazing is one of the serious problems in the study area. This is because; farmers release their cattle to the field at the end of December (crop harvesting month) and beginning of January (cultivating land for crop). Such problems have been discarding the goal of land management activities in the study area. Not only this but also the poor and landless people cut trees illegally for charcoal making and for fuel wood. Therefore, this misuse of forest in the study area has aggravated the problem of deforestation and resulting into land degradation.

4.5.3 Land management efforts by government

As it is indicated in (Table 4.12), 47.5% HHs realized that DAs support them in the land management practices and 45.8% of HHs replied as they are supported by Woreda agricultural office. The remained few HHs respondents 1.7% and 5% answered that they are supported by NGOs and no any support respectively.

Table 4.12 Government bodies those support farmers \

Who provide the extension service?	Frequency	Percent
Development agents (DAs)	57	47.5
NGOs	2	1.7
Woreda agriculture office	55	45.8
No	6	5.0
Total	120	100.0

Additional responses from key informant interviewee and FGD participants reviewed that land management practice is issue of special concern of the Misirak Badawacho Woreda Agricultural and rural development office in particular and at the country level as a whole. This is why, population pressure, terrain nature of land, over-cultivation, deforestation and irregular rainfall pattern, the agricultural production in the study area has been decreasing over time.



Fig 4.5 Woreda government discussing with community members about land management(left) and practicing how to cut terrace (right) Source: WARDO 2015.

In order to increase farm productivity and conserve the resource base of the Woreda, Primarily, land management efforts were introduced with the objectives of land management and as well as increasing food security through increased food crop production.

As a result, most of the land management structures from Woreda to Kebele for the construction of physical soil and water conservation measures and afforestation were forwarded for the farmers to protect land degradation. Currently, all farmers and stakeholders are participating in land management practices called " *Tefases* " (fig.4.4). It is the organized program from federal to Woreda level as a basic issue of government for the sustainable land management. So, the activities undertaken by this program are soil bunds, fanya juu, cutoff drains, water ways, check dams, hillside closure and the like. Each land management practices are discussed in the following manner.

4.5.3.1 Soil bunds

Soil bunds are constructed during the dry season that do not interfere land preparation for cropping. The construction is aimed on reduction and stopping velocity of runoff. It increases soil productivity by capturing moisture and crop yields over time. Soil bunds can easily be integrated with grasses, shrubs, growing cash crops, root crops like sweet potato and *inset* growing. Grazing animals on bunds damage the structures.

4.5.3.2 Fanya juu

This is an embankment constructed by throwing the soil dug from basin to uphill and the term was coined from Swahili language; meaning “throwing up-hill (Woldeamlak, 2003). This conservation structure is also constructed during dry season. The aim is to reduce and stop erosion and increase water holding capacity of the soil so as to enhance crop yield. The main benefit of fanya juu is its capacity to become bench terrace within few years than soil bunds, yet it has overtopping and breakages (Lakew et al. 2005). Fanya juu is usually applied in cultivation land with slopes above 3% and below 16% gradient. It can also be constructed in uniform terrains with deep soils. Moreover, it has a potential to increase/sustain soil productivity and environmental protection. Integration with grasses and composting is suitable in fanya juu soil conservation measure.

4.5.3.3 Cutoff drains

As many of other structural land restoration practices measures, cutoff drains are constructed during dry season to avoid impediment to land preparation for main cropping season. This structure is a graded channel constructed mainly in moist area to intercept and divert the surface runoff from higher slopes and protect downstream cultivated land or village. On the contrary, cutoff drains in dry area are used to divert runoff and additional water into cultivated fields to increase soil moisture.

4.5.3.4 Waterways

Waterways can be natural or manmade drainage channel to receive diverted runoff from cutoff drains in upper slope. The waterway carries the excess runoff to rivers, reservoirs, or gullies safely without causing more erosion damages.

4.5.3.5 Check dams

Check dams for the gully control may be made of stones, soils or brush-woods. In the study area stone is not available to make check dams at any place. Accordingly, a farmer dominantly uses, the brush-woods and soil to construct check dams.

4.5.3.6 Hillside closure

It is the closure of hillside area and denying access to all human and livestock activity, and allowing it to recover by natural process.



Fig.4.4 Contour plough method technology in Amburse Anjulo kebele FTC , Source: Photo taken during field survey, March 2016

As it is seen in fig.4.4, like contour plough, government training farmers by introducing new technology by kebele FTC center. Accordingly farmers are practicing on their own farm land, (see fig.4.5).



