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A STUDY ON PERCEPTION AND PRACTICES TOWARDS ENVIRONMENTAL CONSERVATION IN LEMO WOREDA WATERSHEDS, HADIYA ZONE, SNNPR, ETHIOPIA

BY TEKLE TUKE

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A study on Perception and Practices towards Environmental Conservation in Lemo Woreda Watersheds, Hadiya Zone, SNNPR, Ethiopia.

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List of Acronyms

CDE	Center for Development and Environment
CRC	Renter for Research Community
CSA	Central Statistical Authority
DA	Development Agent
EPA	Environmental Protection Authority
EPE	Environmental Policy of Ethiopia
ETB	Ethiopian Birr
EXT	Extension
FAO	Food and Agricultural Organization
FDRE	Federal Democratic Republic of Ethiopia
FFW	Food for Work
FGD	Focus Group Discussion
GDP	Gross Domestic Product
GECC	Global Environment and Climate Change
GTP	Growth and Transformation Plan
HZSEP	Hadiya Zone Socio Economic Profile
HH	Household
IFAD	International Fund for Agricultural Development
ISCO	International Soil Conservation Organization
KII	Key Informant Interview
LWCF	Land and Water Conservation Fund
masl	Meters above sea level
mm	Millimeter
MoARD	Ministry of Agriculture and Rural Development

MoFED	Ministry of Finance and Economic Development
M/ha	Meters Per hectare
NGO	Non-governmental Organization
No/ha	Number Per hectare
PAs	Peasant Associations
PASDEP	Plan for Accelerated and Sustained Development to End Poverty
PERCP	Perception of Farmers
PLTRE	Plantation of Trees
PSNP	Productive Safety Net Program
RF	Rainfall
SD	Standard Deviation
SEXHH	Sex of Head of Household
SNNPR	Southern Nations, Nationalities, and Peoples' Region
SPSS	Statistical Package for Social Sciences
SWC	Soil and Water Conservation
UNESCO	United Nations Educational Scientific and Cultural Organization.
WB	World Bank
WFP	World Food Program

List of Tables

List of Figures

Abstract

Environmental conservation for sustainable development is widely felt now, invariably by all the nations. Development at the cost of environment, leads to not only environmental scarcity, but affects standards of living too. Of course, environmental scarcity is the biggest challenge before the human kind in this century. How to confront these challenges becomes a formidable task for all the countries, especially developing countries with Ethiopia being no exception. It is high time that all the stakeholders of economic development and environmental conservation are to be taken on this regard. One such a kind of activity is to undertake research so as to gauge the levels of perceptions and resultant practices especially from the major stakeholders. i.e farmers' community. Generally, behavior pattern is the outcome or the product of one's attitude or perception. How perception of farmers' particularity in this study area impacts on their practices towards conservatism of natural resources and environment is the main objective of this research study. This study was mainly limited to an assessment of perceptions and practices of farmers with respect to soil and water conservation though other practices are not totally neglected. A sample of 232 households was selected by systematic sampling out of the study population of farmers spread over to 35 kebeles inhabiting in the Lemo Woreda. By employing appropriate data collection tools like questionnaire, interview schedule, focus group discussion and participant observation, data was collected and analysed by using apt quantitative as well as qualitative methods. In the study area farmers community have no problem of perceiving the existence of soil erosion problem. They have even identified types and severity of erosion by water. The study also finds out their willingness to cooperate in activities arresting further erosion of Sing and degradation of environment, prided they set sufficient support and encouragement.

Key words: Environmental Management, Soil and water conservation, Perception, Practices, Ethiopia.

Table of Contents

Chapter One

1.Introduction

1.1 Background of the Study

Environmental sustainability presupposes environmental conservation. The environmental sustainability mainly depends upon the carrying capacity of earth and its ecological footprint. Only through sustaining environment the needs of the present and future generation can be met. Set of development programs are expected to meet a target of human needs satisfaction without violating long term natural resource capacities and standards of environment quality and social equity (International center for tropical agriculture, Nairobi Kenya, 2013).

Every year the world loses roughly a worth of 24 billion US dollar of fertile soil due to usage of chemical fertilizers, soil erosion, over-grazing, pollution, and natural disasters. In sub-Saharan Africa the main problems are soil erosion and lose of soil fertility due to unsustainable land use (ibid). Ethiopia is one of the most environmentally troubled countries in the Sub-Saharan belt. The principal environmental problem in Ethiopia is land degradation in the form of soil erosion, gully formation, soil fertility loss and severe soil erosion (Hurni, 1993, cited in Mushir and Kedru, 2012). Large parts of the highlands of Ethiopia are severely eroded. The vast majority of the population derives its livelihood from agricultural sectors (Mushir and Kedru, 2012). Land degradation and the associated threats to the ecological support system underpinning agricultural production are the most serious environmental problems in Ethiopia. The introduction of crops with narrow genetic bases replacing the farmer's varieties has increased risk of loss of crops. The use of obsolete technology which is not environmentally friendly and overgrazing by the fast growing livestock population has also exacerbated soil erosion (Environmental Protection Authority, 1998). Ethiopia’s diverse production landscapes and natural resources provide a range of services to rural poor. Unfortunately, this natural resource and landscapes are increasingly unable to help reduce poverty due to persistent land degradation that damages the hydrological cycle, reduces the availability of forest product and reduces agricultural productivities. The cost of land degradation in Ethiopia is estimated to be at least two to three percent of agricultural GDP (Daily Monitor, 2013, December 11).

Similarly water management practices in most of the worlds' countries have been historically poor and continue to be poor. Water is being used very inefficiently. Rain water harvesting for accumulation and deposition of rain water for reuse before it reaches the aquifer, conserving water through plenty of small water ponds check dams are the major practices mainly employed to conserve water and environment. Integrated and sustainable watershed management has been tried in several countries as an effective way to address water and land resource challenges. In Ethiopia conserving water through watershed management techniques is new and requires appropriate strategies for effective integrated and sustainable watershed management (The Ethiopian Herald, 2014, March 16).

Sustainable development of agriculture enhancing its productivity without destroying the nature and environment by promoting climate smart agriculture becomes the objective of government of Federal Democratic Republic of Ethiopia. It endeavors its goals by involving sustainable land management policy and implementing it through various phases with aid from donor countries and multilateral agencies (ibid).

In spite of many land and water conservation practices which are vogue to conserve nature and environment to endure its sustainability, the success rate is not encouraging in many countries including Ethiopia (The Ethiopian Herald, 2014, March 16). The success of these practices has bearing upon the common perception and attitude of the people living in the country, specially the farmer's community towards environmental protection and conservation. This necessitates a community led implementation of more improved practices and infrastructure. The practices which are perception based either positive or negative will impact a lot on environmental conservation (ibid).

Currently, Ethiopia is one of the most severely affected countries in sub-Saharan African countries. Particularly in deforestation, soil erosion and degradation of agricultural land are very common and serious problems in most parts of the high lands of Ethiopia. The decline in overall stability and productivity of the country's natural resources is the result of a complex and interrelated series of processes that were triggered by the loss of forest cover (Tumcha, 2004, cited in Tadele, 2008).

Land and water conservation serves many critical purposes in society. It provides open spaces, parks, and recreational spaces essential for mental and physical health, as well as social communications in progressively urbanized and human-built world. It protects agricultural lands and rural communities from encroachment by development. It promotes biodiversity by preserving plant species and habitat critical to wildlife species. It maintains ecological processes and functions, such as energy and nutrient flows, temperature and climate effects, renewal of soils, ecologically important disturbance regimes like wildfires and floods, and processing of the chemical, biological, and physical content of air, soils and waters (Arnold, 2006).

There are many specific land and water conservation tools are available. Some may be more effective than others, but the specific apparatuses to be employed to safeguard water supplies, water quality, and watersheds will depend on a diversity of ecological, hydrological, political, legal, economic, financial, social, and even ethical factors (http://www.nps.gov/lwcf/.).

1.2 Statement of the Problem

Ethiopia is one of the poor countries in the world. Nearly half of the population lives under the poverty line, and more than 12 million people are chronically or periodically food insecure. Agriculture generates approximately 50 per cent of the GDP and 90 per cent of export earnings. Despite its importance, agricultural performance has improved little over the past 50 years and food security has deteriorated. Low agricultural productivity and chronic food insecurity are direct results of the ongoing degradation of natural resources in the Ethiopian highlands (Global Environment and Climate Change Unit and IFAD, 2009).

Despite intensive soil and water conservation activities since more than two decades ago, adoption of the interventions in Ethiopia is considerably rather low. This fact is frequently attributed, among other things, to the top-down approach in extension activities, standard – mainly structural – soil and water conservation technologies, lack of awareness of land degradation by the land users, and land security issues(Mitiku,et al ,2006). Several approaches to extension delivery systems were exercised in Ethiopia. In most of the cases they were focused on either crop production or livestock husbandry. Extension on natural resources management was neglected at most, and if addressed, it was marginalized (EARO, 1998, cited in Mitiku et al, 2006).

Recognizing land degradation as a major environmental and socio-economic problem, the government of Ethiopia has made numerous interventions. As a result, large areas have been converted to terraces, covered by soil bunds, closed by area closures and planted with millions of tree seedlings. Nevertheless, the achievements have fallen far below expectations. The country still loses a wonderful amount of fertile topsoil, and the threat of land deprivation is broadening alarmingly (Teklu and Gezahegn, 2003, cited in Fikru, 2009).

In Ethiopia, a significant number of studies have been done on environmental degradation and determinants of land and water management practices in different parts of the country. These researchers mainly focus on nature of land degradation, traditional farmers' land management practices, soil and water conservation by government and other actors, farmers' perception on soil fertility change and on causes of land degradation (Eyasu, 2002; Aklilu, 2006; Genene, 2006; Habtamu, 2006; Yohannes, 1999; Desta, 2012; Mesfin, 2010; Shibru, 2010, Kibemo, 2012). 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, as far as the researcher's understanding is concerned, there is a research gap on the issue of soil and water conservation perception and practices of environmental problems.

In an attempt to contribute in bridging the above stated gap, the study focused on assessing the perception and practices of Farmers towards Environmental conservation particularly in soil and water conservation in Lemo Wereda Watersheds. The reason for selection of this area is that it is among the Ethiopian highlands that are facing problem of environmental degradation. In addition, in this area, so far no significant study has been done on issues related to environmental conservation practices and perception.

Moreover, achieving cooperation and local participation in environmental rehabilitation requires the study and analysis of local peoples' beliefs, knowledge, attitude, interest, practices and perception about their environment and physical surroundings. The problems are associated with the depletion of environmental resources caused by natural and manmade problems. Practices and good perception of the farmers help to resort number of mechanisms that help them to overcome these environmental harms. However, studies on farmers' perception of environmental degradation and their practices to environmental management are very few. It is obvious that

there is a lot of environmental degradation in rural areas of Ethiopia, but the research is mainly focused on this study area with only soil and water conservation problems.

1.3 Research Questions

How farmers' communities perceive and practices towards environmental conservation particularly in soil and water conservation in Lemo District Watersheds, Hadiya Zone SNNPR, Ethiopia?

1. How farmers' communities do perceive soil erosion problem and conservation of soil and water in the study area?

2. How farmers' communities do practices for conserving the soil and water resources in the study area?

3. How farmers' communities perceive and practice the soil and water conservation technologies in the study area?

4. What are the development agents supports to farmers' towards conservation of soil and water in the study area?

1.4 Objectives of the Study

1. 4.1 General Objective of the Study:

The general objective of this study is to assess the perception and practices of Farmers towards environmental conservation particularly in soil and water conservation in Lemo District watersheds, Hadiya Zone SNNPR,Ethiopia.

1.4.2 The Specific Objectives of the Study:

1. To assess the farmers' communities perception and awareness in the Soil and water conservation activities in the study area.

2. To assess the farmers' communities practices in the Soil and water conservation activities in the study area.

3. To assess the farmers' communities perception and practices towards the soil and water conservation technologies in the study area.

4. To determine the level and degree of development agents support to farmers' in conservation of soil and water in the study area.

1.5 Operational Definitions

Conservation: The term is applied in general to the positive work of maintenance, enhancement and wise management or reducing the rate of consumption to avoid irrevocable depletion, ignored to benefit posterity as in the conservation of nature or of natural resource (Tadele, 2008).

Environmental management refers to restoring, caring and conserving of soil and water resources and making these resources for sustainable utilization for a long period of time (Tewodros, 2008).

Environmental degradation represents to a continuous deterioration of soil erosion and deforestation problems (Tewodros, 2008).

Watershed refers to a geographic region within which hydrological conditions are such that water becomes concentrated within a particular location, e.g., a river or a reservoir, by which the watershed is drained (Center for Research Community, 2000).

Farmers represent those who cultivate a land to feed their families and to some extent produce surplus crops for market (Tadele, 2008).

Farmer's practices to soil and water conservation denote to the ways of mitigating or coping mechanism that help farmers to overcome soil erosion /environmental degradation problems (Tadele, 2008).

Farmer's perception and awareness to environmental degradation denotes to individual farmer's evaluation or awareness to the process of environmental degradation which is caused by socio-economic and demographic characteristics (Tewodros, 2008).

1.6 Scope of the Study

The researcher assumes that the problem is not restricted only to the Lemo Woreda in Hadiya Zone. It also affects other parts in different regions in the whole country. However, the study was geographically delimited to the selected district in Hadiya Zone. This was because to make the study more manageable. And this study was delimited only to soil and water conservation

practices. The study population for this research study was delimited to only the farmers inhabiting in the study area.

1.7 Limitation of the Study

Any research undertaking faces certain limitations. Similarly, this research was not free from such limitations mainly caused by budget and time constraints. As the study focused on four kebeles as its major sources of primary data hence it was difficult to generalize the results to the entire Woreda. And the concept of perception and practices of farmers to soil and water conservation was very broad and takes different forms; it was difficult to evaluate the perception and practices as accurately as possible within the short period of time.

1.8 Significance of the Study

Environmental degradation, particularly deforestation and soil erosion is one of the major problems of the highlands that Ethiopia is currently facing. The empirical studies that deal with the estimation of farmer's perceptions and practices toward environmental conservation are very rare in Ethiopia. Accordingly, studies pertaining to perceptions and practices towards environmental conservation will throw much light on this subject.

As this study is going to measure the farmers' perception towards environmental conservation, it will have application to other parts of Ethiopia also. Since their practices are based on their perceptions, it is pertinent to measure their level of perceptions in each variable which may contribute much to the existing knowledge. In this way, this study is expected to help utilize the natural resources of the country for development in a sustainable manner and may facilitate the government and the non-governmental organizations and other stakeholders in their planning and implementation of programs to alleviate these problems. This study is mainly under taken to make a contribution along this line. It could also be used as a springboard for further studies. In addition, it will enrich the literature in the area of study that is under consideration.

1.9 Organization of the Study

The study is classified into five chapters. Chapter one the introduction part, the theoretical background to the study, statement of the problem, research questions, objectives of the study, limitation of the study, and organization of the study are dealt with. Chapter two review of related literature is presented and analysed. Chapter three deals with methodology, description of

the study area, research design, study population, sample population, sample size and technique, methods of data analysis and ethical consideration. Chapter four the collected data is analysed and interpreted by employing appropriate statistical tools and highlights the important findings of this research study. The last chapter includes summary, conclusions and recommendations suggested are presented.

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Chapter Two

2.Review of the Related Literature

2.1 Theoretical and Conceptual background

Environment degradation and their consequential results have been the major problems facing many developing countries in the world. The nature and type of environmental problems are different from countries to countries. Environmental degradation is primarily confined to developing countries and mainly in the tropics. Poverty and natural resources/environmental degradation are negatively reinforcing; that is, as the land is degraded, agricultural productivity is lowered, resulting in decreasing incomes and food security. This in turn leads poor people from both rural and urban areas to engage in activities that further degrade the natural resources and environment in order to obtain supplementary incomes and to sustain a living. As a result, the level of poverty in Ethiopia also worsens and population increases exacerbate the problem (Badage and Abdu, 2003).Watershed management implies the wise use of natural resources like land, water and biomass in a watershed to obtain optimum production with minimum disturbance to the environment. In Ethiopia Watershed management was merely considered as a practice of soil and water conservation (Tesfaye, 2011).

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 (Desta, 2012). 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 and water 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, 2003,cited in Desta,2012).

Natural resources are interdependent and degradation of one affects the other. Biomass-cover change influences ecosystem services and processes. Ecosystem services acquired from vegetation include provision, regulation, cultural and supporting services (Wallace 2007 cited in

Shimeles, 2012). Hence, vegetation degradation influences those ecosystem services and processes. For example, vegetation degradation negatively influences soil formation, nutrient and water cycles, climate and erosion regulation, food supply, bio-chemical cycle and others. Therefore, the impact of vegetation and forest cover destruction has a wide range of impacts (Richter et al. 1999; Lemenih et al. 2005; Wallace 2007; Kalinina et al. 2009, cited in Shimeles, 2012). The recurrent droughts, severe soil erosion, sedimentation of reservoirs and water bodies, soil quality deterioration, surface- and ground-water resource reduction and biodiversity loss are some of problems related to deforestation and vegetation clearance (Asefa et al. 2003; Lemenih et al. 2005,cited in Shimeles,2012).