Fig.4.5 Farmers practice of wide contour plough, Source: Photo taken during field survey, March 2016

4.5.4 NGOs activities in land management practices in the study area

On table 4.12, only 1.7% HHs respondents realized that NGOs support them in work of land management practices. But according to key informant and FGDs, the numbers of NGOs which are concerned with performing different development projects in Misirak Badawacho Woreda are few as compared to other Woreda. Among these, World Bank is one local NGO which widely involved in environmental restoration works. At the beginning, the main activity of World Bank was sensitization and mobilization of the society through panel discussion, workshops, training and establishing community committees. Then establishment of nursery and seedling production, plantation and distribution among the societies are the main tasks of World Bank. In addition, distribution of fruits and coffee seedlings in order to introduce agro forestry practice is part of the activities. Moreover, soil and water conservation structures are practiced on individual lands to minimize soil loss and to increase productivity of farm land. With the involvement of the society and government cooperation extremely degraded areas around hill

side are enclosed to protect from encroachment of livestock. World Bank, on the study area, to minimize the pressure exerted on natural vegetation by human being, is working on alternative energy sources. Among these activities, training on biogas construction and fuel saving stove construction and distribution are the main ones. In addition, an alternate way of constructing houses i.e. construction of model mud house block is being introduced in the district and training has been given for the society on how to make a mud block and how to construct it. Promotion of non-farm activities is another activity practiced in the district. These activities help the society to earn their livelihood other than farm activity and reduce pressures to be exerted on land resources by promoting conservation activities.

CHAPTER FIVE

5. CONCLUSION AND RECOMMENDATIONS

5.1 Conclusion

The general objective of this research is to investigate the consequences of land degradation and land management practices in Msirak Badawacho Woreda, Hadiya Zone of SNNPR, Ethiopia. The findings of the study indicated that the livelihood of the farmers in the study area depends on subsistence agriculture. For almost all sampled households, the major economic activity is based on mixed farming. The average size of farm land owned by farmers is less than one hectare and limits the amount of agricultural production in the study area.

Based on the result of this study, the researcher draws the following conclusion:

The study indentified the following main causes of land degradation. These are: population pressure which in turn caused (i.e. over cultivation and deforestation), poor land management practices and overgrazing which exacerbates soil erosion.

This result also shows that, soil nutrient depletion is another problem which followed land degradation. The communities are excessively removing crop residues and animal dung for different purposes like for fuel, and for thatching. With this, soil losses nutrient recycling process on their farm and its fertility and productivity decreases. So soil fertility management is another acute problem in the area.

Expanding their farm land in to communal land and forest area is also one of the main problem that aggravates land degradation and there no strong rules and regulations at the community level as well as institutions like " Idir", " Iqub ", " Debo " and different institutions do not have potential to work together on land management issues.

In collaboration with natural resource experts at Woreda level and development agents (DAs) at kebele level, the farmers are currently more or less practicing afforestation, reforestation, gully control, terracing and other modern land management practices. This is mainly practiced under government water shade development program. So, this gave the researcher some hope that it brings sustainability in natural resource management effort in general, but it needs coordination with community at large as well as institutions in the locality particularly.

As far as a challenges of land degradation is concerned, the sample respondents well understood the causes of land degradation and its multi dimensional effects on human livelihoods such as reduction of agricultural productivities, quality of yield, resource depletion and expansion of diseases.

5.2 Recommendations

The study revealed that the study area is suffering from land degradation caused by population pressure, , over grazing, deforestation and over cultivation. To mitigate these problems, the researcher recommends that permanently working supporting, sufficient training and experience sharing should be encouraged by Woreda agricultural and natural resource development office, NGOs and different institutions to reduce the above problems. Additionally, provision of better alternative measures of natural resource and land management methods like agro-forestry and newly adopted land management practices by awareness creation and capacity building of farmers. If this is well done, it brings attitudinal and behavioral change on the farmers about the physical and biological works for land management.

This finding also showed that the rural farmers are mainly dependent on natural forests, crop residues and animal dung for energy consumption. This practices have negative impact on land management practices. So, it may be useful if the government supply other best alternative of energy sources like electric power accessibility, biomass and solar energy to mitigate the burden on forest and nutrient loss.

Even though much is to be done and in progress on natural resource management in the area, there are some obstacles both from the experts and the communities. These are: Lack of education and training from the side of communities, reluctant of farmers to implement what told to do by experts and lack of commitment and sense of ownership from experts. Sustainable land management practices need joint action from both the government and communities. Therefore, the government should go further in working with farmers on the issue of land management.

This study also revealed that increasing family size is one of the problems to increase population pressure. Therefore, it is very interesting if the government gives due attention on family planning to reduce population pressure and improve the means of farmers' income

diversification that enables them to practice fallowing which plays its own role in reducing land degradation and increasing soil fertility.

New technologies which are brought by government, NGOs and different institutions should have continuity , which means it is better to cope farmers and responsible bodies by knowledge and good performance to work permanently.

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Appendix I:

House Hold survey Questionnaire

Part I. General information

1. Name of the enumerator _____
2. Enumeration kebele _____
3. Date of the enumeration _____

Part II. Personal information

1. Name of respondent _____
2. kebele _____
3. Age (1) 0 - 18 ____ (2) 19 - 29 ____ (3) 30 - 55 ____ (4) 56 - 60 ____ (5) > 60 ____
4. Sex: (1) male ____ (2) female ____
5. Marital status: (1) married ____ (2) unmarried ____ (3) divorced ____ (4) widowed ____
6. Family size ____ (1) Male ____ (2) Female ____
7. Educational status: (1) illiterate __ (2) 1-4 __ (3) 5-8 __ (4) 9-12 __ (5) >10+1 __
8. Annual income in birr _____
9. Occupational status: (1) Crop production ____ (2) Animal husbandry ____
(3) Mixed farming (4) Fruit and vegetable ____
(4) Fruit and vegetable production ____ (5) others (please specify) _____

Part III. Economic activities

1. Do you have farm land? (1) yes ____ (2) No ____
2. If your answer is yes, how many in hectare? _____
3. Which major crops do you grow in your farmland ?
(1) Maze ____ (2) Wheat ____ (3) Teff ____ (4) Sorghum ____
(5) Barely ____ (6) Pulses ____ (7) other (Specify) ____
4. Do you feel that the production of corps in your farm has declined? (1) Yes _ (2) No ____
5. If yes, what measures did you take when the productivity of your farmland decline?
(1) Look for additional land __ (2) Fallow ____ (3) Crop rotation __ (4) Others (Specify) ____

6. For what purpose do you use crop residues? (1) Livestock feed ____ (2) Fuel ____ (3) thatching roof ____ (4) Fence ____ (5) for sale ____ (6) others (specify) ____
7. How do you collect crop residues from the farm? (1) Harvesting with sickle ____ (2) uprooting ____ (3) others (specify) ____
8. Do you integrate water conservation and rain water harvesting in your farmland? (1) Yes ____ (2) No ____
9. If yes, what techniques do you use? (1) Stubble mulching ____ (2) cover bare lands by forest ____ (3) Contour bunds ____ (4) others (specify) ____
10. Specify types of animals you domesticated in the following table,

Livestock /Cattle Types	Number
Ox	
Cow	
Heifer	
Calf	
Sheep	
Goats	
poultry	
Equines	
Mule	
Donkey	
Horse	
Others (specify)	

11. Which of the following are problems of livestock production? (1) Shortage of feed ____ (2) Shortage of grazing land ____ (3) Pests and disease ____ (4) Others (Specify) ____
12. What are the major sources of feed for animals? (1) crop residues ____ (2) communal grazing land ____ (3) private grazing land ____ (4) others (specify) ____
13. Do you think that the carrying capacity of the grazing area fits with the number of livestock? (1) Yes ____ (2) No ____
14. If no, what measures do you take to alleviate feed shortages? Please decide your measure that you are often used.

Alternatives	Measure taken	Measure not taken
Produce fodder on farmland		
Conserving hay and straw		
Purchasing feed		
Renting grazing land		
Transferring stocks to other farmers		
Owner moving stocks to other places		
Others (specify)		

Part IV. Land degradation and its consequences

15. Have you faced soil erosion problem in your farm? (1) Yes ____ (2) No ____.
16. If yes, what type is it ? (1) Low erosion ____ (2) Medium erosion ____
(3) High erosion ____ (4) others (specify)
17. What do you think the causes of soil erosion mainly ? (1) Deforestation ____ (2) overgrazing ____ (3) continuous cultivation ____ (4) others (specify) ____
18. In which season erosion is severe in your farm land? (1) summer ____ (2) autumn ____
(3) winter ____ (4) spring ____
19. What are the immediate root causes of land degradation?
(1) overstocking ____ (2) cutting trees for fuel and construction ____ (3) ploughing steep slopes ____ (4) limited use of conservation structures ____ (5) continued cultivation/no fallowing ____ (6) others (specify) ____
20. What were/are the underlying root causes for land degradation in your area? (Multiple Answers are possible)

(1) heavy rainfall___ (2) steep topography___ (3) population pressure___ (4) others (specify)_____

21. Is it possible to halt/minimize land degradation problem?

(1) yes ___ (2) no___ (3) I don't know_____

22. If your answer is 'yes', how? _____

23. If your answer is 'no', why? _____

24. What seems to be the major consequence of land degradation mostly in your locality?

(1) Climate is become harsh ___ (2) decreasing soil fertility _____

(3) Unemployment and out-migration_____ (4) drought _____

25. What consequences do you observe after impacts of land degradation in your locality?

(1) Land productivity (yield) decrease ___(2) Land preparation becomes difficult___

(3) Reduced farm size___ (4) Poverty _____ (5) others (specify) _____

26. Have you ever noticed the decline of soil fertility in your farmland? (1) Yes _(2) No___

27. If yes, what indicators did you observe? (1) Stunted growth of crops _____ (2) Color change on leaves ___ (3) Yield decline ___(4) Others (Specify) _____

28. Is there forest currently in your locality? (1)Yes _____ (2) No_____

29. If yes, what type ? (1) Natural (2) plantation.

30. Do you observe problem of deforestation in your area? (1) Yes _____ (2) No_____

31. If yes, what kinds of deforestation for what purpose? (1) Conversion of forest to farmland _____ (2) Fuel wood and charcoal production _____ (3) Construction of house _____ (4) Conversion of forest to grazing land _____