The environment is linked with the survival of the society, and thus inevitably with development. According to classical resource economics theory, maximum sustainable yield, as stands for an increment in the quality of renewable resources, through growth and reproduction, which can be exploited continuously without causing harm to capital stock. If exploitation of resource is confined within maximum sustainable yield limit, human population tends to establish themselves in an ecological balance situation (Tewodros, 2008). Moreover, the concept of ecological balance implies method or rate of resource use, which maintains the sustainable use of resource through wise managerial decision such as limiting harvest with in maximum sustainable yield or increasing the capacity of the resource base to carrying ability. It can serve us a beneficial conceptual tool in diagnosing a given society's interaction with the environment (Terefe, 2004, cited in Tewodros, 2008). The attainment of ecological balance can conveniently be traced back to the time when human society and environment were in harmonic relation to each other. Among various mechanisms enabling society to establish such a relation with environment are wise resource use and conservation (Terefe, 2004, cited in Tewodros, 2008). In short, indigenous society as often mentioned has managed to keep the environment without much disturbance and maintained livelihood on reasonable standard. This was true in most portions of the world.

Man has accelerated soil erosion by reducing and even removing the vegetation cover and by employing poor cultivation practices (Getachew, 2005) The direct causes of land degradation include: cultivation of steep slopes and fragile soils with inadequate investments in soil and water conservation or vegetative cover, declining use of fallow, limited recycling of dung and

crop residues to the soil, limited application of external source of plant nutrients, deforestation and over grazing. According to Hurni (1994,cited in Getachew,2005), soil erosion, wind erosion and physical and chemical deterioration are processes responsible for land degradation and further he indicated that soil erosion by water and wind account for about 84 percent of all the damage.

Soil erosion has major ecological and economic consequences, particularly in populated areas. Soil erosion causes economic loss because of crop destruction and reduced agricultural productivity. Erosion also leads to shortened investment life of water management infrastructures, and greater flood frequency caused by sedimentation and dimensioned infiltration capacity of soil (Whitmore et al., 1994, cited in cited in Getachew, 2005).

Soil erosion also causes the loss of a buffer layer of organic material, exposing to aluminum toxicity and acidification, which can cause sudden and severe yield decrease (FAO, 1999, cited in Getachew, 2005). Through the removal of clay content and organic matter, soil erosion may result in a reduced capacity of the soil to provide phosphorus in a farm usable to the plants (e.g. increase phosphorus fixation) (Getachew, 2005). In terms of structural impacts, soil erosion can increase the bulk density of the soil, making it more difficult for water to penetrate to rooting depths and for plant shoots to emerge, either by the removal of organic matter and colloid that create spaces between soil practices or by exposing highly compacted subsurface layers. Soil erosion involves the loss of fine particles, nutrients and organic matter, and contributes to the loss of structural stability of the soil, surface compaction and sealing, reduced water infiltration and increased surface runoff (ibid).

Poor land and water management practices and lack of effective planning and implementation approaches for soil conservation are responsible for accelerating degradation on agricultural lands and siltation of lakes and reservoirs downstream (Gizaw et al, 2009). For decades, soil conservation programs in the highlands of Ethiopia were premised on the notion that farmers did not perceive erosion and had little or no interest in combating it. Most soil and water conservation planning approaches rely on empirical assessment methods by experts and hardly consider farmers' knowledge of soil erosion. Conservation programs relied on coercive approaches and performed poorly (Yohannes and Herweg, 2000, cited in Gizaw et al, 2009). Failure to balance land management interventions with the current level of land degradation is

still a growing challenge to smallholder farmers on the hill slopes to meet both immediate economic objectives and sustainable environment (Gizaw et al, 2009).

Ethiopia for the last couple of decades has faced serious ecological imbalances because of large scale deforestation and soil erosion caused by improper farming practices, destructive forest exploitation, wild fire and uncontrolled grazing practices. This has resulted in a declining agricultural production, water depletion, disturbed hydrological conditions, poverty and food insecurity (Daniel, 2002). Over the past three decades, many governmental and non-governmental organizations have been involved in massive soil and water conservation activities. However, the results achieved in reducing soil erosion problem and improving agricultural productivity has been unsatisfactory (ibid).

2.2 Soil and Water Conservation Practices

The term conservation is applied in general to the positive work of maintenance, enhancement and wise management or reducing the rate of consumption to avoid irrevocable reduction, ignored to benefit posterity as in the preservation of nature or of natural resource (the forest, soil, wild life, water, biodiversity and environment) or of building or work of art of special merit, etc(Clark, 1985 cited in Mesfin, 2010). Traditionally through time, farmers have developed diverse soil conservation and land management practices of their own. With those practices, the farmers are able to sustain their production for centuries (Mesfin, 2010). Until now, those technologies are playing a significant role in the production of subsistence agriculture. Among the traditional land management techniques that have been practiced by Ethiopian farmers, the major ones include: ploughing of narrow ditches on sloping fields to control run-off, farmland terraces, traditional drains and channels, contour ploughing, fallowing, crop rotation, farmyard manure and agro-forestry (Betru,2003,cited in Mesfin,2010).

Large-scale efforts for implementing natural resource conservation and development programs had taken place to reverse the problem of land degradation in Ethiopia starting from the1970s. The programs mainly focused on soil and water conservation and rehabilitation of degraded land through building physical structures and afforestation measures (Alemneh, 2003; Woldamlak, 2003; Aklilu, 2006; Alemayehu, 2006, cited in Habtamu, 2006). These projects were supported by development food aid and the first food for work-supported soil and water conservation activities were started in Ethiopia in 1971 and that was in Tigray. Next to that in 1972, it was

started in Wello, these activities were supported by U.S. food under PL 480 project to carry out afforestation, and construction of low cost rural roads and small water projects. Then it was replaced by food for work projects that were funded by World Food Program (WFP) in 1974, commenced primarily due to drought and famine of 1973/74. The main activities under those projects were reforestation and soil and water conservation in the drought prone areas of the country (Betru, 2003, cited in Mesfin, 2010).

Most local soil and water conservation practices are location specific and accordingly vary in purpose. They may preserve soil in situ such as stone and earth bunds; conserve soil while simultaneously improving soil fertility such as mixed cropping, crop rotation, strip cropping, mulching, or folding; yield water such as tied ridges; and dispose of excess water from crop lands such as traditional ditches or cut off drains. Thus indigenous soil conservation systems may be agronomic, vegetative or physical in nature (Shibru, 2010). Quite frequently, a combination of these practices exists. The traditional practices are efficient in controlling soil loss in some cases, but should be modified and developed further. However, the potential of these indigenous soil and water conservation practices have very often been ignored or underestimated by researchers, soil preservationists and government staff (IFAD, 1992, cited in Shibru, 2010).

The percentage of farmers using the soil and water conservation practices is still low, especially when one considers that these studies have simply reported elements of the total recommended packages. Faced with such low levels, one may be tempted to conclude that soil and water conservation practices are not profitable (Geoffrey, 2004). Such doubts would be in direct conflict with the emerging evidence in the country, which demonstrates the benefits of soil water management. The assessment study by Keyser and Mwanza (1996, cited in Geoffrey, 2004) conducted in Mwanza noted differential income to the user of conservation farming techniques in the order of 45-60% over and above the users of conventional farming.

2.2.1 Soil and Water Conservation Practices in Ethiopia

The Ethiopian government has for a long time recognized the serious implications of continuing soil erosion to mitigate environmental degradation and as a result large national programs were implemented in the 1970s and 1980s. However the efforts of these initiatives were seen to be inadequate in managing the rapid rate of demographic growth within the country, widespread and increasing land degradation, and high risks of low rainfall and drought. Since 1980, the

government has supported rural land rehabilitation, these aimed to implement natural resource conservation and development programs in Ethiopia through watershed development (MoARD, 2005).

Planning the development of watershed for Ethiopia started in the 1980‘s. Before these years, conservation practices in Ethiopia were based on campaign that was top down approach, and gave emphasis on forest protection, soil and water conservation activities. These approaches were not efficiently and effectively successful with respect to the designed goals throughout the country. Community based participatory watershed development program was designed and started in pilot projects and booming by the effort of None Governmental Organizations (NGOs) such as GTZ and SOS Sahel (Lakew , et al, 2005).

Soil and water conservation projects in Ethiopia were very few in number. The institutional strengthening project was implemented by FAO, and was principally aimed at capacity building of Ministry of Natural Resource’s technicians and experts and development agents in the highland regions of the country. The projects used the sub-watershed as the planning unit and sought the views of local technicians and members of the farming community to prepare of land use and capability plans for soil and water conservation. This approach was tested at the pilot stage through FAO technical assistance under MOA during 1988-1991(MoARD, 2005). This was the first step in the evolution of the participatory planning approach to soil and water conservation development. By late 1990, watershed development was considered the focal point for rural development and poverty alleviation. Several NGOs and bilateral organizations adopted watershed development in the last decade in their perspectives intervention areas with collaboration of government partners.

Under Ethiopia’s previous five-year economic development plan, the Plan for Accelerated and Sustained Development to End Poverty (PASDEP), 2005/06–2009/10, the government invested in a series of soil and water conservation activities with the goal of augmenting agricultural production. These activities included piloting and implementing locally appropriate, community-based approaches to watershed management; scaling up successful models for soil and water conservation; and strengthening natural resource information through monitoring and evaluation of ongoing and planned land and watershed programs. In the country’s most recent five-year plan, the Growth and Transformation Plan (GTP), 2010/11–2014/15, the government outlines the

need to promote and invest in soil and water conservation infrastructure that takes into account the unique conditions of varying agro ecological zones (MoFED, 2010).

Different empirical studies have also revealed that there are different efforts of sustainable soil and water conservation practice undertaken by Ethiopia farmers at household and supra-household levels in different parts of the country. For instance, the Konso people in southern Ethiopia are known for traditionally well-developed terraces, where the terrace practices are registered by the United Nations Educational, Scientific and Cultural Organization (UNESCO) as a world heritage. The Konso terraces are estimated to be older than 400 years. Some rudimentary and poorly established terraces and lynchets depicted on older aerial photographs and physical remnants can also be observed in different parts of the northern highlands (Shimeles, 2012). A study done by Birru (2003) indicated level bund is built more than 100 years ago in Ankober and Debresina in North Shoa , traditional ditches are common in the highland of Gojjam, and contour plowing and crop rotation are practiced in many area of the country. Similarly, a study done in Chomoga watershed by Woldeamlk (2003) indicates farmer are using structural measures of fanya juu bunds, diversion ditches, and check dames to arrest the problem of soil erosion.

In Beressa watershed, north central of Ethiopia, farmers are using contour plowing, drainage ditches, stone terraces, waterways; trees grass strips, and soil bunds to arrest the problem of soil erosion (Aklilu, 2006). In east Gojjam, traditional ditches, manure through animal parking , crop rotation contour plowing, traditional vegetative fences traditional waterways ,traditional check dams, traditional stone terraces, unplowed grass strips, weed heaping, artificial waterways , modern cut-off drains, modern stone terraces, area closures, artificial fertilizer and compost are widely practiced (Michael, 2002 and Yilikal,2007) .

In Tigray region, traditional terraces, grass strips, and hillside terracing are the commonly used practices by the farmers (Dagnew, 2007). In Konso, southern Ethiopia, stone terraces tied ridges, trash lines agro forestry, intercropping fallowing, manure, kraal shifting, burning of debris, minimum tillage, and use of artificial fertilizer are applied by farmers to arrest the problem of soil erosion and maintain its fertility (Tesfaye,2003).

Nowadays, the government is trying to minimize the problem of land degradation based on the voluntary involvements of smallholders and implementation of soil and water conservation project and programs (Getachew, 2005). Moreover, most agricultural development projects consider natural resource developments in general and promotion of soil and water conservation activities in particular as the potential area of intervention for sustainable agricultural production and rehabilitating degraded areas of the country. Because of very low adoption of community based SWC and to create accountability, at present government also started land ownership licensing to construct and maintain their farm by themselves (ibid).

Over the past three decades, many governmental and non-governmental organizations have been involved in massive soil and water conservation activities. However, the results achieved in reducing soil erosion problem and improving agricultural productivity has been unsatisfactory (Daniel, 2002).

2.3 Farmers' Perceptions and Practices

Farmer's participation is essential not only for implementation of soil and water conservation activities like terracing, bunding by food for work but also during planning of sustainable management of soil and water resources. Farmers are closer to the real problems, and therefore they are aware of issues that experts may miss, and their objectives are more practical for economic development (Stocking, 1996). Furthermore, farmer's participation in conservation work is also considered important in improving the adoption of the recommended technology (Ashby J., 1996). Good practices have been obtained from the ongoing rural community led environmental management activities. Sound environmental management practices have been being undertaken by philanthropic organizations. Environmental impact assessment reports are being received and impacts evaluated prior to issuing a license to operate major development initiatives. Some industries have undertaken environmental audit on their own activities and prepared environmental management plans to reduce their respective emissions of pollutants (EPA, 2010).

The perception of farmers' about the problem of land degradation plays a vital role in promoting soil and water conservation. The empirical evidence on farmers' perception on promoting sustainable land and watershed management is mixed. Some others liked farmers' management initiation to the visible indicators of land degradation and perceptive severity of problem (Aklilu,

2006; Tesfaye, 2003; Yilikal, 2007) On the other hand, the Ethiopian highland reclamation study pointed out that 98% of the interviewed peasant responded that was eroded, and 79% of them replied the rate of the soil degradation was serious accelerating, and they also reported as they are managing their land due to their awareness of the problem (FAO, 1984).

Good practices and positive perceptions of communities are important for environmental conservation. Although an understanding of the physical erosion phenomena is important for the formulation of erosion control approaches, it is also vital to understand social relations influencing management choices. Traditional land resource consumption in many areas has followed an exploitative sequence consisting of clearing, cultivation, and erosion abandonment (Kuru, 1986, cited in Esser and Kjell, 2002). This unsustainable farming practice is linked to a lack of choice due to poverty rather than linked to neglect.

According to Admassie and Gebre(1985, cited in Esser and Kjell,2002)Ethiopian farmers' attitudes to land degradation and conservation indicated that farmers were aware of the problems of land degradation. Erosion was identified as the main cause for land degradation, followed by drought, deforestation, rainfall, and inappropriate farming practices. According to the farmers, the effects of land deprivation were famine, drought, reduced harvest, and poverty. Soil and water conservation activities undertaken by farmers prior to the food-for-work projects were mainly construction of drainage canals and ditches as well as soil and stone bunds. Farmers also practiced fallowing, mulching and crop rotation. Among the food-for-work activities, soil bunds, hillside terraces, reforestation, and stone bunds were considered by farmers to be the most effective for soil and water management (Esser and Kjell, 2002).

Berhanu and Swinton (2003, cited in Getachew, 2005), farmers' awareness of conservation practices, plus security, stable land tenure is important for adoption of long-term soil conservation. Investment in stone terraces was positively influenced by factors associated with long-term investment perspective such as capacity to invest and land tenure security. By contrast, investment in soil bunds was associated with a short-term, low budget invest-mental perspective; land titling and legal enforcement of title are fundamental for the widespread adoption and sustained use of conservation practices (Getachew, 2005).

Farmers' perception and attitude can have a major bearing on soil degradation and management. Although farmers are often more actively aware of the condition of their land than is something assumed by experts, they may not be fully aware of land degradation, it causes or consequences (Ervin and Ervin, 1982, cited in Getachew, 2005).

Farmers' management practices are also quite important in affecting erosion on cropland, reducing erosion by as much as 50% or more (Eweg et al., 1997, cited in Getachew, 2005). Thus, in terms of addressing the areas where erosion is greatest, as well as where it's socio-economic impact is greatest and where changes in management practices have the greatest potential benefit, efforts to combat water erosion should focus mainly on cropland (Getachew, 2005).

2.4. Soil and water conservation technologies

Traditionally through time, farmers have developed different soil and water 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 cited in Desta, 2012). For instance, the Konso people in southern Ethiopia are known for traditionally well-developed terraces, where the terrace practices are registered by the United Nations Educational, Scientific and Cultural Organization (UNESCO) as a world heritage. The Konso terraces are estimated to be older than 400 years. Some rudimentary and poorly established terraces and lynchets depicted on older aerial photographs and physical remnants can also be observed in different parts of the northern highlands (Shimeles, 2012).

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)(Desta,2012). 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 it key strategy. The major elements of the soil and water 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, 2003 cited in Desta,2012).

Management of soil and water conservation can be made possible by using a variety of technologies such as vegetation conservation like grass contours, alternative tillage techniques and physical structures like terraces, stone bunds, gabion box etc. The World Bank has given more importance to vegetative measures in soil and water conservation. This supports the global trend that favors choosing technologies that are low cost and more farmers friendly "Successful adaptation of this technology in the World Bank projects was achieved by involving farmers in the choice of technologies, a strategy that helps to implement technologies that are more compatible with existing land uses and surrounding environments and that meet farmer's needs" (World Bank, 2001).

In most of the centrally planned projects, like Ethiopia, soil and water conservation programs are promoted with standard technical solutions such as terracing, contour bunding etc. On the assumption that soil and water conservation measures are universally applicable and local farmers are unaware of soil erosion and ignorant of its causes and consequences (Pretty and Shah, 1999, cited in: Johnson et al., 2007, MoARD, 2005). However, these measures, which were often forced on the people, may cause more erosion than their own indigenous practices, either because the new conservation works are not maintained or are technically less well adapted than existing practices (Kerr et al., 1996).

To achieve sustainable development, sustainable technologies need to be developed, transferred and adopted. Natural resources can potentially be used in a sustainable way through appropriate technology. Following the sustainability pattern, "appropriate" would require that a technology should be ecologically protective, socially acceptable, economically productive, and economically viable and reduce risk (Hurni, 1997).

The successful promotion of soil and water conservation can be challenged due to technological related challenges. A study done in Gojjam by Michael (2002) reveals sustainable land management practices are constrained by different factors for farmer's application. For example,

manure require more labor force to transport, traditional ditches , traditional cutoff drains and traditional waterways aggravate soil erosion in area where ill-designed. The same study also noticed the inflexibility, non-integrity, and specific functionality of sustainable land management practices retarded the promotion of sustainable land management practice in the area. Similar study done in east Gojjam by Yilkal (2007) indicates high dependence of technologies on land resource, sensitivity to environmental conditions, need special training and high financial requirement.