32. How does deforestation affect you and the community as a whole? In order of impact?

(1). Causes land degradation _____ (2) loss of habitat _____ (3) gullies and rills created _____

(4) others (Specify) _____

33. If deforestation is a problem in your village, is there community participation to solve the problem ? (1) Yes _____ (2) No_____

34. If yes, how do communities in the village contribute to the protection of forest? (1)

Participate in afforestation and reforestation programs _____ (2) Reduce pressure on forest

by planting multipurpose trees _____ (3) Participate in forest development program _____

(4) Respect rules by laws and regulation of local governments and the Community _____

(5) others (specify)_____

35. Specially what is being used as an energy source for your house hold? (1) Wood ____
 (2) Animal dung ____ (3) Crop residues ____ (4) Kerosene ____
36. If your answer is wood from where do you get it? Where is the main sources for your fuel in you village ? (1) Natural forest ____ (2) homestead ____ (3) purchasing ____ (4) Colleting from community forest_____
37. Do you use dry dung (*kubet*) for fuel for household sale? (1) Yes ____ (2) No ____
38. If yes, for what purpose? (1) For household (2) for sale

Part V. Land management practices

39. Did you take any measure to protect erosion? (1) Yes _____ (2) No_____
40. If yes, which measures did you take mostly? (1)Terraces, ____ (2) contour plauging ____ (3) stone bunds ____ (4) soil bunds____ (5) Check dam ____ (6) others (specify) ____.
41. What will happen to your farm if you do not take protection measures? (1) Loose of farmland fertility ____ (2) Crop yields will be reduced ____ (3) others specify ____
42. Does community play role in the management of land resources? (1) Yes ____ (2) No_____
43. If yes, what roles do they play? (1) Organizes communal labor for the management activities ____ (2) Manages and controls the uses of resources ____ (3) Regulates the use and management of land resources at local level____ (4) Others (specify) ____
44. How do you manage the soil fertility? (1) Fallowing ____ (2) Crop rotation ____ (3) Intercropping ____ (4) Apply organic fertilizer (residue, dung,...etc)
45. Do you use organic fertilizer to maintain soil fertility and organic matter in your farm? (1)Yes ____ (2) No_____
46. If no, what is/are the reason/s for not using organic fertilizer?
 (1) Shortage of composting materials ____ (2) Preference to artificial fertilizer ____ (3) Lack of knowledge and skill of compost making ____ (5) Others (specify) ____
47. Is there any kinds of constraints in the process of your land management practice? (1) Yes _____ (2) No_____

48. If yes, what are the constraints to crop production in your area? (Multiple answers are possible) (1) Erratic rainfall__ (2) drought__ (3) Pest and disease__ (4) Others (specify)_____
49. Did you get agricultural extension service? (1) Yes _____ (2) No _____
50. If yes, who provides the extension service? (1) Development agents (DAs) _____ (2) NGOs_____ (3) woreda agriculture office _____ (4) Others (specify)_____
51. What the Development agents (DAs) taught or training in your locality ? (1) Input supply and use _____(2) Soil and water conservation _____ (3) Land management practice_____ (4) rain water harvest _____ (5) Animal husbandry ____ (6)Agro-forestry _____ (7) Any other, please specify _____

Appendix II:

Check list for the focus group discussion about impacts of land degradation and land management practices

1. What are the major causes of land degradation in your locality?
?_____
2. If there is a problem of land degradation, what are the indicators?_____
3. What are the contributing factors for land degradation?_____
4. What is the trend of productivity of land through time?_____
5. What are the major impacts of land degradation in your locality ? _____
6. How did you see land management practice carried out in your area in the past?

- What Indigenous practices are undertaken mostly ?_____
7. What interventions are there by government and NGOs in the area with regard to land

management practice?

8. What are the constraints to the sustainability of land management in your area?
 - a. Policy/institutional _____
 - b. Socio-cultural _____
 - c. Economic _____
9. What measures do you suggest for the land management in effective manner? _____
10. Which kinds of land conservation methods practiced at your household level ?

11. What pre-conditions taken with your society before new land management strategies established by government or NGOs ? _____
_____.
12. What measures being taken by Woreda agricultural office so as to alleviate the impacts of land degradation? _____

Appendix III:

Questionnaire for key informant interview about impacts of land degradation and land management practices in Misrak Badawacho Woreda of Hadiya Zone

1. What are the major impacts of land degradation in your Woreda ?
2. How do you describe the status of land degradation in study area?
3. If there are problems of land degradation, what are the indicators for the problems?
4. What are the major causes for land degradation?
5. What factors are aggravating the problem of land degradation?
6. How farmers participating in sustainable land management practices?
7. When and how you are playing the role to create awareness about sustainable land management among the farmers?

8. what are the community-based land management practices in your Woreda as well as the study area?
9. What are the constraints you faced in implementing sustainable land management practices in your Woreda?

Appendix IV

ለአባወራዎች እና እማወራዎች የቀረበ የዳሰሳ ጥያቄ

ክፍል አንድ:- ዋና መረጃ

1. የመረጃ ሰብሳቢ ስም -----
2. መረጃ የሚሰበሰብበት ቀበሌ -----
3. መረጃው የተሰበሰበበት ቀን -----

ክፍል ሁለት:-የአባወራው/ዋ ማንነት መረጃ በተመለከተ

1. ስም-----
2. ቀበሌ -----
3. ዕድሜ (1) 0 - 18 _____ (2) 19 - 29 _____ (3) 30 - 55_____ (4) 56 - 60_____ (5) > 60 _____
4. ፆታ (1) ወንድ---- (2) ሴት-----
5. የጋብቻ ሁኔታ : (1) ያገባ/ች (2) ያላገባ/ች (3) የተፋታ/ች (4) በሞት የተለየ/ች
6. ቤተሰብ ቁጥር :(1) ወንድ----- (2) ሴት----- (3) ድምር-----
7. የትምህርት ደረጃ : (1) ያልተማረ (2) የተማረ (የክፍል ደረጃ ይግለጹ)-----

8. አመታዊ ገቢ በብር ስተመን -----ብር ነው::
9. የሥራ ሁኔታ: (1) ሰብል አምራች (2) አርብቶ አደር (3) ጥምር ግብርና (4) አትክልትና ፍራፍሬ አምራች (5) ሌሎችም (ይገለጻል) -----

ክፍል ሦስት:- የእኮኖሚ ሁኔታ በተመለከተ

1. የእርሻ መሬት አለወት? (1) አዎን (2) የለም

2. መልስዎ አዎን ከሆነ ምን የህል ሄክታር ነው?

3. በማሳዎ የሚያመርቱት የትኞቹን የሰብል ዓይነቶችን ነው? (1) በቆሎ (2) ስንዴ (3) ጤፍ (4) ማሽላ (5)ገብስ (6)የቅባት እህሎች (7) ሌሎችም (ይገለጻል)-----

4. በማሳዎ የምርት መቀነስ ታይቷል ብለው አስበው ያውቃሉ? (1) አዎን (2) አይደለም

5. መልስዎ አዎን ከሆነ ምን ዓይነት መፍትሔ እየፈለጉ ነው ? (1) ሌላ መሬት መፈለግ (2) አሳድሮ ማረስ (3) አፈራርቆ መዘራት (4) ሌሎችም (ይገለጻል)-----

6. ከእርሻ ማሳ የሚገኘውን ተረፈ ምርት (ጭድ ፣ አገዳ...ወዘተ) ለምን አገልግሎት ያወላሉ?

(1) ለእንስሳት መኖ (2) ለማገዶ (3) ለቤት ክፍን (4) ለአጥር (6) ለሽያጭ (7) ሌሎችም (ይገለጻል)-----

7.ከማሳዎ ተረፈ ምርት በምን ዓይነት መልኩ ነው የሚሰበስቡት ? (1) በማጨድ (2) ከነሥሩ በመንቀል (3) ቆርጦ በማንሳት (4) ሌሎችም (ይገለጻል)-----

8. በማሳዎ የወሃ ጥበቃ እና የዝናብ ወሃ የማሰባሰብ ሥራ አጣምረው ይሠራሉ ? (1) አዎን (2) አይደለም

9.መልስዎ አዎን ከሆነ በምን አይነት መንገድ ነው ? (1) ገለባ፤ ሣርና እና ቅጠላ ቅጠሎችን አፈር በማልበስ (2) የተለያዩ ዛፎችን በመትከል (3) አግድም በማረስ (4) ሌሎችም (ይገለጻል)-----

10. እባካዎትን በሚቀጥለው ሰንጠረዥ የሚያረቡትን የቤት እንስሳት አይነትና ቁጥር ይግለጹ.

የቤት እንስሳት (ከብቶች) አይነት	የቤት እንስሳት ቁጥር
በሬ	
ላም	
ወይፈን	
ግደር	
በግ	
ፍየል	

ዶ/ር	
በቅሎ	
አህያ	
ፈረስ	
ሌሎችም ካሉ ይገለጹ	

11. ከሚከተሉት ውስጥ ለእንስሳት እርባታ አስቸጋር ነገር ምንድን ነው ? (1) የመኖ እጥረት (2) የግጦሽ ቦታ እጥረት (3) ተባይና በሽታ (4) ሌሎችም (ይገለጹ)-----
12. የከብቶች መኖ በዋናነት የሚገኘው ከየት ነው ? (1) ከተረፈ ምርት (2) ከግጦሽ መሬት (3) ከገበያ ተገዝቶ (4) ሌሎችም (ይገለጹ)-----
13. በአካባቢያችሁ ያለው የግጦሽ ቦታ ከከብቶቻችሁ ቁጥር ጋር ተመጣጣኝ ነው? (1) አዎን (2) አይደለም
14. መልስዎ አይደለም ከሆነ የመኖ እጥረትን ለመሸፈን ምን ዓይነት መፍትሄ እየወሰዱ ነው? እባክዎ መልስዎን በሚቀጥለው ሠነጠረዥ ከተቀመጡት አማራጮች በወሰዱት መፍትሄ መሠረት ይመልሱ፤