2.5 Opportunities and Constraints for Soil and water Conservation

Soil and water conservation development has been problematic when applied in a rigid and conventional manner. This is true when applied without community participation and using only hydrological planning units, where a range of interventions remained limited and post rehabilitation management aspects were neglected. This resulted in various failures or serious shortcomings difficult to correct (MoARD, 2005).

Sustainable agriculture is indeed concerned with the proper natural resource management and abatement of land degradation, since land (or soil) is a basic factor in this sector (Getachew, 2005). Proper soil management aiming at improving the condition of the soil by actively integrating soil and water conservation practices with strategic policies can enhance agricultural productivity, food security and sustainability, and thus have positive impact up on growth perspective (Ayalneh, 2002,cited in Getachew,2005).

Soil and water conservation is to be promoted through the expansion of scientific livestock production which eliminates uncontrolled expansion of livestock population and movement; emphasizing research in soil and water conservation and the creation and introduction of appropriate technology; identification of inputs required for soil and water conservation suitable for the various agro-ecological zones and undertaking of awareness creation programmes (EPA, 1998).

In soil erosion, the effects of rainfall and wind erosion are largely irreversible. Although plant nutrient and soil organic matter may be restored, to replace the actual loss of soil material would require taking the soil out of the use for many thousands of years. In other cases, land degradation due to soil fertility decline is reversible; soils with reduced organic matter can be

restored by additions of plant residues, degraded pastures may recover under improved range management (FAO, 1994, cited in Getachew, 2005).

2.5.1 Opportunities for Soil and water Conservation

The potential for community-based watershed development in Ethiopia are huge. This applies both for already severely degraded and food insecure areas as well as for those areas classified as food-secure and surplus-producing. The latter definition should not be misleading as these areas are also subject to high erosion and deforestation rates, gradually losing their potential. These areas should rapidly undertake corrective actions to reverse degradation trends and retain as well as improve their potential (MoARD, 2005). Other opportunities that apparently are key to successful management of soil and water and natural resources include bringing citizen participants in early in the process, making sure that the whole watershed are included, using culturally appropriate approaches to communication and decision making, and ensuring that citizen participation is integral to the processes involved, as opposed to using citizen input as just another set of data or not fully engaging citizens in the processes (Duram and Brown, 1999).

Ethiopia has made commendable efforts in developing its policy and strategic response to land degradation (Asfaw, 2003). One of the most important umbrella polices is the Environmental Policy of Ethiopia (EPE), approved by the Council of Ministers in 1997. The policy addresses a wide variety of sectoral and cross-sectoral environmental concerns in a comprehensive manner. Its major aim is to ensure sustainable use and management of natural and cultural resources and the environment (Asfaw, 2003) rich experience in participatory soil and water conservation. The need for genuine participation by communities at all levels of the decision-making process is a key requirement of successful sustainable soil and water management undertakings. Although different approaches to participatory soil and water management raise issues that need careful scrutiny, there are very good experiences with a range of approaches in the country. The government has recognized the need for participatory soil and water management, and recently. Ministry of Agriculture and Rural Development developed a national guideline on community-based participatory watershed development (Lakew et al. 2005) that describes high-potential procedures drawn from selected approaches in Ethiopia.

2.5.2 Constraints of Soil and water Conservation

There are a number of issues and challenges that have been identified as associated with taking a soil and water conservation or ecosystems approach to the management of watersheds and natural resources. It has been found that successful formation and operation of collaborative soil and water conservation and natural resources decision making groups can be hampered when a community has experienced events that have led citizens to be distrustful of leaders and agency officials (Singleton, 2002). In practice, meaningful participation is difficult to achieve when communities are unorganized, unaware of their legal rights and responsibilities, and lack the information, education, and confidence necessary to interact with other more powerful stakeholders (Johnson et al., 2007).

On the other hand, research demonstrates that collaborative ventures are successful when there already is trust of leaders and officials on behalf of citizen participants, or trust is established and maintained as the collaboration is created and begins operation (Lubell, 2004).

Collaborative efforts also are more successful if the property rights of the citizen participants are acknowledged and respected (Rickenbach and Reed, 2002). Further, respect for the knowledge and experience that citizen participants bring to the table is critical to success of the collaboration. Collaborative efforts can be impeded if not rendered impossible if the approaches taken by the leaders are too technocratic or heavily reliant on "expert" assessments rather than giving credence to "regular" peoples' observations and suggestions (Steele, 2004). Another real challenge to participation in watershed management groups or organizations is that many people do not think in terms of a "watershed." This is hard for them to visualize, or else hard for them to place their own place of residence in this broader context (Rickenbach and Reed, 2002).

FAO (2006) has stated that watershed ecology is very important for humankind. The world's supply of fresh water depends largely on people's capacity to manage upstream-downstream flows. Food security also largely depends on upland water and sediments. Inappropriate watershed management creates many problems, such as deforestation, improper hillside agricultural practices and overgrazing, all of which may increase runoff, prevent the recharging of upland sources, and generate seasonal torrents that spoil the lowland fields. Badly engineered watersheds may not be able to stand heavy rains, and water courses are also very good vectors for biological and industrial chemical pollution.

There are several possible reasons for the failure of past management interventions to meet users' expectation. The innovated management measures did not consider local management practices, the interventions require high cost which cannot be afforded by the local people, and the intervention did not consider the local agro-ecological and socioeconomic variations (Aklilu, 2006)

The challenges of land management practices in Ethiopia especially soil and water conservation programs are lack of a holistic approach. These structures are also concentrated on farm lands and the degraded hill sides are not properly taken care of. Sustainable land management practices through biological measures such as organic matter management, maintenance of vegetative cover, improved fallow practices and the livestock management practices are not well integrated. The rehabilitation of hill sides, which had incredibly great success in terms of environmental rehabilitation and creation of assets, was over looked (Betru, 2003)

Gete et al. (2006) based on their stake holder assessment pointed out the promoting of sustainable land management in Ethiopia is constrained by the overwhelming strategic problem of the extension system. Quick solutions rather than sustainability, quantity rather than quality area coverage rather than impacts, and seemingly commanding control system rather than participation are identified as the most determining constraints.

It is becoming increasingly clear especially in the case of Ethiopia that land management practices are a complex issue requiring further investigations as they are influenced by different factors operating at different scales (Desta, 2012). These factors include government policies, programs, and institutions at many levels. Infrastructure development, agricultural extension, conservation technical assistance programs, land tenure policies, and rural credit and savings programs affect awareness, opportunities, and constraints at the village or household level which may further influence land management (Pender, Ehui & Place, 2006, cited in Desta,2012). There are also household-level factors such as households' endowments of physical assets, human capital, social capital, financial capital and natural capital that could determine households' soil and water management practices (Desta, 2012).

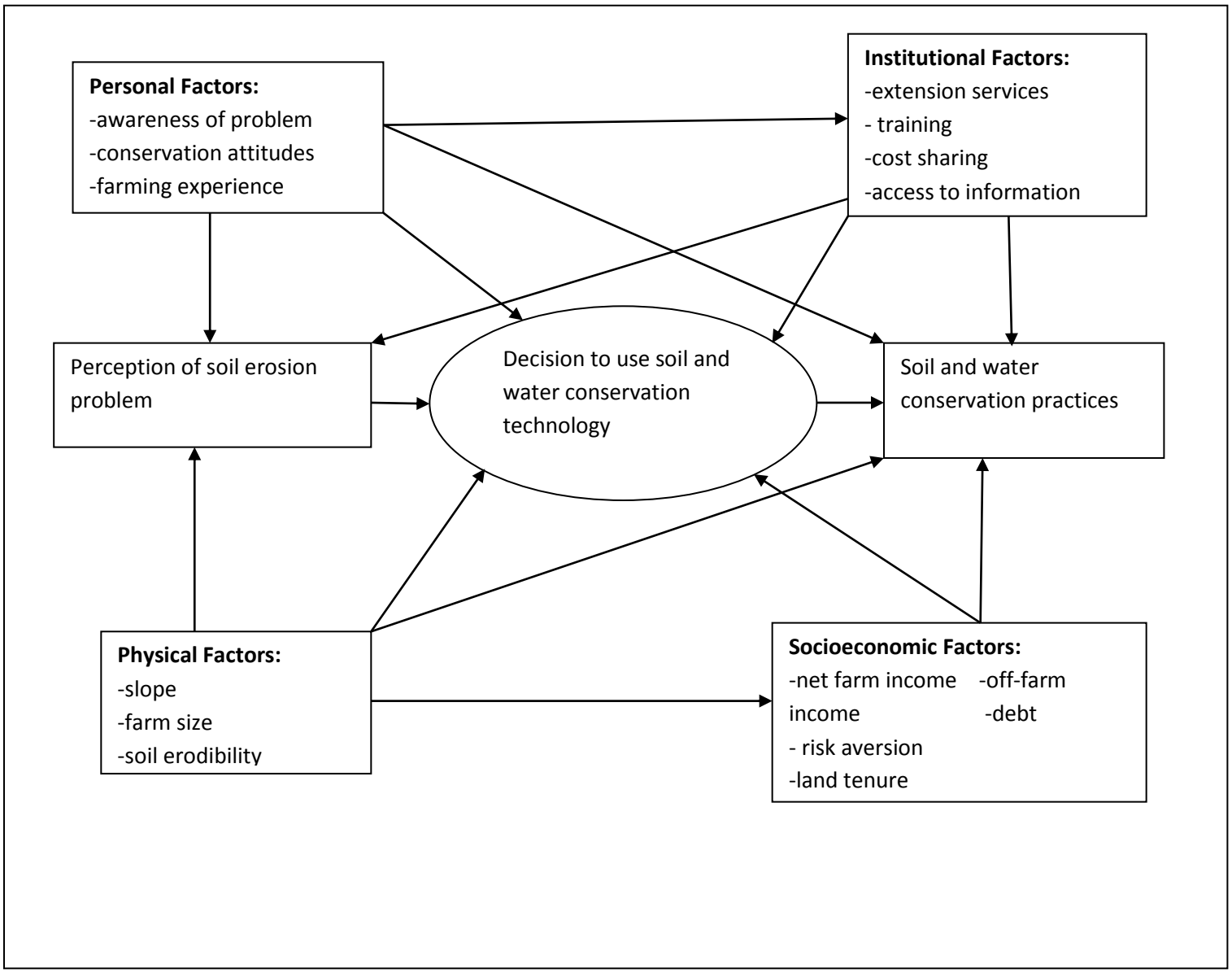
2.6 Conceptualisation of the study

The degree of the perception depends on the farmer's personal characteristics (e.g., age, education, conservation attitudes) and the physical characteristics of the land (e.g. slope). The effect of age on adoption soil and water is unclear. Older farmers' could adopt conservation because they have more experience, but conversely, they could be less willing to bear the risk of investing in soil and water conservation due to their shorter planning horizons. Also, younger farmers may be more educated and therefore more involved with innovative farming practices; consequently, they will be more aware of erosion problem and solutions (Asafu, 2008). As shown in figure 2, institutional factors such as extension education may also assist in heightening awareness of the soil erosion problem.

Once the erosion problem has been perceived, the farmer decides to adopt a soil and water conservation practices. This decision will be influenced by a combination of personal, institutional, physical, and economic factors. The higher the level of education the more information and awareness the farmer possesses regarding the costs and benefits of soil conservation, and therefore the more likely this individual is to adopt a given practice (Asafu, 2008).

Institutional factors such as extension programs and the possibility of sharing costs may persuade farmers to adopt particular measures. The perceived extent of actual or potential physical erosion on the farm may also motivate a farmer to choose a particular measure. Economic factors, such as net farm income ,off-farm income, risk aversion, discount rate/planning period, debt status, and land tenure, may either inhibit or enhance a farmer's inclination toward adopting soil and water conservation(Asafu,2008). The choice of soil and water conservation effort is affected by the four outlined above. Personal factors such as education and farming experience affect the proper application and maintenance of soil and water conservation practices. The choice of how much effort to apply also depends on the physical characteristics of the land such as slope and farm size. However, because measures that are more efficient in reducing erosion are expensive, the economic factors are hypothesized to more significantly impact the conservation effort.

Figure 1: Decision process for making use of soil and water conservation technology.



Source adapted from (Asafu, 2008).

Chapter Three

3. Methodology

3.1 Description of the Study Area

The study area is located in Lemo woreda of Hadya zone, Southern Nation, Nationalities and People Region (within 7°14'N to 7°45'N and 37°05'E to 37°52'E). Lemo is bordered on the south and southeast by the Alaba , Kembata and Tembaro Zone, on the southwest by Soro, the west by Misha, and on the north by the Gurage Zone; most of its eastern boundary is defined by the course of the BilateRiver. The woreda constitutes 35 kebeles (the lowest administrative unit) of which 33 rural and 2 rural town kebeles. Lemo has 67 kilometers of all-weather roads and 56 kilometers of dry-weather roads, for an average road density of 123 kilometers per 1000 square kilometers (SNNPR Bureau of Finance and Economic Development, 2009).

3.1.1 Demographic features

Based on figures published by the Central Statistical Agency in 2007, this woreda has an estimated total population of 118,578 of whom 58,663 were males and 59,915 were females and 3% of its population are urban dwellers, which is less than the Region and Zone average of 10.28% and 8.1% respectively. With an estimated area of 1,002.03 square kilometers, Lemo has an estimated population density of 437.1 people per square kilometer, which is greater than the Zone average of 378.7 and the Region average of 133.9 people per square kilometer. The Woreda has an estimated population density of 440.5 persons per km2 of arable land and the average arable land holding is 0.98 hectares per household, varying from 0.25 ha to 2.0 hectares. More than 85% of households own less than one hectare of farmland (LemoWoreda office of agriculture, 2001). The five largest ethnic groups reported in Lemo were the Hadiya (62.13%), the Silte (30.3%), the Amhara (3.05%), the Kambaata (2.67%), and the Sebat Bet Gurage (0.45%); all other ethnic groups made up 3.4% of the population. Hadiya is spoken as a first language by 57.81%, 31.35% Silte, 6.63% spoke Amharic and 3.36% spoke Kambaata; the remaining 0.85% spoke all other primary languages reported. 58.52% of the population said they were Muslim, 22.09% embraced Protestants, 18.36% were Ethiopian Orthodox Christianity, and 0.45% Catholic. Concerning education, 30.97% of the population were considered literate, which is less than the Zone average of 33.01%. Concerning sanitary conditions, 68.48% of the urban

houses and 21.33% of all houses had access to safe drinking water at the time of the census; 48.52% of the urban and 5.71% of all houses had toilet facilities (CSA, 2008).

3.1.2 Economic Activity

The major economic activity in the study area is crop-livestock mixed agriculture on which the population depends. Crop production is the main agricultural activity for the livelihood of the smallholder farmer in the study area. The major crops grown include wheat which covers about 63%, barley, teff, peas, bean, sorghum and potato, maize and fruits and vegetables. Nearly, all of the crop production in the study area is rain fed and grown in the main cropping season, the Meher. According to Solomon, (2008) the area is climatically and edaphically suitable for crop-livestock mixed agricultural activities. According to Woreda report documents (2010) the land use pattern of the area is such that about 66.86% (23094 ha) of its land area is cultivated for annual and perennial crops, 4.4 % is grazing land, and 10% is bush & wood land whilst about 10.9% unproductive land including wetland, 7.57% covered with natural forests.

3.1.3 Geology and Soil Type

Geologically, it appears that the upper most rock layer that forms the crest of the mountains and hills of Hadiya is welded tuff. In terms of composition the ignimbrite of the study area are sub-alkaline rhyolite and trachyte with rare per alkaline (Solomon, 2008). The volcanic soils that have evolved in greater part of the Zone have great depths suggested that the area was extensively covered by forests until the recent past. According to Solomon, the most widespread soil groups found in the Zone as a whole, appear to be Eutric Nitosols which cover approximately 61 percent of the area.

3.1.4 Climate

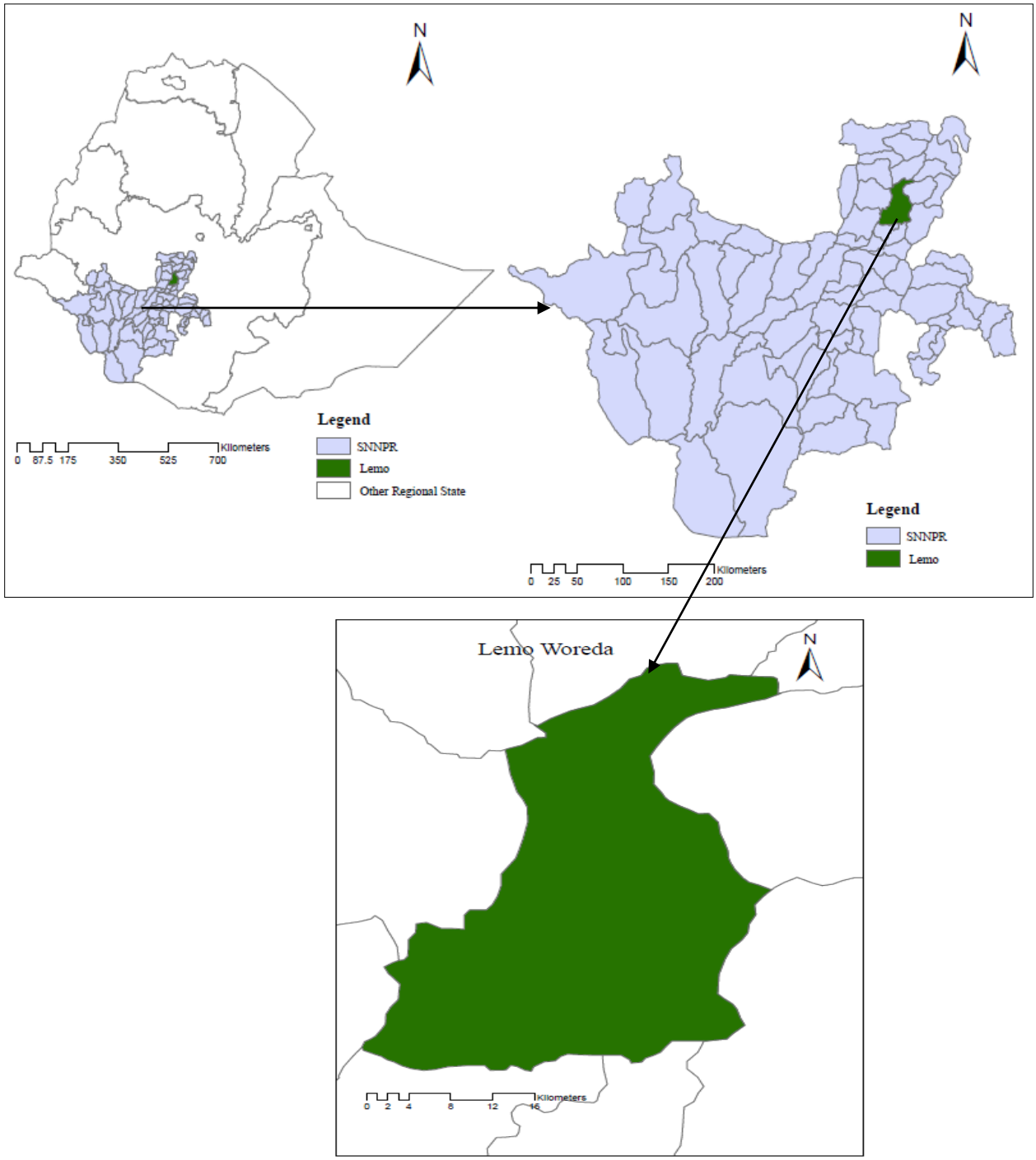
Ethiopians since antiquity have broadly divided their climate into five zones based on elevation. Each zone has its own rainfall pattern and agricultural production system. In general, the highland zones (Dega and Weina Dega zones) contain most of the agricultural areas, while the semi-arid and arid lowlands zones (Kolla and Bereha) are dominated by livestock in agro-pastoral and pastoral production systems.

Accordingly, the mean maximum temperature of the Woreda is about 22℃ while its mean minimum temperature is about 13℃ and mean annual temperature being 18℃ and with (2300-2400 masl) altitude. The study area has two rainy seasons, the long rains (Kremt) from June to September; dry season from October to February (Bega); and small rainy season from March to May (Belg). These agro-ecological zones differ in altitude and amount of average annual rainfall is 1200mm with minimum and maximum rainfall 900mm and 1400mm respectively.

3.1.5 Vegetation

The area displays a substantial presence of cultural vegetation such eucalyptus and inset, which together with crop covered fields give the impression that the land is overwhelmingly green especially during the pre-harvest season. The natural vegetation is almost removed due to rapid population growth and expansion of agricultural land particularly field crop cultivation (HZSEP, 2006).

Figure 2: Map of the Lemo Woreda within the context of its location in the SNNPRS



Source: Administrative Map of SNNPRS

3.2 Study Design

A cross-sectional descriptive survey study design was conducted from June-November; 2014. Which was employed both quantitative and qualitative aspects. In the quantitative aspect of descriptive and numerical values was assigned to the variable under study. Raw data was refined to get of a sensible data. With respect to qualitative aspects, data was subjected to qualitative data analyses.

3.3 Study Population

Study Population was the entire group of people to which a researcher intends the results of a study to apply. Therefore, the population was the farmers' community living in 35 kebeles of Lemo Woreda. It also included development agents (DAs), and other employees of District Administrator's Office and District Agricultural Office. Their responses were used to cross-check and verify additional information of interest to this study.

3.4 Sample Size and Technique

Multistage sampling technique was employed for the study. There are a total of 35 kebeles in the selected Woreda. Researcher intends to divide these kebeles into four clusters based on geographic location. The main objective of this study was to assess the perception and practices of the farmers' community in the study area towards environmental conservation particularly in soil and water conservation. Therefore grouping the kebels into four clusters based on the geographic location was seemed to be logical and convenient. From each cluster, one kebele was selected by using simple random sampling technique. A sample of ten percent households in each kebele which has been randomly chosen from each cluster was selected by using systematic random sampling. From the sample population, responses were elicited from only one individual in the household from the head of the household. The total number of sample size was 232 households. It is known that sample size depends on variability of a population to be sampled and taking time, cost and accessibility. Given the relative homogeneity of the subsistence farmers in the study area (kebeles) in terms of physical, environmental factors and resource endowments, this number was considered optimum which was handled effectively with in research time and budget.

For the case of convenience 10% of the 2324 study population = 232 sample size was selected (Yount .R, 2006). Therefore, the study used purposive, simple random sampling and systematic random sampling. Convenience sampling used to select the study woreda, because the woreda is more convenient for the researcher and availability of issues.

Table 1: Sampling Size and Frame

No.	Name of kebeles'	Geographic location	No. of total households	No. of sample households	%
1	Lambudda	North	723	72	31.0
2	Haisse	South	455	45	19.4
3	Gora xume	West	677	68	29.3
4	Debubi balessa	East	469	47	20.3
Total			2324	232	100.0

3.4.1 Sampling Procedure

Stratified multistage sampling technique was employed for the study. The totals of 35 kebeles found in the selected woreda were stratified in to four geographical settings using naturally existing strata. The total number of kebeles included in the study was determined by using clusters based on geographic location. This was related with proportional allocation to sample size. Hence, From each cluster, one kebele was selected by using simple random sampling technique. The total population size of the four Kebles is 2324, out of which 232 were sample size.

To give equal chance and free from bias, the selection respondents from each stratum was taken through systematic random sampling (SS) technique by using. $K^{th} = \frac{Ni}{ni}$formula (Bhattacherjee, 2012)

Where: K^{th} =$\frac{Ni.}{ni}$interval between two respondents' between serial number.

Ni =total number farmerts in each kebele

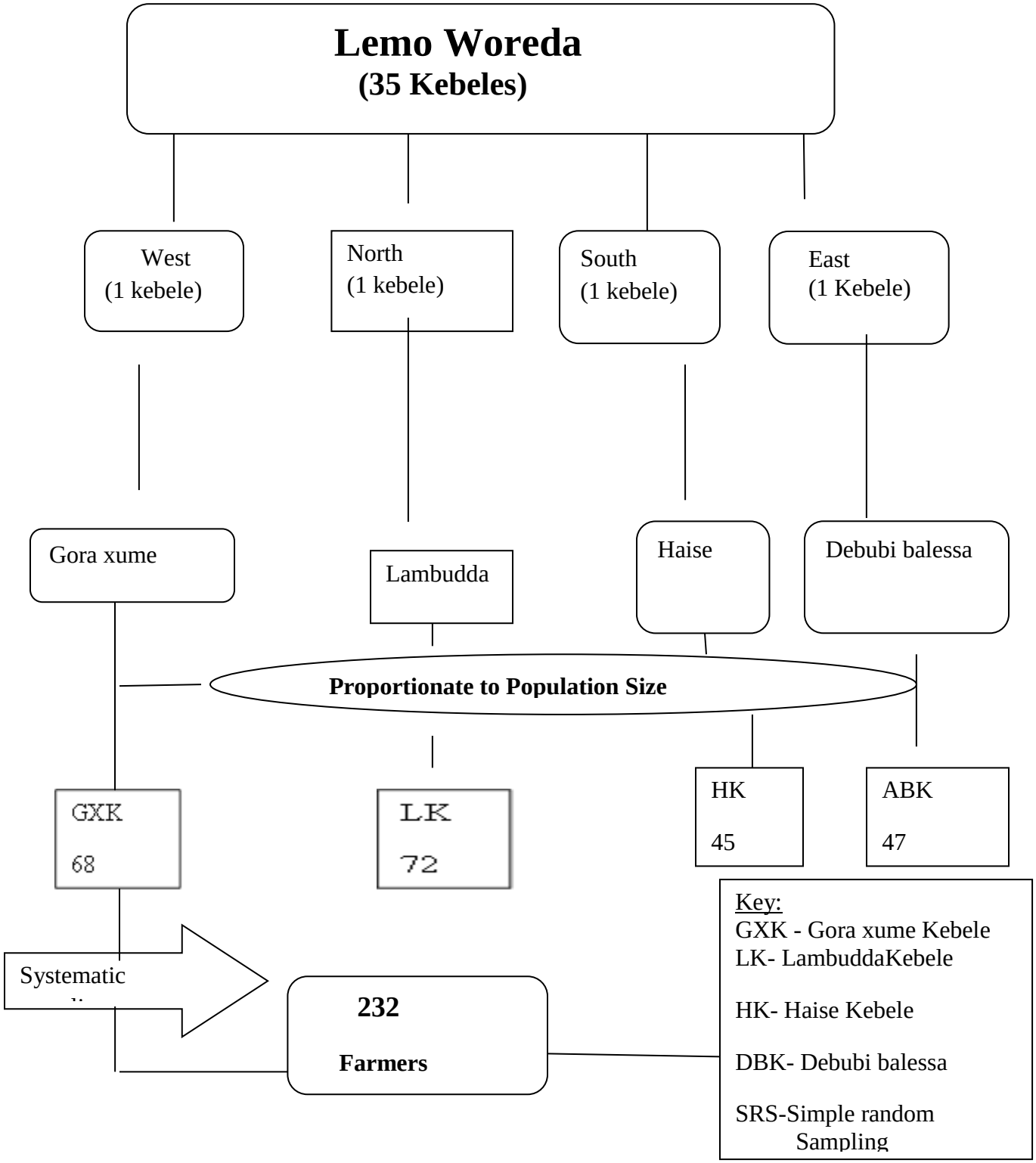
ni =sample size required for each kebele

Hence, for farmers, k= $\frac{Ni}{ni} = \frac{2324}{232} = 10$

By taking all farmers and the farmer's, roll No. in each kebele was written consecutively from first number to last possible number. Then the researcher has drawn any one serial number which is <10, let say 'a'. The second respondents were a+k and continue in the same manner till the end of number of farmers in each kebele in the form of a, a+k<a+2k, a+3k….a+nk. It is from these target population that the required sample size was taken according to the size of the sample frame in each Keble (fig.3). Farmers from each kebele were selected again by systematic random sampling with a sampling interval of 10 using list prepared from the kebele resident list.

Further, in view of generating extensive information, adequately support the quantitative data collected at kebele level and hence increasing reliability and generalization of the finding of the study, key informant interview, and focus group discussions was conducted through purposive sampling techniques to get detail information from key people only (Bhattacherjee, 2012).

Figure 3: The Sampling Procedure Adopted for this Study



Sources: Developed by the researcher's assumption based on field study.

3.5 Sources of Data and Methods of Data Collection

Data for this study was obtained from two sources: primary and secondary sources. The main primary sources of data were information enlisted from farmers. Hence, field observation, focus group discussion, interviews with selected farmers and other informants were primary data sources. Zonal and district agricultural experts, Kebele administrators, soil and water conservation supervisors and DAs provided primary information. In addition, secondary sources of information like Acts, Proclamation, Official records, Reports of National and International organizations have also been made use of.

3.5.1 Field Observation and Informal Interviews

Field observation was started even writing the proposal and continued on to the whole process of data collection to make sure the validity of acquired information. It was aimed on understanding the local condition of local community in terms of their culture, farm practices and traditional way of resources utilization and application of conservation measures, etc. During the course of investigation, the researcher took notes on the soil erosion severity, existing soil and water conservation technologies, soil color, topography and land use and land cover. Accordingly, the four sampled peasant associations (kebeles) were observed purposefully. Infrequently, informal interviews were carried out with farmers who were met along the path that was aimed on obtaining information to produce structured questionnaires which is the core instrument for collected information and were conducted in an informal and easy manner.

3.5.2 Questionnaire

This was the most important tool of data collection in this research. On the bases of information obtained from techniques discussed above and literatures, questionnaire was developed. The interviews with the identified households were conducted by four enumerators (development agents who live and work with the community in the study area). Since farmers in the study area speak Hadiyyisa, the questionnaires that were initially prepared in English were translated to Hadiyyisa. And the enumerators are fluent in speaking Hadiyyisa and Amharic as well. Before the implementation of survey, enumerators were trained and tested for their clarity and understanding the questions. Unclear and unrelated questions to local people and enumerators were modified and additional questions were also included that was supposed to be necessary to capture relevant information. The survey questionnaire covered a wide range of information

which included household characteristics, soil erosion problems, farmers perception, farmers practices, farmers perception and practices to soil and water conservation technology and development agents supports to soil and water conservation from four kebeles of Lemo Worade:- Lamibuda, Haise, Gora Xume, and Debubi belessa.

3.5.3 Focus Groups Discussion (FGD)

Four focus groups with six to eight persons from different backgrounds were established. And each group had seven members included four 'model farmer', two DAs and one kebele administor for two hours. Check-lists were prepared and these focused on the problems of soil erosion, soil and water conservation practices by farmers, farmers' perception and practices towards soil and water conservation technology and other related issues. These facilitated in obtaining detailed qualitative information and also triangulating data from household survey.

3.5.4 Key Informant Interview (KII)

It is one of the other methods used to collect qualitative data. It was complement and supplement to the data collected from individual households through semi-structured questionnaire and to have a detailed in sight in to soil and water conservation practices in the area, a discussion covering different topics with 10 key informants, who were working in the study area and selected kebele administrators and including so-called 'model farmer' were interviewed.

3.6 Methods of Data Analysis

Both qualitative and quantitative methods were used in order to analyze collected data. The findings of the study were presented in tables, field photograph, figures and charts. Some structured household survey data were analyzed using percentages, multiple response (frequency and cross tabulation), and descriptive statistics (frequency and cross tabulation) using the Statistical Package for Social Sciences (SPSS) for Windows 20.0. Discussion held with DAs, key informants and selected local people on soil erosion problems, practices of soil and water conservation, perception on soil and water conservation and practices of structural soil and water conservation measures was also analyzed descriptively. Comparison between structural soil and water conservation measures and other conservation measures was made using descriptive frequency and multiple responses frequencies.

3.7 Ethical Considerations

Information on ethical clearance was obtained from ethical committee of the Department of Governance and Development Studies, Jimma University. The formal letter the Department wrote for support and cooperation was submitted to District Office of Agriculture and concerned bodies to obtain requisite information who in fact showed their willingness to co-operate with Resercher. The purpose of the study was clarified to each of the participants. At the time of data collection, a verbal consent was taken from the participants to confirm whether they are willing to participate. Those not willing to participate were given the right to do so. Confidentiality of responses was also ensured throughout the research process i.e. their responses to this study were kept secret. All my basic questions were answered in my finding of study and research basic questions had consistence with findings.

Chapter Four

4. Results and Discussion

4.1. Demographic and Socio-economic characteristics of all eligible respondents in Lemo Woreda

The overall response rate was 232 (100%). From the total respondents, 179 (77.2%) were male while the rest, that is, 53 (22.8%) female respondents. An average, each household has six to ten family members. Of these respondents, 200 (86.2%) were married and in union, 111 (47.8%) were protestant, 129 (55.6%) were illiterate, 228 (98.3%) were farmers and remaining 4 (1.7%) of respondents were students engaged in agriculture as well. 136(58.6%) of respondents belonged to Hadiya ethnic group. As an average, respondents were between 41-60 years of age and the mean age of the respondents was 3.40 years (SD±0.980) and ranges from 20 to 65 years. A majority of the participants 87 (37.5 %) were between the ages of 51-60 years and 223 (96.1%) of respondents had not known their monthly income. The details of the summary are illustrated in the following Table-2 below.