አማራጮች	መፍትሄ ተወስዳል	መፍትሄ አልተወሰደም
ከማሳ ድርቆሽ ማዘጋጀት		
የመኖ እና ድርቆሽ ቆጥቦ በማስቀመጥ		
ከገበያ መኖ በመግዛት		
የግጦሽ መስክ በመከራየት		
ከብቶችን ከአንድ ቦታ ወደ ሌላ ቦታ ማዛወር		
ከብቶችን ይዞ ሌላ አካባቢ በመቀየር		
ሌሎችም ካሉ (ይገለጹ)		

ክፍል አራት:-የመሬት መጋጋጥ እና ተፅዕኖውን በተመለከተ

15. በማሳዎ ላይ የአፈር መሸርሸር ችግር ገጥመዎት ያወቃል ? (1) አዎን (2) አይደለም
16. መልስዎ አዎን ከሆነ የአፈር መሸርሸር ምን ዓይነት ነው? (1) ዝቅተኛ የአፈር መሸርሸር (2) መካከለኛ የአፈር መሸርሸር (3) ከፍተኛ የአፈር መሸርሸር (4) ሌሎችም ካሉ ይግለጹ -----
17. በአካባቢያችሁ ወይም በማሳዎ ለአፈር መሸርሸር ዋና መንስኤ ምን ይሆን? (1) የደን መጨፍጨፍ (2) የግጦሽ መሬት በተደጋጋሚ መጋጥ (3) ሳያሳርፉ በተደጋጋሚ ማረስ (4) ሌሎችም ካሉ ይግለጹ-----
18. በየትኞቹ የአመቱ ወቅቶች ነው በከፍተኛ ሁኔታ የአፈር መሸርሸር የሚከሰተው ?
(1)ክረምት (2) መከር (3) በጋ (4) ፀደይ
19. ለመሬት መጋጋጥ ቀጥተኛ መንስኤ የሚሆኑት ምንድን ናቸው? (1) የግጦሽ ቦታ ከምችለው አቅም በላይ መጋጥ (2) ለቤት ግንባታና ለማገዶ እንጨት ደንን መጨፍጨፍ (3) ተዳፋት መሬትን ያለ አግባብ ማረስ (4) ሌሎችም ካሉ ይግለጹ -----
20. ለመሬት መጋጋጥ ቀጥተኛ ያልሆኑ መንስኤዎች ምንድን ናቸው?(1) ከባድ ዝናብ (2) ተዳፋት መሬት (3) የሕዝብ ብዛት (4) ሌሎችም ካሉ ይግለጹ -----
21. የመሬት መጋጋጥን መቀነስ ይቻላል? (1) አዎን (2) አይደለም
22. መልስዎ አዎን ከሆነ እንዴት ነው የሚቻለው? -----
23. መልስዎ አይደለም ከሆነስ ለምን ? -----
24. በአካባቢዎ የመሬት መጋጋጥ ስለመከሰቱ ዋና አመላካች ምን ይመስልዎታል? (1) የአየር ሙቀት መጨመር (2) የመሬት ምርት መቀነስ (3) ሥራ አጥነትና ስደት መጨመር (4) ድርቅ
25. ከመሬት መጋጋጥ ተፅዕኖ በኋላ በአካባቢያችሁ የሚከሰቱት ምንድን ናቸው ? (1) የምርት መቀነስ (2) መሬት ለእርሻ አስቸጋሪ መሆን (3) የእርሻ መሬት ጀጥኒት (4) ሌሎችም ካሉ ይግለጹ ---
26. በማሳዎ የአፈር ለምነት እየቀነሰ ስለመምጣቱ ተገናዝበው ያወቃሉ ? (1) አዎን (2) አይደለም