Table 2: The Demographic and Socio-economic characteristics of respondents

Variables	Category	Numbers	Percent (%)
Sex of households	Male	179	77.2
	Female	53	22.8
Age of households (years)	20-30	5	2.2
	31-40	40	17.2
	41-50	81	34.9
	51-60	87	37.5
	>= 61	19	8.2
Size of household	1-5	48	20.7
	6-10	123	53.0
	11-15	49	21.1
	>=16	12	5.2
Religion	Protestant	111	47.8
	Orthodox	61	26.3
	Muslims	56	24.1
	Catholic	4	1.7
Ethnicity	Hadiya	136	58.6
	Amhara	17	7.3
	Gurage	14	6.0
	Silte	31	13.4
	Alaba and Kembetas	34	14.7
Marital Status	Single	11	4.7
	Married	200	86.2
	Divorced	6	2.6
	Widowed	15	6.5
Educational level	Illiterate	129	55.6
	Primary level(1-8)	84	36.2
	Secondary level(9-12)	16	6.9
	Certificate and above	3	1.3
Occupational status	Farmer	228	98.3
	Student	4	1.7
Monthly income	Don't know	223	96.1
	1000-1500	4	1.7
	1501-2000	5	2.2

Source: Field Survey, 2014

4.2 Farmers' Perception and awareness in the Soil and water conservation activities

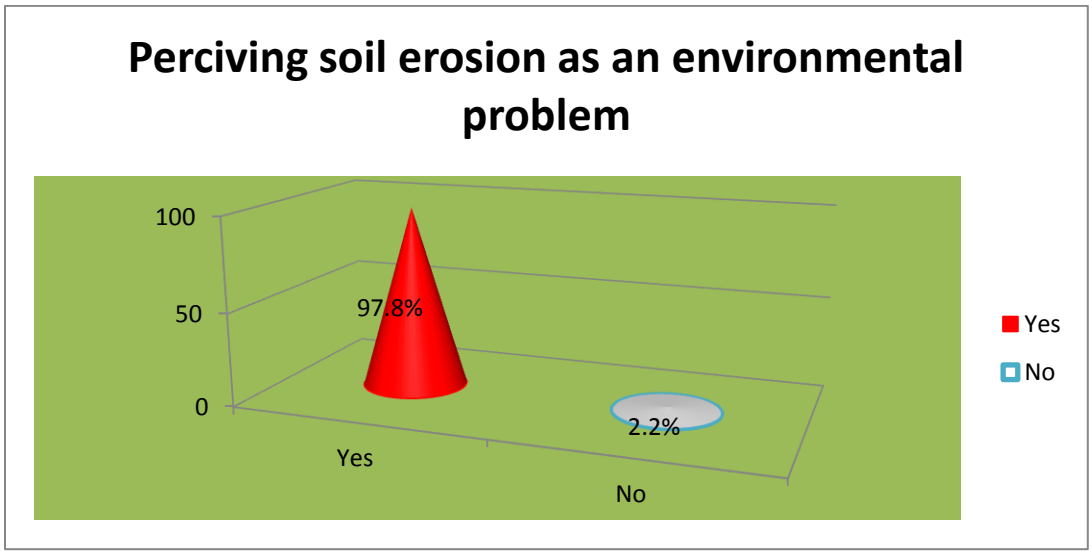
As result of table-3 indicated that, 227(97.8%) of respondents perceived that soil erosion as an environmental issue in their locality whereas 5(2.2%) of them responded that it is not main issue for environmental degradation. And as recognized from group discussions, farmers' communities perceived soil erosion as a problem of the environment and this is evident in figure,5. Of course, farmers familiarize with soil erosion from observations of their surroundings, accumulated experiences and by pressures from experts. Environment lends them with traditional knowledge that could be experienced through the passage of time and shared with each other that could either strength or weakness of farmer's practices (figure; 6). Majority of respondents are aware of soil erosion as environmental problem and declining yields from their farms from year to year in the study area. The results of analysis is found to be similar with pervious research done by (Yenealem et al, 2013); the higher proportions of the respondents were aware of about the problem of soil erosion and majority of these respondents perceived erosion on their land as severe. And the result of different focus group discussions conducted with different members of people in the study area also confirmed the same.

Table 3: Perception of Soil Erosion as an Environmental Problem

Do you think that soil erosion is an environmental problem in your area?	Perception of Erosion	Frequency	Percent (%)	Cumulative Percent
	Yes	227	97.8	97.8
	No	5	2.2	100.0
Total		232	100.0	

Source: Field Survey, 2014

Figure 4: Perception of soil erosion as an environmental problem in Lemo woreda.



Source: assessed on the basis of field survey in Lemo Woreda, 2014s

Figure 5: Soil degradation problem in Gora xumme kebele

Source: Field photograph by the researcher, 2014

Figure 6: Gully conservation in Lamibuda kebele

Source: Field photograph by the researcher, 2014

4.2.1 Farmers' Perception on the slope of cultivation land and causes of soil Erosion

The item number 1 of the table 4 shows, responses from respondents of the study area who were asked about describing the slope of their cultivation land. Accordingly, out of 232 respondents, gently sloping were accounted by 75(32.2%), moderately sloping were accounted by 83 (35.8%), steeply sloping were accounted by 25(10.8%), and remaining accented for Flat 49 (21.1%) and the greater percentage accounted for gently and moderate slopes. And the mean of item 4(1) was 2.36 with the std. deviation 0.934.

The dominant causes of soil erosion in the study area include Population pressure, slope steepness of the topography, heavy rainfall, ceaseless cultivation without fallowing, erodible nature of the soil, deforestation and desertification, absence and delay of soil conservation practices, and overgrazing. According to interviewed respondents, the immediate causes for soil erosion in the study area are overgrazing of rangeland and Deforestation 55(24.2%), plugging steep slopes 70(30.8%), Continued cultivation/no fallowing 54(23.8%), and limited use of conservation structures 43(19.0%) respectively. This has been revealed by responses to item no.2 of the table 4. Other causes of erosion were lack of proper maintenance and widely spaced soil and water conservation structures. The seriousness of the on-going soil erosion was demonstrated with the identification of several on-site erosion indicators (figure; 5).

As a result of analysis of item no.3 in table, 4 Population pressure 87(38.2%), heavy rainfall 75(33.0%) and slope steepness 54(23.8%) are root causes for soil erosion and followed by ceaseless cultivation and forced farmers to give up land fallowing respectively. As the study area being more highland /weyna dega agro-ecologic zone, the intensity of rainfall is among the major causes of soil erosion and results in heavy loss of topsoil. Environment forest cover was damaged by expanding demand for agricultural land and by deforestation.

Table 4: Farmers' Perception on Major Causes of Soil Erosion problems

	Items	Causes of Soil Erosion	Frequency	Percent (%)
1	How do you describe the slope of your cultivation land? (n=232).	Flat Gently sloping Moderately sloping Steeply sloping Total	49 75 83 25 232	21.1 32.3 35.8 10.8 100.0
2	Immediate causes of soil degradation? (Multiple Answers are possible)(n=227)	Overgrazing and Deforestation Plugging steep slopes Limited use of conservation structures Continued cultivation/no fallowing Others Total	55 70 43 54 5 227	24.2 30.8 19.0 23.8 2.2 10 0.0
3	Underlying root causes for soil degradation (Multiple Answers are possible) (227).	Heavy rainfall Steep topography Population pressure Others Total	75 54 87 11 227	33.0 23.8 38.2 5.0 100.0

Source: Field Survey, 2014

4.2.2 Types of soil degradation and season erosion is more severe

As can be observed from table 5 (1) the respondents were asked about the major forms of soil degradation in their locality , the majority 153(67.4%) of respondents were reported that Soil erosion by water; 118 (52 %) of respondents reported that Overgrazing of range land is a major form of soil erosion,100 (44.0%) of respondents perceived that Gully formation is a major forms of soil erosion ,88(38.8%) study participant reported that Soil erosion by wind is a major form, 78(34.4 %) of respondents reported that deforestation is a major forms of soil erosion, while the remaining, 109(48 %)of them were reported as others form soil erosion.

As a result table-5(2) shows respondents were also asked about , in which season erosion is more severe in their farmland, a largest portion, 199(87.7%) of the respondents were reported that summer season is seen as the most severe season for soil erosion. The remaining 14(6.2 %), 8(3.5%), 6(2.6 %), of respondents were responded that autumn, winter, spring respectively.

Table 5: Types of soil degradation and erosion due to seasonal variations

	Items	Types of soil degradation		respondents' responses	
				Frequency	Percent (%)
1	What were the major forms of soil degradation in your area? (Multiple answers are Possible) (n=227)	Soil erosion by water	Yes	153	67.4
			No	74	32.6
		Soil erosion by wind	Yes	88	38.8
			No	139	61.2
		Deforestation	Yes	78	34.4
			No	149	65.6
		Overgrazing of rangeland	Yes	118	52.0
			No	109	48.0
		Gully formation	Yes	100	44.0
			No	127	56.0
		Others	Yes	109	48.0
			No	118	52.0
2	In which season erosion is more severe in your farm land?(n=227)	Summer		199	87.7
		Autumn		14	6.2
		Winter		8	3.5
		Spring		6	2.6
		Total		227	100.0

*The category 'other' includes % of respondents who gave answers different from the enlisted ones

Source: Field Survey, 2014

4.2.3 Farmers' perceptions and severity of soil erosion problem

As observed from table 6(1) respondents were asked about their perception on the severity of soil erosion problem in study area, from total study participant the majority 68(30%) of respondents responded that the severity of issue is rated as High in their study area. The remaining 65(28.6 %), 41(18.1 %), 30(13.3%), 23(10%), of respondents were rated as Moderate, Low, Very High, and Very low respectively. And the mean of item 6(1) is 2.81 with the std. deviation 1.176.

In the table 6(2) below, respondents were also asked about the changes in soil erosion severity over the past 5 years term, among the participants, the largest percentage 80(35.2%) of them reported that there was Moderate change. Whereas the others 70(30.8%), 52(22.9 %), 14(6.1%), 11(5%) of respondents responded as Low, High, Very High and Very low. And the mean of item 6(2) is 3.06 with the std. deviation 0.985.

As indicated also in the table 6(3) below, respondents were asked about the degree of risk of soil erosion, among the total participant, 105 (46 %) of the respondents said that there is Moderate risk of soil erosion 69(30.4, %), of the respondents reported that there is High risk of soil erosion, 38(16.7 %) of participants of this study said that there is Low risk of soil erosion,10(4.4%) of them said that Very High risk of soil erosion. While the remaining 5(2.2%) them rated as Very low risk of soil erosion. And the mean of item 6(3) is 2.82 with the std. deviation 0.838.

The results of table 6 (4) illustrate that, majority 116(51%) of respondents, responded it would be possible to minimize erosion problem. And this is evident in figures, 7 and 8. The remaining 73(32%) and 38(17%) of respondents responded that it would not possible to minimize erosion problem. As a result of analysis of item no.5 in table 6, the majority 113(50%) of respondents did believe that investment in soil and water conservation practices was profitable in the long run. On the other hand, 73 (32%) and 41(18%) of the respondents responded that they had no belief that investment in soil and water conservation practices would be profitable in the long run and they had not known how investment in soil and water conservation practices would be profitable in the long run.

Table 6: Farmers' perceptions and Severity of soil erosion problem

	Items	Perception of Erosion	Respondents' responses	
			Frequency	Percent (%)
1	Severity of the soil erosion problem in your cultivation land?(n=227)	Very High	30	13.3
		High	68	30.0
		Moderate	65	28.6
		Low	41	18.1
		Very low	23	10.0
2	Observed change in soil erosion severity over the past 5 years (n=227).	Very High	14	6.1
		High	52	22.9
		Moderate	80	35.2
		Low	70	30.8
		Very low	11	5.0
3	How do you describe the degree of risk of soil erosion in your farmland? (n=227).	Very High risk of soil erosion	10	4.4
		High risk of soil erosion	69	30.4
		Moderate risk of soil erosion	105	46.3
		Low risk of soil erosion	38	16.7
		Very low risk of soil erosion	5	2.2
4	Is it possible to halt/minimize soil erosion problem? (n=227)	Yes	116	51.0
		No	73	32.0
		Don't know	38	17.0
5	Do you believe that investment in soil and water conservation practices is profitable in the long run? (n=227).	Yes	113	50.0
		No	73	32.0
		Don't know	41	18.0
		Total	227	100.0

Source: Field Survey, 2014

Figure: 7, soil bunds in Haise kebele

Source: Field photograph by the researcher, 2014

Figure:8, Gully Rehabilitated Haise Site kebele

Source: Field photograph by the researcher, 2014

4.3 Farmers' practices in the Soil and water conservation activities

The result of table 7(1) illustrates that, majority 204(87.9%) of respondents participated in the soil and water community conservation activities. The remaining 28(12.1%) of respondents responded that as they were not participated in soil and water conservation activities. And as result of table-7(2) shows most farmers mentioned that, 149(73%), 114(60.3%), 129(56.0%), 106(51.7%), of respondents have mentioned that Soil bunds, Trench digging, Cut of drain and Tree Planting respectively were bused to solve the erosion problem in their environments. And this is evident in figure 9, 10 and 11. The results of investigator's analysis are found to be similar with previous research done by Tesfaye and Debebe (2013). The majority of soil and water conservation technologies introduced in the area were physical conservation measures. And implementation of all soil and water conservation technologies occurred during the dry seasons. This avoided interference with crop production and difficulties of the work that arises from wetness of the soil during the summer season.

Soil and water conservation development has been problematic when applied in a rigid and conventional manner. This is true when applied without community participation and using only hydrological planning units, where a range of interventions remained limited and post rehabilitation management aspects were neglected. This resulted in various failures or serious shortcomings difficult to correct (MoARD, 2005).

The potential for community-based watershed development in Ethiopia are huge. This applies both for already severely degraded and food insecure areas as well as for those areas classified as food-secure and surplus-producing. The latter definition should not be misleading as these areas are also subject to high erosion and deforestation rates, gradually losing their potential. These areas should rapidly undertake corrective actions to reverse degradation trends and retain as well as improve their potential (MoARD, 2005).

Table 7: Farmers' practices in the Soil and water conservation activities

	Items	Activities	Respondents ' responses		
1				Frequency	Percent (%)
	Have you participated in the soil and water community conservation activities?	Yes		204	87.9
		No		28	12.1
		Total		232	100.0
2	If yes, what kinds of conservation measure are you taking to solve this problem? (Multiple Answers are possible)(n=204)	Soil bunds	Yes	149	73.0
			No	55	27.0
		Cut of drain	Yes	114	56.0
			No	90	44.0
		Fanya juu	Yes	75	37.0
			No	129	63.0
		Trench digging	Yes	106	52.0
			No	98	48.0
		Tree Planting	Yes	120	51.7
			No	112	48.3
		Others*	Yes	136	66.7
			No	68	33.3

*The category 'other' includes % of respondents who gave answers different from the enlisted ones

Source: Field Survey, 2014

Figure 9: constructed pond in dububi belesa

Source: Field photograph by the researcher, 2014

Figure 10: Trench technology used for soil and water conservation activities.

Source: Field photograph by the researcher, 2014

Figure 11: Farmers usage of banana plant for soil and water conservation.

Source: Field photograph by the researcher, 2014

4.3.1 Farmers' land holding and off-farm activities

As indicated in the table 8(1) below, respondents were asked about the current farm land holding to support their households. Out of total study participants, the majority 120(51.7%) of respondents responded that they have low farm land areas. The remaining 68(29.3%), 44(19.0%), of respondents were rated as Medium, and Very low possessions respectively. And the mean of item 8(1) is 3.90 with the std. deviation 0.689. The analysis is also shown in fig, 12.

About 121(52.2%) respondents told that they had not any off-farm employment activities. But the remaining 111(47.8) of respondents' mentioned that they had off-farm employment. And

about 154(66.4%) of respondents responded that they had witnessed influence of off -farm activities on soil and water conservation practices. Others described that they did not know whether there was influence or not due to off -farm activities on soil and water conservation practices. Around 158 (68.1%) of respondents have replied that the soil and water conservation practices have been increasing over time. Whereas, 41 (17.7%), 33(14.2%) of respondents have said that the soil and water conservation practices have been decreasing and no change respectively.

Involvement in off-farm jobs was very common in the study area. Some were engaged in handicrafts, daily labor work, selling of firewood, small scale trading, and others. Off-farm activities might have a negative effect on the adoption behavior of soil and water conservation due to reduced labor availability. When the farmers and their family members were more involved in off-farm activities, the time spent on their farmland would be limited and hence the family was discouraged from being involved in construction and maintenance of soil and water conservation structures. Thus, investigator's findings are inconsistent with findings of previous research done by (Fikru, 2009); off-farm activities could be a source of income and might encourage investment in farming and soil and water conservation. The major off-farm activity was collecting and selling of firewood. Other activities were petty trade, pottery, weaving, leather making, labor hired out and rental of a local "Cart" for transportation.

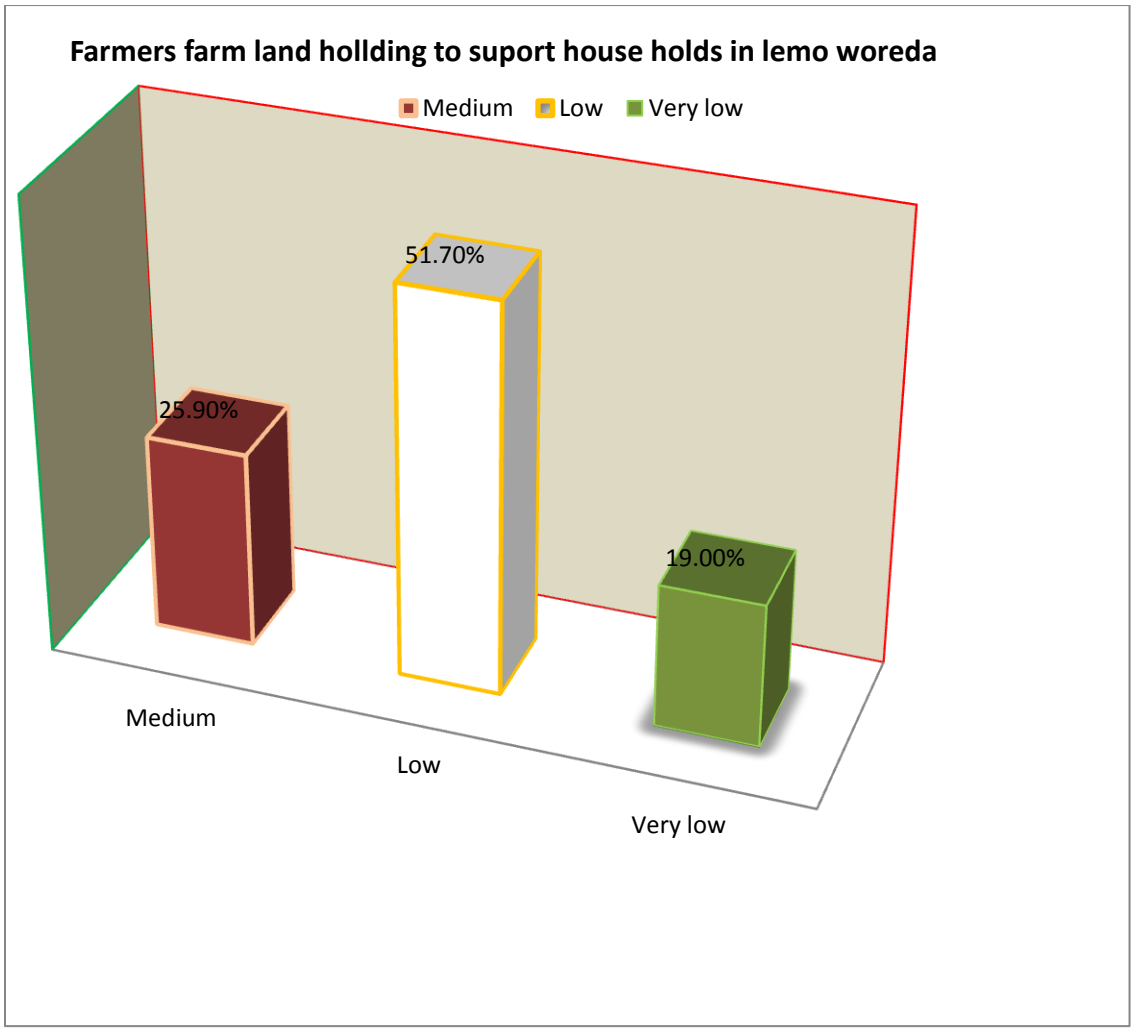
And also the result of investigator's findings are not similar with previous research done by (Kibemo, 2012), Involvement in non-farming job supports farmers in practicing structural soil and water conservation technologies by equipping materials required for construction of soil bunds, fanya juu, etc. Food secured farmers perceived soil and water conservation structures as important and have been practicing them as well.

Table 8: Farmers' land holdings and off-farm activities

	Items	Category	Respondents' responses	
1			Frequency	Percent (%)
	How do you think that current farm land holding to support the household?	Very High	-	-
		High	-	-
		Medium	68	29.3
		Low	120	51.7
		Very low	44	19.0
2	Do you have any off-farm employment?	Yes	111	47.8
		No	121	52.2
3	Do you see any influence of off -farm activities on soil and water conservation practices?	Yes	154	66.4
		No	16	6.9
		Don't know	62	26.7
4	How do you see soil and water conservation practices over time?	Increasing	158	68.1
		Decreasing	41	17.7
		No change	33	14.2
		Don't know		

Source: Field Survey, 2014

Figure 12: Overall land holding to support the household



Source: the researcher's computation based on his data in field survey in 2014.

4.3.2 Farmers' adoption decisions and participation towards SWC conservation activities

As shown in Table 9, the surveyed respondents 58(25.0%) have a very good adoption decision; 110 (47.4%) of them had a good adoption decisions, and 64(27.6%) of respondents had poor adoption decisions of soil and water conservation measures. According to this study, the majority of respondents had good and very good decision techniques to soil and water conservation measures. And the mean of item 9(1) was 2.03 with the std. deviation 0.726.

Among the surveyed respondents, 119(51.3%) have voluntarily participated in the soil and water conservation activities. On the other hand, about 85 (36.6%) were forced to participate and 28(12.1%) of the households responded that they did not involve in the soil and water conservation activities. And it might be due to the failure of intervention programs unnoticed or it might be due to household variations (age, education etc.), or it might also be related to lack of willingness of farmers to soil and water conservation (figure 14). The mean of item 9(2) was 1.61 with the std. deviation was 0.694. Farmers' participation in soil and water conservation activities had been diagrammatically presented in figure 13.

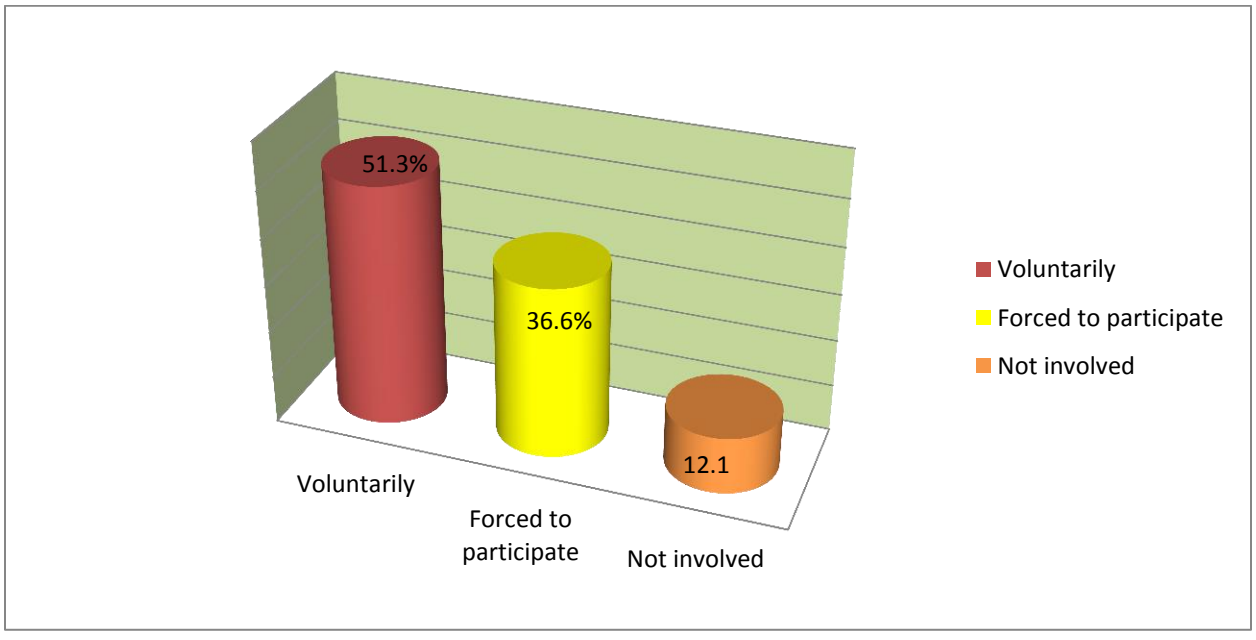
The result of investigator's analysis is found to be similar with previous research done by (Tesfaye and Debebe, 2013). They found that the majority of the farmers considered soil and water conservation activities that were underway in their communities to be mandatory development works in which the Kebele administration and the DAs forced them to participate. This suggests that the practice did not respect participatory principles, and was thus a conventional top-down type. The most important factor discouraging the farmers from willingly participating was found to be associated with the effectiveness of the soil and water conservation techniques under construction. Awareness about soil erosion as a problem, willing participation in the soil and water conservation works, level of literacy, and land tenure insecurity were found to be less significant as an explanation for the disinterest shown by most of the farmers towards the conservation activities.

Table 9:Farmers adoption decisions and participation towards SWC conservation activities

	Items	Activities	Respondents' responses		
1			Frequency	Percent (%)	Cumulative Percent
	How is your adoption decision towards soil and water conservation measures?	Very good Good Moderate Poor Very poor	58 110 - 64 -	25 47.4 - 27.6 -	25 75.4 100.0
2	How are you participating in the SWC activities currently underway in your Kebele?	Voluntarily Forced to participate Not involved	119 85 28	51.3 36.6 12.1	51.3 87.9 100.0
3	Are your house hold members willing/have motive to involve in soil conservation practices?	Yes No Don't know	111 84 37	47.8 36.2 15.9	47.8 36.2 100.0

Source: Field Survey, 2014

Figure 13: Farmers participation in the SWC activities



Source: the researcher's computation based on his data in field survey in 2014

Figure 14: Farmers' monitoring methods by taking attendances after work

Source: Field photograph by the researcher, 2014

4.4 Farmers perception and practices towards externally introduced Soil and Water Conservation technologies

In the surveyed watersheds, the soil and water conservation structures/ technologies were under implementation. As shown in Table 10, only 16(6.9%) of the interviewed respondents have not known the existence of improved soil and water conservation structures/technologies. The remainder, 216(93.1%) of the respondents have known the existence of improved soil and water conservation technologies. And more dominants soil and water conservation measures were: trench digging, fanya juu bunds, soil bunds, diversion ditches, terracing and check dams. And the

result of investigator's analysis is found to similar with previous research done by (Tesfaye and Debebe, 2013); Farmers adopted improved soil and water conservation methods. And the most widely used improved soil conservation technologies were improved soil bund, fanya juu cut-off drain, and eyebrow basin. While other types of improved physical and biological conservation methods were promoted, they were very limited due to various reasons. They were established to conserve and rehabilitate degraded lands, to reduce and stop the velocity of runoff, increase the infiltration of rain water and stabilizing crop yields, so as to increase food security through increased food production/ availability.

Perception of soil erosion as an environmental problem as well as risk to crop production and sustainable agriculture was the most important determinant in the adoption of conservation measures. Theoretically, those farmers who perceive soil erosion as a problem, having negative impacts on productivity and expect positive returns from conservation, are likely to decide in favor of adopting available conservation technologies (Gebremedhin and Swinton, 2003, cited in Tesfaye and Debebe, 2013).

Table 10: Farmers' knowledge about soil and water conservation technologies

	Items	Activities	Respondents' responses		
1				**Frequency**	**(%)**
	Do you know the existence of improved soil and water conservation structures?	Yes		216	93.1
		No		16	6.9
		Total		232	100.0
2	If yes for, which type do you know? (Multiple Answers are possible) (n=216)	Stone bunds	Yes	28	12.0
			No	188	88.0
		Soil bunds	Yes	158	73.0
			No	58	27.0
		Cutoff drain	Yes	121	56.0
			No	95	44.0
		Trench digging	Yes	112	51.9
			No	104	48.1
		Fanya juu	Yes	79	36.6
			No	137	66.4
		Planting of d/t tree	Yes	130	60.2
			No	86	39.8
		Others	Yes	144	66.7
			No	72	33.3

*The category 'other' includes % of respondents who gave answers different from the enlisted ones

Source: Field Survey, 2014

4.4.1 Farmers' sources of information for the Soil and water conservation technologies

From the sample population, 140(60.3%) respondents got information about the soil and water conservation technologies from DAs followed by 60(25.9%) respondents who believed that NGOs as source of information for soil and water conservation technologies. Interestingly, only 20(8.6%) of the respondents responded that through traditional methods they learnt by themselves (Table 11). Farmers cannot adopt technologies if they do not have access to all the relevant information, but the information they have given is often incomplete, focusing only on the technical aspects and overlooking some key criteria from a farmer's point of view. The analysis is also shown in figure, 15.

Furthermore, this study falls short of agreement with the previous research done by (Perez and Tschinkel, 2003); the reality is often that most farmers fully realize the losses caused by erosion, and frequently use traditional soil erosion control methods. The reasons they do not enthusiastically adopt the conservation practices espoused by the implementing organisations have more often to do with the organisations' rigidity in applying technological packages and the farmers' limited labour or financial resources to experiment with and adapt some of the most promising technologies proposed than with their ignorance of soil erosion problems and solutions. But the most important reason for non-adoption is that farmers do not see clearly visible economic returns deriving from the technologies, which often require long-term investments, are difficult to perceive or measure (Bunch, 1999, cited in Perez and Tschinkel, 2003) and /or subtract from area cultivated.

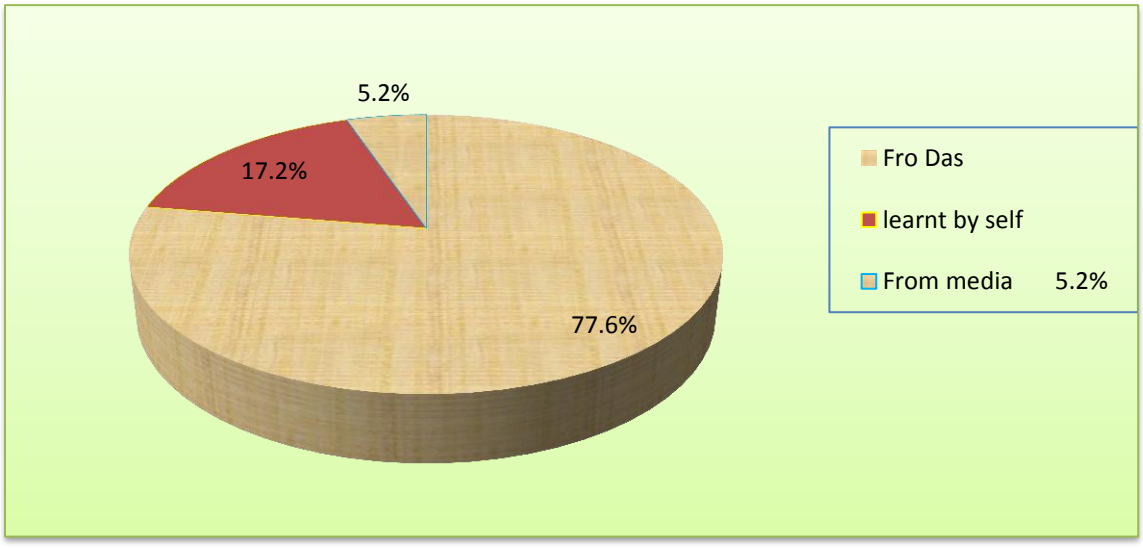
Table 11: Farmers sources of information for the SWC technologies and their ranks

Item	Ranks and percentage of responses					
Where did you get information about the soil and water conservation technologies (rank them according to the useful of the information if they are more than one)?	1st	2nd	3rd	4th	5th	6th
Traditionally (learnt by self)	40	60	50	12	20	50
From neighbors	0	0	70	32	50	80
From Media	12	60	30	0	14	10
From DAs	180	30	0	0	0	32
Other NGOs	0	40	32	30	60	0
Others	0	0	72	40	80	70

*The category 'other' includes % of respondents who gave answers different from the enlisted ones

Source: Field Survey, 2014

Figure 15: Farmers sources of information for the SWC technologies in the study areas



Source: assessed on the basis of field survey in Lemo woreda, 2014

4.4.2 Farmers' Perception, Productivity and Effectiveness of SWC Technologies

An analysis of the data in the table (12) illustrates the majority of respondents' perceive structural soil and water conservation technologies cheap and labor intensive. As the table indicates, about 122(52.6%), of the respondents responded as cheap and labor intensive, 97 (41.8%) cheap, 6(2.6%) expensive and the remaining 7 (3.0%) did not clearly know about it. And item number 2 of the same table about the types of soil and water conservation measures which are efficient to reduce the problem of soil erosion,91(39.2%) of respondents responded trench digging,75(32.3%) quoted Soil bunds and 63 (27.2%) stated Cut off drain. And in addition to this they also mentioned terracing as efficient technology to reduce the problem of soil erosion.

According to this study, respondents well recognized the importance of soil and water conservation measures in controlling erosion so as to enhance soil fertility. Soil and water conservation measures were practiced on both cultivation land and grazing lands or on hillsides and degraded lands or to rehabilitate the gullies. The soil and water conservation structures were constructed most probably in a dry seasons. And most of the conservation structures were practiced in order to protect the soil erosion and protect their environment. Dominantly, respondents practice structural soil and water conservation technologies such as trench digging, soil bunds, cutoff drains, waterways, fanya juu, and check dams.

In the belief of most of respondents' soil and water conservation measures introduced to the area were more productive than the traditional. As the table indicates, about 100(43.1%) of respondents' perceive soil and water conservation measures introduced to the area as more productive than the traditional ones and 80(34.5%) of respondents perceive as the same to traditional ones. On the other hand, 45 (19.4%) of the respondents perceive the introduced soil and water conservation technologies as less productive than the traditional ones.

This study analysis agrees with earlier findings by Kibemo (2012), the effectiveness and productivity of structural soil conservation measures can be seen either on their own land or on the land next to them or on the adjacent kebeles. Thus, if the specific conservation measure is more effective in controlling erosion and productive than other existing, farmers decide to install or familiarize it.

Respondents have well recognized the importance of soil and water conservation measures in controlling erosion so as to enhance soil fertility. Soil and water conservation measures were practiced on both cultivation land and grazing lands or on hillsides and degraded lands or to rehabilitate the gullies. Majority 173(67.7%) of the soil and water conservation measures have been applied on cultivated and grazing lands and all of them are physical conservation measures.

The soil and water conservation structures are constructed most probably in a dry seasons. And most of the conservation structures were practiced in order to protect the soil erosion and protect their environment. Respondents Perception of soil erosion problems and benefits of soil and water conservation technologies were positively and strongly associated with respondents' practice of structural soil and water conservation technologies. In fact, respondents' perception was one way that influences respondents' decision to practice structural soil and water conservation technologies on their land.

Table 12: Farmers' Perception, Productivity and Effectiveness of SWC Technologies

	Items	Category	Respondents' responses	
1			Frequency	Percent (%)
	How do you perceive structural soil and water conservation technologies?	Very cheap and easy	-	-
		Cheap	97	41.8
		Expensive	6	2.6
		Cheap and labor intensive	122	52.6
		Do not know	7	3.0
	Which of the following types of soil and water conservation measures are efficient to reduce the problem of soil erosion?	Stone bunds	-	-
		Soil bunds	75	32.3
		Cut off drain	63	27.2
		Trench digging	91	39.2
		Fanya juu	-	-
		Planting of d/t tree	-	-
		Do not know	3	1.3
2	How do you perceive the productivity of soil and water conservation measures introduced to the area compared to the traditional ones?	Less productive than the traditional ones	45	19.4
		The same as the traditional ones	80	34.5
		More productive than the traditional ones	100	43.1
		Don't know	7	3.0
3	Where/on which plots do you practice soil and water conservation technology?	Cultivation field	57	26.6
		Grazing field	18	7.8
		On both	173	67.7
		Total	232	100.0

Source: Field Survey, 2014

4.5 Institutional Supports in the Soil and water conservation activities

As can be seen from Table 13, only about 32(13.8%) of respondents had no contact with community based organization in their areas. The remaining 200(86.2%) of respondents had contact with community based organizations. And majority of respondents 112 (56.0%) had contact with DAs and the remaining 88(44.0%) had contacts with NGOs.