27. መልስዎ አዎን ከሆነ ምን አመላካች ሁኔታዎች እየታዩ ነው ? (1) የሰብሎች ዕድገት መቀጨጭ (2) የተክሎች ቅጠል መልክ መቀየር (3) የምርት መቀነስ (4) ሌሎችም ካሉ ይግለጹ -----
28. በአካባቢያችሁ በአሁኑ ጊዜ ደን ይገኛል? (1) አዎን (2) አይደለም
29. መልስዎ አዎን ከሆነ ምን ዓይነትና ምን ያህል ነው? (1) የተፈጥሮ ደን በሄ/ር----- (2) በሰው ኃይል የተተክለ በሄ/ር ----- (3) የተካለለ በሄ/ር ----- (4) ሌሎችም ካሉ ይግለጹ-----
30. የደን መጨፍጨፍን በአካባቢዎ አይተዉ ያዉቃሉ? (1) አዎን (2) አይደለም
31. መልስዎ አዎን ከሆነ ምን ዓይነትና ለምን አገልግሎት ነው ደን የምጨፈጨፈው ? (1) የእርሻ ማሳ ለማዉጣት (2) ለማገዶ እንጨትና እና ከሰል ለማክሰም (3) ለቤት ግንባታ (4) የግጦሽ ቦታ ለማዉጣት (4) ሌሎችም ካሉ ይግለጹ-----
32. የደን መጨፍጨፍ ካለ በእርስዎና በአካባቢዎ ላይ ምን ዓይነት ተፅዕኖ እያደረሰ ይገኛል ?
 (1) የመሬት መጋጋጥ (2) የአየር ሙቀት መጨመር
 (3) የዝናብ እጥረት መከሰት (4) ሌሎችም ካሉ ይግለጹ -----
33. በአካባቢዎ የደን መጨፍጨፍ ካለ ማህበረሰባችሁ ችግሩን ከመቅረፍ አኳያ ይሳተፋሉ?
 (1) አዎን (2) አይደለም
34. መልስዎ አዎን ከሆነ ማህበረሰባችሁ በምን ዓይነት ሥራ ይሳተፋሉ? (1) ደንና የተፈጥሮ አካባቢን መልሶ በማልማት (2) በአካባቢያቸው ዛፍ በመትከል ደን እንዳይጨፈጨፍ ጫና መቀነስ (3) የአፈርና ወኃ ጥበቃ ሥራ ላይ በመሳተፍ (4) መንግስት ደንን ለመንከባከብ የሚያወጣውን መመሪያና ደንብ በማክበርና በመተግበር (4) ሌሎችም ካሉ ይግለጹ-----
35. በዋናነት ለማገደነት የምትጠቀሙት ምንን ነው ? (1) እንጨት (2) ኩብት (3) ተረፈ-ምርት (4) ናፍጣ (5) ሌሎችም ካሉ ይግለጹ-----
36. በአብዛኛው ለማገደነት የምትጠቀሙባቸውን ነገሮች ከየት ነው የሚታገኙት?
 (1) ከተፈጥሮ ደን ዉስጥ (2) ከመኖሪያ ቤት አካባቢ (3) በግዥ (4) ካልተካለለ አካባቢ ደን ዉስጥ

37. ደረቅ ኩባት ለማገዶ እና ለሽያጭ ተጠቅመው ያወቃሉ ? (1) አዎን (2) አይደለም

38. መልስዎ አዎን ከሆነ ምን ያህል ቅርጫት? (1) ለቤት ----- ቅርጫት (2) ለሽያጭ ----- ቅርጫት

ክፍል አምስት:-የመሬት ጥበቃ ሥራን በተመለከተ

39. የአፈር መሸርሸርን ለመከላከል ማንኛውንም ዓይነት ርምጃ ወስደው ያወቃሉ?

(1) አዎን (2) አይደለም

40. መልስዎ አዎን ከሆነ አብዛኛውን ጊዜ የቱን ዓይነት ርምጃ ነው የሚወስዱት? (1) እርከን መመቆፈር (2) አግድም ማረስ (3) ድንጋይ ካብ (4) ሌሎችም ካሉ ይግለጹ----

41. የአፈር መሸርሸርን ካልተከላከሉ ምን ይከሰታል ብለው ይገምታሉ? አፈር ለምነቱን ያጣል (2) ምርት ይቀንሳል (3) መሬት መጋጋጥ (4) ሌሎችም ካሉ ይግለጹ -----

42. የአካባቢው ማህበረሰብ በአፈርና አካባቢ ጥበቃ ሥራ ይሳተፋሉ? (1) አዎን (2) አይደለም

43. መልስዎ አዎን ከሆነ ምን ዓይነት ሚና ይጫወታሉ? (1) ተደራጅተው አካባቢ ጥበቃ ሥራ መስራት (2) የተፈጥሮ ሀብት መቆጣጠርና መምራት (3) ደንብና መመሪያ በማወጣት ተደራጅተው መሥራት (4) ሌሎችም ካሉ ይግለጹ----

44. የአፈር ለምነትን እንደት ይቆጣጠራሉ? (1) አሳድሮ በማረስ (2) አፈራርቆ በመዝራት (3) አቀላቅሎ በመዝራት (በመትከል) (4) የተፈጥሮ ማዳበሪያ በመጠቀም (5) ሌሎችም ካሉ ይግለጹ----

45. የተፈጥሮ ማዳበሪያን በመጠቀም የአፈር ለምነትን ወደ ቀድሞው ለመመለስ ምን ተጠቅመው ያወቃሉ? (1) አዎን (2) አይደለም

46. አይደለም ከሆነ መልስዎ ላለመጠቀም የፈለጉበት ምክንያት ምንድን ነው ? (1) የኮምፖስት እጥረት (2) ሰው ሰራሽ ማዳበሪያ ስለመረጥኩ (3) የግንዛቤ እጥረት (4) ሌሎችም ካሉ ይግለጹ-----

47. በአፈር ጥበቃ ሂደት የገጠመዎት እንቅፋቶች አሉ? (1) አዎን (2) አይደለም

48. መልስዎ አዎን ከሆነ ለሰብል ምርት እንቅፋቶች ምንድን ናቸው? (1) ያልተስተካከለ (ወቅቱን ያልጠበቀ ዝናብ) (2) ድርቅ (3) ተባዮችና በሽታ (4) ሌሎችም ካሉ ይግለጹ

49. የግብርና ኤክስቴንሽን አገልግሎት ተጠቅመው የወቃሉ? (1) አዎን (2) አይደለም

50. መልስዎ አዎን ከሆነ ማነው የግብርና ኤክስቴንሽን አገልግሎት አቅራቢው?

- (1) ልማት ሠራተኞች /DAs (2) መያድ (መንግሥታዊ ያልሆኑ ድርጅቶች)
- (3) የወረዳ ግብርና ጽ/ቤት (4) ሌሎችም ካሉ ይግለጹ----

51. በአካባቢዎ የልማት ጣቢያ ሠራተኞች (DAs) ስለምን ያስተምራሉ ወይም ያሠለጥናሉ?

- (1) ግብዓት አቅርቦትና አጠቃቀም (2) ስለ አፈርና ወኃ ጥበቃ (3) ስለ መሬት አጠቃቀምና አያያዝ (4) ስለ ዝናብ ወሃ አሰባሰብ (5) ከብቶችን ስለማርባት (6) ስለደንና አካባቢ ጥበቃ ሥራ (7) ሌሎችም ካሉ ይግለጹ----

አመሰግናለሁ !!

Appendix V

ክፍል ስድስት :- ለባለድርሻዎችና ጉዳዩ ለሚመለከታቸው አካላት በመሬት መጋጋጥና ተፅዕኖው ዙርያ

የተዘጋጀ መጠይቅ

1. በአካባቢያችሁ ለመሬት መጋጋጥ ዋና ዋና መንስኤ የሚሆኑት ምንድን ናቸው ? -----

2. የመሬት መጋጋጥ ችግር በአካባቢያችሁ ካለ መገለጫው ምንድን ነው ? -----

3. ለመሬት መጋጋጥ አስተዋፅኦ የሚያበረክቱት ምን ምንድን ናቸው ? -----

4. የመሬት ምርታማነት ከጊዜ ጊዜ እየጨመረ ነው ወይስ እየቀነሰ ነው ? -----

5. በአካባቢያችሁ በመሬት መጋጋጥ ምክንያት የሚመጡ ተፅዕኖዎች ምንድን ናቸው ? -----

6. በአካባቢያችሁ የመሬት ጥበቃ ሥራ ከዚህ በፊት የነበረውን እንዴት ያያሉ? -----

- ባህላዊ የመሬት ጥበቃ ሥራስ ምን ምንድን ናቸው ? -----

7. በመሬት ጥበቃ ሥራ ላይ የመንግስት እና መያድ (መንግስታዊ ያልሆኑ ድርጅቶች) እገዛ ምን

ይመስላል ? -----

8. ለመሬት ጥበቃ ሥራ እንቅፋት የሚሆኑ አሉታዊ ነገሮች ምንድን ናቸው ? -----

ሀ/ ከፖሊሲ /ከተቋማዊ ጉዳይ አኳያ-----

ለ/ ከማህበረሰባዊ ልማድ አኳያ -----

ሐ/ ከኢኮኖሚያዊ ጎን አኳያ -----

9. ለመሬት ጥበቃ ሥራ መወሰድ ያለበት እና ይሻላል የሚሉት መፍትሔዎች ምንድን ናቸው ? -----

10. የትኞቹን አይነት የመሬት ጥበቃ ሥራዎችን ነው በማሳዎ ላይ የሚተገብሩት ? -----

11. መንግስት እና መያድ (መንግስታዊ ያልሆኑ ድርጅቶች) አዳድስ የመሬት ጥበቃ ሥራዎችን ከመተግበሩ

በፊት ከህብረተሰቡ ጋር ምን ዓይነት ቅድመ - ሁኔታዎችን ተግባራዊ ያደርጋል ? -----

12. የመሬት መጋገጥ ተፅዕኖን ለመቋቋም የወረዳ ግብርና ጽ/ቤት ምን ዓይነት መፍትሔዎችን እየወሰደ ይገኛል ? -----

አመሰግናለሁ !!

Declaration

This thesis is my original work and has not been presented for other institution anywhere for the award of any academic degree, diploma, or certificate. All sources of materials used for this thesis has been acknowledged.

Name: Worku Yohannes

Signature _____

Date _____

This thesis has been submitted for examination with approval of my advisor.

Name _____

Signature _____

Date _____