Access for information and contact with NGOs and DAs has a role on the practice of soil and water conservation activities. Farmers' close contact with DAs seems as better to adopt soil and water conservation structures and to conserve their environment. This is because: farmers reduce the risk associated with conservation structures by obtaining adequate information. The close contact with extension agents makes accurate and timely information easily available to farmers. The results of investigator's analysis is found to be similar with previous research done by (Benin ,2002, cited in Habtamu, 2006);that also found contact with extension agents to be associated with use of more drainage ditches, fences and stone terraces implying that farmers opt for long term land improving techniques if they have close contact with extension agents.

Table 13: Farmers' Contact with Community Based Organizations

Items	Category	Respondents' responses		
		Frequency	Percent (%)	Cumulative Percent
Do you have any Contact with Community Based Organizations in your area?	Yes No	200 32	86.2 13.8	86.2 100.0
If your answer is "yes", Which organization employees do you contact?(n=200)	DAs NGOs With both	112 - 88	56.0 - 44.0	

Source: Field Survey, 2014

Among assessed respondents in table 14 (1), 110(55%) of respondents have contact once per month with development agents. The remaining 90(45%) of respondents have contact twice per three months.

About 138(69%) of the respondents have responded to the environmental problem based on the information obtained from developmental agents about environmental issues. However, 62(31%) of respondents were not responded to the environmental problems. And as it can be observed from the data shown in Table 14, the majority 105(52.5%) of respondents have limited contact with soil and water conservation experts. And the mean of item 14(3) was 2.73 with the std. deviation 0.856.

Table 14: Farmers Contact with DAs and Practices of Soil and water Conservation

	Items	Category	Respondents' responses	
			Frequency	Percent (%)
1	How often you have obtained developmental agents advice on soil and water conservation practices? (n=200)	Once per month Twice per month Three times per month Once per three months Twice per three months	110 - - - 90	55.0 - - - 45.0
2	Based on the information obtained from developmental agents about environmental issues are you responding to this problem?(n=200)	Yes No	138 62	69.0 31.0
3	How do you describe the contact you have with soil and water conservation experts (DAs experts,)(n=200)	Very good. Good Limited Very limited No contact	22 42 105 31 -	11.0 21.0 52.5 15.5 -

Source: Field Survey, 2014

4.5.1 Training and organizational support for farmers

As item number 1 of the table 15 shows, about 105(52.5%) of respondents' attended training on soil and water conservation activities' and how to use soil and water conservation technologies. Others about 95(47.5%) of respondents did not attend trainings on soil and water conservation, as a result they did not know how to use soil and water conservation technologies. Respondents who attended training on soil and water conservation practices had better knowledge to conserve their environment as compared to those who did not attend trainings. This could be due to the fact that respondents who have attended training got information that was useful to make decision to conserve their environment. The result of investigator's analysis is found to be similar with previous research done by (Habtamu, 2006); Farmers that attended trainings on soil conservation are more likely to retain conservation structures than their counterparts that did not.

Table 15 shows that 105(52.5%) respondents mentioned that there were efforts made by woreda agriculture office to promote soil and water conservation practices and about 95(47.5%) respondents mentioned that there were interventions by NGOs to conserve degraded lands in their areas figure, 17. On the contrary, 84(42.0%) respondents said that there was no effort made by woreda agricultural office and 116(58.0%) of the interviewed mentioned that there was no intervention by NGOs to conserve their environment.

During the focus group discussion it was indicated that there are intervention efforts made by woreda agriculture office and NGOs to promote soil and water conservation practices. Efforts were made by woreda agriculture office for giving training and materials for usage to conserve watersheds in their environment. And also they mentioned some NGOs which were available in their areas such as, SOS, Poverty Reduction Organization, Land Use Project and the Productive Safety Net Program (PSNP). Some efforts of NGOs towards giving training to farmers and DAs, took the shape of giving materials which were important to conserve their environments and financial supports. For example, Desho-grass which was important for controlling soil erosion and some trenches digging materials are provided by them figure, 16.

The result of investigator's analysis is found to be similar with previous research done by (Tesfaye, 2011); Several NGOs and bilateral organizations adopted watershed development in the last decade in their perspectives intervention areas with collaboration of government partners. For instance the land rehabilitation project, with WFP Food-for-Work assistance aimed at

addressing the problems of food insecurity through the construction of soil conservation structures, community forestry, and rural infrastructure works.

Table 15: Training and organization support for farmers

	Items	Category	Respondents ' responses		
			Frequency	Percent (%)	Cumulative Percent
1	Have you ever attended trainings related to soil and water conservation?(n=200)	Yes No	105 95	52.5 47.5	53.5 100.0
2	Is there any effort made by Woreda Agriculture Office to promote local conservation practices?(=200)	Yes No	105 95	52.5 47.5	52.5 100.0
3	Is there intervention by NGOs to conserve degraded lands in your area?(n=200)	Yes No	84 116	42.0 58.0	42.0 100.0

Source: Field Survey, 2014

Figure 16: Field training in trench technology to development experts

Source: Field photograph by the researcher, 2014

Figure 17: Promoting local conservation practices by Woreda Agriculture Office

Source: Field photograph by the researcher, 2014

Chapter Five

5. Summary of Findings, Conclusion and Recommendations

5.1 Summary of the Study and Findings

The environmental sustainability mainly depends upon the carrying capacity of earth and its ecological footprint. Only through sustaining environment, the needs of the present and future generation can be met. Soil erosion is a major environmental problem and a decisive contributor for the prevailing food insecurity in Ethiopia. The soil loss by erosion is severe in highlands and continuous to threaten man's wellbeing as bulk of country's population is relying on agricultural production. Farmers are aware of soil erosion as environmental problem and declining yields from their farms from year to year. In the study area farmers community have no problem of perceiving the existence of soil erosion problem.

The dominant recognized causes of soil erosion in the study area include population pressure, slope steepness of the topography, heavy rainfall, ceaseless cultivation without fallowing, erodible nature of the soil, deforestation and desertification, absence and delay of soil conservation practices, and overgrazing. They identify types and severity of erosion by water. Gully formation is the main work of intensive rainfall as slope of the area is ranged from undulating to steeply sloping. And summer season is seen as the most severe season for soil erosion in the study area.

Involvement in off-farm jobs is common in the study area. Some are engaged in handicrafts, daily labor work, selling of firewood, small scale trading, and others. Off-farm activities have a negative effect on the adoption behavior of SWC due to reduced labor availability. When the farmer and their family members are more involved in off-farm activities, the time spent on their farmland will be limited and hence the family is discouraged from being involved in construction and maintenance of soil and water conservation structures. The result of investigator's study is found to be similar with previous research done by (Tesfaye and Debebe, 2013); also said that involvement in off-farm activities is the most significant factor that influences farmers' decision to remove conservation technologies. This is due to the fact that farmers who are involved in off-farm activities lack the required resources (mainly labor and time) to maintain SWC technologies. Such farmers need to be supported so that they can make decision to invest in soil and water conservation measures.

However, the result of investigator's study is found not similar with previous research done by (Fikru, 2009). According to Fikru, off-farm activities could be a source of income and might encourage investment in farming and soil and water conservation. And, finding of this study is inconsistent with the earlier findings by (Kibemo, 2012); involvement in non-farming job supports farmers in practicing structural soil and water conservation technologies by equipping materials required for construction of soil bunds, fanya juu, etc. For those farmers who have food security perceived soil and water conservation structures are as important and have been practicing them as well.

Majority of farmers participated in the soil and water community conservation activities. And from the survey made, majorities were voluntarily participating in the soil and water conservation activities. But still, about 36.6%of farmers' were forced to participate and 12.1% of the farmers' were not at all involved in the soil and water conservation activities due to different reasons. The result of investigator's study is found to be similar with previous research done by (Tesfaye and Debebe, 2013). Even Tesfaye and Debebe, found that the majority of the farmers considered soil and water conservation activities that were underway in their communities to be mandatory development works in which the Kebele administration and the DAs forced them to participate. This suggests that the practice did not respect participatory principles, and was thus a conventional top-down approaches. The most important factor discouraging the farmers from willing participation was found to be associated with the effectiveness of the soil and water conservation techniques under construction.

In the surveyed areas/ watersheds, the soil and water conservation structures/ technologies were under implementation. And more dominants soil and water conservation measures are: trench digging, fanya juu bunds, soil bunds, diversion ditches, terracing and check dams. Farmers Perception of soil erosion problems and benefit of soil and water conservation technologies were positively and strongly associated with farmers' practice of structural soil and water conservation technologies. In fact, farmers' perception was one way that influences farmers' decision to practice structural soil and water conservation technologies on their land. And the result of investigator's study was found to be similar with previous research done by (Tesfaye and Debebe, 2013); Farmers were aware and they used improved soil and water conservation

methods. And the most widely used improved soil conservation technologies were improved soil bund, fanya juu cut-off drain, and eyebrow basin.

According to this study Farmers close contact with Development agents seemed to be better to practice soil and water conservation activities and to conserve their environment. This was due to farmers' commitments to reduce the risk associated with conservation activities by obtaining adequate information. The close contact with extension agents makes accurate and timely information easily available to farmers. Training on soil and water conservation activities and conservation technologies and contact with development agents have role in gathering farmers' attention for practicing the conservation activities and conservation structures. The more effective and the productive were the structural soil and water conservation measures, the more the farmers did tend to practice and maintain the structures. Farmers who attended training on soil and water conservation practices had better knowledge to conserve their environment as compared to those who did not attend trainings. This could be due to the fact that farmers who have attended training got information that was useful to make decisions to conserve their environment.

5.2 Conclusion and Recommendation

5.2.1 Conclusion

Soil erosion is a major environmental problem and a decisive contributor for the prevailing food insecurity in Ethiopia. The soil loss by erosion is severe in highlands and continuous to threaten man's wellbeing as bulk of country's population is relying on agricultural production. Farmers are aware of soil erosion as environmental problem and declining yields from their farms from year to year. The dominant recognized causes of soil erosion in the study area include population pressure, slope steepness of the topography, heavy rainfall, ceaseless cultivation without fallowing, erodible nature of the soil, deforestation and desertification, absence and delay of soil conservation practices, and overgrazing. Involvement in off-farm jobs is common in the study area. Some are engaged in handicrafts, daily labor work, selling of firewood, small scale trading, and others. Off-farm activities have a negative effect on the adoption behavior of SWC due to reduced labor availability**.**

Majority of farmers participated in the soil and water community conservation activities. And from the survey made, majorities were voluntarily participating in the soil and water conservation activities. But still, about 36.6%of farmers' were forced to participate and 12.1% of the farmers' were not at all involved in the soil and water conservation activities due to different reasons. In the surveyed areas/ watersheds, the soil and water conservation structures/ technologies were under implementation. And more dominants soil and water conservation measures are: trench digging, fanya juu bunds, soil bunds, diversion ditches, terracing and check dams. Farmers Perception of soil erosion problems and benefit of soil and water conservation technologies were positively and strongly associated with farmers' practice of structural soil and water conservation technologies. According to this study Farmers close contact with Development agents seemed to be better to practice soil and water conservation activities and to conserve their environment. This was due to farmers' commitments to reduce the risk associated with conservation activities by obtaining adequate information. The close contact with extension agents makes accurate and timely information easily available to farmers.

5.2.2 Recommendations

Soil and water conservation measures necessarily entails coordination, comprehensive efforts and improved communications and more direct involvement of local communities, institutions, local governments and other stakeholders in the management of the environment as a whole.

Local governments', agricultural office and development agents should not force farmers' in soil and water/environmental conservation activities against their will. This should have been aroused in their minds. Agricultural office should provide farmers with variety of conservation measures so as to diversify the choice of farmers appropriate to their farm land and farm size.

Community awareness programs on the conservation measures should be promoted at local level by giving training and through the use of television and radio broadcasts. Indeed an exclusive broadcasting/telecasting channel for farmers is a welcome feature. Village extension agents should encourage proper use of sustainable soil conservation practices among the farmers through workshops, seminars and trainings. Contacts with development agents is found to surely increase the interest of the farmers in practicing structural soil conservation measures by providing useful information in terms of where and when to construct them.

Furthermore, the agricultural sector has to be made more economically attractive so that farmers can invest more on conservation based agriculture. Farmers' approval should be obtained if they are to yield genuine benefits. They should be involved in all stages of problem identification, alternative solutions prescription, implementation and evaluation of effectiveness and efficiency of the choices.

Those soil and water conservation and watershed management projects and implementation actions that are clearly biased toward certain technologies and approaches used or promoted elsewhere, should not be forced to adopt. Individual practices are seldom added or deleted, expanded or refined depending on their effectiveness and acceptance by farmers. Indigenous knowledge of farmers in this regard is to be appreciated, recognized, improved and applied.

Most development agencies carry out participatory assessments of farmers' needs, conditions and priorities but a very few of them make full use of this information for planning the content or delivery of services. Despite an over-abundance of participatory assessments, the provisions of extension services by many implementing organizations are strictly top-down. They often go on adopting and promoting technical packages without modifying and streamlining them fast enough or at all, even though the services that they offer become redundant, irrelevant or are not in a high priority to farmers. Therefore bottom-top approach should be encouraged to avail actual benefits. Involvement of local community is to be strengthened.

Development organizations and other concerned bodies need to take income generation activities for those farmers involving in off-farm activities. Farmers' off-farm involvements have some impacts, positively or negatively influencing their mode of approach to environmental conservation. Most farmers need cash income for their households. They often purchase staple foods to complement their own production, work as day labourers or migrate to meet their cash needs. With this meager income farmers buy food, agricultural inputs and know-how. Therefore, this situation should be changed and improved. Many farmers meet the goal of food security only through other income generation methods. The work done by the NGOs in the area of participatory soil and water conservation should be continued in a sustainable manner. Last but not the least, a concerted, co-ordinated effort from all the stakeholders in a sustainable manner only will accelerate solutions to this pressing problem. Under this context, the findings of this research study will definitely enrich the knowledge domain of the policy holders to pursue the goals of sustainable development and to foster a green economy.

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Annex I: Questionnaires of English version

JIMMA UNIVERSITY

College of Law and Governance

Department of Governance and Development Studies -Graduate schools in master of development management

Study Title: An Assessment of Perception and practices towards environmental conservation in Lemo Woreda Watersheds, Hadiya Zone, SNNPR, Ethiopia.

Introduction and Purpose of the study

Dear farmers:

My name is _____. I am interviewing farmers who have 20 and above years old to assess the perception and practice of water &soil conservation. The objective of this study is to assess the perception and practices of Farmers towards Environmental conservation particularly in soil and water conservation in Lemo District Watersheds SNNRPR, Ethiopia. I am going to ask you some questions that are very important for the conservation of soil and water practice. Please be frank and honest in your response. Data collected will be kept confidential. Please do not leave any item unresponded. I am grateful to your co-operation.

Name and signature of interviewer who sought consent_____ Date___

PA: _____

General Instructions (asking questions and recording answers)

All questions in this paper are based upon soil and water conservation. It is very important that you ask each question exactly as it is written on the questionnaires. Most questions have pre-coded responses. It is important that you do not read these alternatives/choices aloud to the households. When you ask a question, you should listen to the residents' response/answer, and then circle the code next to the category that best matches his/ her answer/response. In addition

to the questions, there are statements that are appear in all bolded letters, indicating that they are interviewer instructions and should not be read aloud to the respondents.

Questionnaire to assess Perception and practices towards environmental conservation in Lemo Woreda Watersheds, Hadiya zone, SNNPR, Ethiopia

001 House code_____

002. Questionnaire ID number_____

Part I: Demographic and Socio-economic characteristics of all eligible farmers

Q.N^{o}	Questions	Responses	Skip to
1	Head of Household	1. Male 2. Female	
2	What is your age? (completed in years)	_____years.	
3	Size of household	_____	
4	What is your religion?	1. Protestant 2. Orthodox 3. Muslim 4. Catholic 88. Any others (specify) _____	
5	What is your Ethnicity?	1. Hadiya 2. Amahara 3. Guraghe 4. Silte 88. Any others(specify) _____	
6	What is your marital status?	1. Single 2. Married 3. Divorced 4. Widowed 88. Any others (specify) _____	
7	Level of education	1. Illiterate 2.Primary school (1-8 grade) 3.Secondary school (9-12 grade) 4. Certificate and above	
8	What is your current occupational status?	1. Farmer 2.Government employee 3.Business 4.Private sector 5.Student 88. Any others(Specify)_____	
9	What is the average monthly income of the house hold? (in birr)	_____ 77,Don't know	

PART II Farmers' Perception and awareness in the Soil and water conservation activities

10	Do you think that soil erosion is an environmental problem in your area?	1. Yes 2. No	If no skip to Q#11-22
11	How do you describe the slope of your cultivation land?	1. Flat 2. Gently sloping 3. Moderately sloping 4. Steeply sloping	
12	If yes Q#10, what were /are the immediate causes of soil degradation? (Multiple Answers are possible)	1. Overgrazing of rangeland 2. Deforestation 3. Plugging steep slopes 4. Limited use of conservation structures 5. Continued cultivation/no fallowing 88.Any others (specify)_____	
13	What were/are the underlying root causes for soil degradation in your area? (Multiple Answers are possible)	1. Heavy rainfall 2. Steep topography 3. Population pressure 88. Any others(specify)_____	
14	What were the major forms of soil degradation in your area? (Multiple answers are Possible)	1. Soil erosion by water 2. Soil erosion by wind 3. Deforestation 4. Overgrazing of rangeland 5. Gully formation 88.Any others (specify) _____	
15	In which season erosion is more severe in your farm land?	1. Summer 2. Autumn 3. Winter 4. Spring	
16	Severity of the soil erosion problem in your cultivation land?	1. Very High 2. High 3.Moderate 4.Low 5.Very low	
17	Observed change in soil erosion severity over the past 5 years	1. Very High 2.High 3. Moderate 4.Low 5. No change	
18	How do you describe the degree of risk of soil erosion in your farmland?	1. Very High risk of soil erosion 2. High risk of soil erosion 3. Moderate risk of soil erosion 4. Low risk of soil erosion 5. Very low risk of soil erosion	
19	Is it possible to halt/minimize soil erosion problem?	1. Yes 2. No 77. Don't know	
20	If your answer is 'yes' for Q#19, how?		

		_____	
21	If your answer is 'no' for Q#19, why?	_____	
22	What do you think about the benefits obtained from land conservation practices?	_____	
23	Do you believe that investment in soil and water conservation practices is profitable in the long run?	1. Yes, 2. No 77. Don't know	

PART III Farmers' practices in the Soil and water conservation activities

24	Have you participated in soil and water community conservation activities?	1. Yes 2. No	If no skip to Q#25-37
25	If yes, Q#24 what kinds of conservation measure are you taking to solve this problem? (Multiple Answers are possible)	1. Soil bunds 2. Cut of drain 3. Fanya juu 4.Trench digging 5. Tree Planting 88.Any Other, Specify__	
26	How do you think that current farm land holding to support the household?	1. Very High 2. High 3.Medium 4.Low 5.Very low	
27	Do you have any off-farm employment?	1. Yes 2. No	
28	If yes, Q#27 what type of work do you do?	_____	
29	Do you see any influence of off -farm activities on soil and water conservation practices?	1. Yes 2.No 77. Don't know	
30	If your answer is 'yes 'Q#29 in what way they could influence the practice?	_____	
31	How do you see soil and water conservation practices over time?	1. Increasing 2.Decreasing 3. No change 77. Don't know	
32	If your answer is 'increasing', what are the reasons?	_____	
33	If your answer is 'decreasing', what are the reasons?	_____	
34	How is your adoption decision towards soil and water conservation measures?	1. Very good 2. Good 3. Poor	

35	How are you participating in the SWC activities currently underway in your Kebele?	1. Voluntarily 2.Forced to participate 3. Not involved	
36	Are your house hold members willing/have motive to involve in soil conservation practices?	1. Yes 2. No 77.Don't know	
37	If your answer is" no" for Q#36, what is the reason?	_____	

PART IV Farmers perception and practices towards externally introduced SWC technologies.

38	Do you know the existence of improved soil and water conservation structures?	1. Yes 2.No	If no skip to Q#39-45
39	If yes for Q#24, which type do you know? (Multiple Answers are possible)	1. Stone bunds 2. Soil bunds 3. Cutoff drain 4. Trench digging 5. Fanya juu 6. Planting of d/t tree 88. Any other (specify)_____	
40	Where did you get information about the soil and water conservation measures (rank them according to the useful of the information if they are more than one)?	1. Traditionally (learnt by self) 2. From neighbors 3. From Media 4. From DAs 5. Other NGOs 88. Any other (specify)_____	
41	How do you perceive structural soil and water conservation technology?	1. Very cheap and easy 2. Cheap 3. Expensive 4. Cheap and labor intensive 77. Do not know	
42	Which of the following types of soil and water conservation measures are efficient to reduce the problem of soil erosion?	1. Stone bunds 2. Soil bunds 3. Cut off drain 4. Trench digging 5. Fanya juu 6. Planting of d/t tree 77. Do not know	
43	How do you perceive the productivity of soil and water conservation measures introduced to the area compared to the traditional ones?	1. Less productive than the traditional ones. 2. The same as the traditional conservation measures 3. More productive than the traditional ones 77.Don't know	
44	Where/on which plot do you practice soil and	1. Cultivation field 2. Grazing field	

	water conservation technology?	3. On both	
45	What factor do you think affect practice of structural soil conservation measures?	_____	

PART V Institutional Supports in the Soil and water conservation activities.

46	Do you have any Contact with Community Based Organization in your area?	1.Yes 2.No	If no skip to Q#47-55
47	If your answer is "yes", Which organization employees do you contact?	1. Developmental Agents 2. NGOs 3. Developmental Agents and NGOs	
48	How often you have obtained developmental agents advice on soil and water conservation practices?	1. Once per month 2.Twice per month 3. Three times per month 4. Once per three months 5. Twice per three months 88,Anyothers(specify):_____	
49	Based on the information obtained from developmental agents about environmental issues are you responding to this problem?	1. Yes 2. No	
50	How do you describe the contact you have with soil and water conservation experts (DAs experts,)	1. Very good 2. Good 3.Limited 4. Very limited 5. No contact	
51	Have you ever attended trainings related to soil and water conservation?	1. Yes 2. No	
52	Is there any effort made by Woreda Agriculture Office to promote local conservation practices?	1. Yes 2. No	
53	If your answer is yes, Q#52 mentions those efforts.	_____	
54	Is there intervention by NGOs to conserve degraded lands in your area?	1. Yes 2. No	
55	If your answer is 'yes'Q#54 what are their contribution to conserve degraded areas?	_____	

Thank you very much!

A. Free Response (Open) To be replied by the members of the Focus group

1, what do you think are the possible causes of soil erosion problem in your area?

2, what do you think are the major consequence of soil erosion problem in your area?

3, Do you think the community is involving voluntarily in soil and water conservation activities?

A. Yes B. No If your answer is no, why?

4, How farmers' done with the soil and water conservation technologies introduced to the area?

5, In your opinion, what are the major constraints to implement soil and water conservation activities in your area?

6. What is the status of perception/awareness and practice of the community about the soil and water Conservation?

7, Is there NGOs in your area working on soil and water conservation activities?

B. Key Informants Interview questioners

1. Do you think soil erosion problem in your area?. A Yes B. No If your answer is yes, list the cause for land degradation?

2. Do you think that the farmers' do perceive the existence of the soil erosion problems in your area? A, Yes B. No If yes, how do you know their perception?

3. What are the major consequences of soil erosion problem in your area?

4. Do you think that the farmers' or the communities are voluntarily responding to these soil erosion problems? A. Yes B .No If no, why?

5. How farmers' done with the soil and water conservation technologies introduced to the area?

6. Is there any non-governmental organizations which working on soil and water conservation activates?

7, what is the contribution of your Institution for soil and water conservation activities?

Annex II: Questionnaire Hadiyisa version (local language)

Ejjoi I: Hadiyyisinne gudaakkoo Saga'l Xa'michcha

JIMMI YUNIIVARSIITE'E

Mannigattisaayinsaa See'l Kolleeja

Lichchi sorrobaa gassi losa'n baxxanchi la'm digire'i losan'n minenne lichchi awwonsi maastireeta.

Soroophphi Horoor woshshi: Lee'm Woradanne,Hadiyyi Zoonane,W/G/G/M/G/Q Itophphe'enne hegeeqqi egechchina(abooyyina) yoo aalo'oo qalbeexxaa laseesimma.

Soroophphi anga edannina qananamoohane

Aaggaa soroophphi horoorsawwitee:

Iitantakko'oo abuullaan:

Isummi _____ yamamookko. An ka ammanenne 20 hiinchi hanani umur yoo abuullaano wo'onnee buchcha egechchannee yookki qalbeexxaa aalo'oo laseeseena saga'l xa'michcha xa'moommulla. Ka soroophphek horoorsawwit abuullaan hegeeqqi egechchanne annannem wo'oo buchchaa egerimmanne yooki qalbeexxaa aalo'oo Lee'm Uulli buchchaa wo'i lallaphphi kululleessuwwanne W/G/G/M/Q laseesimma.

Kaba an wo'oo buchchaa egerimmina(abooyyimmina) awwaaddam xa'michchuwwa xa'moommo. Hino'o ki'nuwwi dabachcham caakkissakka'a amma'namchinne uwwehe. Kuwixxoo baa'yaat moqqo'onnetti ihimmi hasisookko. Ayyi xa'michchim daba'loo'n gatoone. Issitakkam hara'matinam shiqaakko galata uwwoommo.

Saga'l xa'michchi balli _____ agan _____ hiinchi _____

Abuullaa'n Mateeyyoom:

_____

Laseeshsha binnaa'ukki xa'maanchi xishshaqqi_____ ball___

001 Mi’n kooda _____

002. Xa’michchuwwi inkiinno’i xigo_____

Baxxanchi I: Doo’lanto’i Abuullaa’n Dutoomekii, Ikonoome’i Mateeyyoo’m Haalata

Xigo	Xa’michchuwwa	Dabachchuwwa	___kollonne caallehe
1	Mi’n gasanichi alibacha	1. Gonicho 2. Meniticho	
2	Umur mee’o?(hiinchinne kuramona)	_____hiincho.	
3	Mi’n abaros dutomma	_____	
4	Ki’nek amma’nat maha??	1. Pirotestaanta 2. Ortodoksa 3.Musliima 4. Kaato liika 88.Mullek yoolas (kullehe) _____	
5	Ki’nek giichchi maha?	1. Hadiyya 2. Amaara 3. Guraage’e 4. Siixe’e 88.Mullek yoolas (kullehe) _____	
6	Gaaram baaxxi (mine issimmi) duuha’i maha?	1. Mine issummoyyo 2. Mine issaammo 3. Annanni inkaammo 4. Lehihne annanni inkaammo 88.Mullek yoolas (kullehe) _____	
7	Affakko’i shiqqeen losa’n gabal hinkane?	1.Losa’n agumoyyo 2.Luxxigabala(1-8) 3.La’m gabala(9-12) 4.Saritifikeeta immiyyohane	
8	Ki’nek bax duuha’i maha?	1. Abuullaancho 2.Adi’l baxaancho 3.Diinaxxi baxo 4.Gaqqi baxo 5.Losaancho 88.Mullek yoolas (kullehe) ___	
9	Ki’nek lambe’aanchi aga’n siixxo’i hinkaa’na (birinne kullehe).	_____ 77. La’oommoyyo	

Baxxanchi II : Buchchaa Wo'o Egerimmina Yookki Abuullaa'n Do'ixxa.

10	Ki'n olla'anne buchchi dirsinne agamchi hegeeqqi hawwoo yitakka'a sawwitakkamo?	1. Eyya 2. A'a'e	A'a'e yitakkolas ,xa'm#11-22 calehee
11	Abuulli uulli afuuchchisa hinkid caakkissakkamo?	1. Biir uulla 2. Hoffokam beqera 3.Lambe'aanchisa beqera 4. Horiyyem beqera	
12	Eeyyaa yitakkolas xa'mmichch#10,buchchi harshoom geleddimmina gaaggaabaalli xoox maha? (Dut dabachcha uwwimmi xanamookko)	1. Higisakka'a allaarimma 2.Giirinaa mi'n baxinaa haqqa murimma 3. Horiyyem beqera abuulimma 4.Llosissako'i losisha seeraamisa awwaaxximma hoogimma. 5.Uumo'i amaxxa seeraamisa awwaaxximma hoogimma 88.Mullek yoolas (kullehe) _____	
13	Eeyyaa yitakkolas xa'mmichch#10,buchchi harshoom geleddimmina horoor mashka'i maha? (Dut dabachcha uwwimmi xanamookko)	1. Kee'maalli xeena 2, Beqer uulli afuuchcha 3.Minaadaphphi dutooma 88.Mullek yoolas (kullehe) _____	
14	Ki'n hegeegonne buchchi harshoom geleddimm qoocci(duuha'i) maha? (Dut dabachchi xanamookko)	1.Buchchi wo'inne agamcha 2.Buchchi hafachchinne agamcha 3.Haqqa murimma 4.Hixe murugisakka'a allaarimma 5.Balle qooccimma 88.Mullek yoolas (kullehe) _____	

15	Hinka sannanne(ammanennette) ki'n abuulli uullane buchchi agamookkok?	1.Hagayyenne 2.Fiittenne 3.Billenne 4.Qaraaxonne	
16	Xa'mmichch#10,buchchi agamichi hawwi kee'maalla yitakko'ilas,	1.Horiyyem kee'maalla 2.Kee'maalla(jora) 3..Lambe'aancho 4.Hoffane 5.Horem hoffane	
17	Higukki 5 hiinchi woronne moo'amukki kee'maalli buchchi aganchi dabassamichi moo'amichi	1. Horiyyem kee'maalla 2.Kee'malla 3. Lambe'aancho 4.Hoffane 5.Dabassamichi bee'e	
18	Ki'n abuulli uullaane yookki buchchi agamchi hawwo hinkid moo'lakkamo?	1. Horiyyem kee'maallis 2. Kee'maallisa 3. Lambe'aanchisa 4. Hoffan issaa 5. Horem hoffan issaa	
19	Buchchi harshoom geleggimma sholliisimmi xanamoo?	1. Eeyya 2. A'a'e 3.La'oommoyyo	
20	Xa'mmichch#19 dabachcha eeyya yitakkolas,hinkid?	_____	
21	Xa'mmichch#19 a'a'a, yitakkolas, mahina?	_____	
22	Buchcha egechchinne siidamukki danaam aallo hinkid moo'lakkamo?	_____	
23	Haraar bax marat wo'o buchcha egerimmanne mishaam iheenaa baxonne hossenaa xanookkoo yitakka'a amma'nitakkamo?	1. Eeyya 2. A'a'e 3.La'oommoyyo	

Baxxanchi III: Buchchaa Wo'o Egerimmi (abooyyimmi) Abuulla'n Angga Ejja.

24	Ka hiinchi woronne minnaadabinne maqirem buchchaa wo'o abooyyimmi maratonne anga eddakka'a?	1. Eeyya 2. A'a'e	A'a'e yitakkolas,xa' m#25-37
25	Xa'mmichch#24 eeyya yitakkolas, hink hagara laqqakkamo?	1. Buchchc diidaassimma 2.Gogo murimma 3. Fanya juu 4.Trench hinimma 5. Haqquwwa kaasimma 88.Mullek yoolas (kullehe) ____	
26	Mi'n amaxxa hara'mimmina ka ama'n uulli amajja hinkid sawwitakkamo(mollakammo)?	1. Horiyyem lobekata 2.Lobekata 3. Lambe'aancho 4.Hoffane 5.Horiyyem hoffane	
27	Abuulliinsi biiree'n mulli baxi yoohonnihe?	1. Eeyya 2. A'a'e	
28	Xa'mmichch#27 eeyya yitakkolas,hinkido'i baxo baxxakkamo?	_____	
29	Abuulliinsi biiree'n baxim buchcha wo'o abooyyimmi baxonne ciimo'o isssoo?	1. Eeyya 2. A'a'e 77. La'oommoyyo	
30	Xa'mmichch# 29eeyya yitakkolas, baxoonne hinka googinne ciimo'o issoo?	_____	
31	Qeera'l ammanenne buchcha egerimmi aalo'o hinkid moo'lakkamo?	1.Edoolla 2.Hoffe'ooolla 3.Dabassamcha moo'isukkoyyo 77.La'omooyyo	

32	Xa'mmichch#31 edoolla yitakkolas, ki'nek mashka'i maha?	_____	
33	Xa'mmichch#31 hoffe'oolla yitakkolas, ki'nek mashka'i maha?	_____	
34	Ki'nek Wo'oo buchchaa egerakkam qqoromma awaxim mal maha?	1.Horemdanaamo 2.Danaamo 3.Hoffane	
35	Ki'n qabale'enne Wo'oo buchchaa egerakkam baxoonne hinkid anga eddakka mulla?	1.Eeyyitinne 2.Irtinne 3.Anga edummoyyo	
36	Ki'n mi'n abaroos buchcha egechchi maratonne anga edoollannihe/anga edimma ittoohonihe?	1. Eeyya 2. A'a'e 77.La'omooyyo	
37	Xa'mmichch#36 a'a'e yitakkolas, mashka'i maha?	_____	

Baxxanchi IV: Buchchaa Wo'o Egechchi Tekinolooje'ee Abuulla'n Qalbeexxa

38	Areesamaakkoo wo'ikaa buchcha egerimmi qooroom (qoocci) yoo'isa laqqakkamo?	1. Eeyya 2. A'a'e	A'a'e yitakkolas,xa 'm#39-45
39	Xa'mmichch#38 eeyya yitakkolas, ka hawwo tirimmina hinka abooyyimmi qooroomanne anga eddakka'a?	1. kinna didasimma 2.Bucha didasimma 3.Wo'i googo murimmanne 4.Trench hinimma 5.Fanya juu 6. Haqquwwa kaasimma 88.Mullek yoolas (kullehe) __	

40	Buchchaa wo'o egechchi qoorooma hannii siiddakko'o (googguwwoom lobakat ikkolas gabalinne dissehe?	1. Losammissanne(igaginnem) 2.Olla'iinsi 3.Duta edansiinsi(media) 4.DAs siinsi 5. Mulli NGO-siinsi 88.Mullek yoolas (kullehe) ____	
41	Qooccaam buchcha egerimmi googuwwa hinkid moo'lakkamo?	1. Horem bushaallaa sholle'aallaa 2. Bushaalla 3.Xee'aalla 4. . Bushaalla annan malaye hasohane 77. La'oommoyyo	
42	Wo'oo buchchaa egerakkam googguwwi hagalluwwinisi buchchi agamcha gabbaa'oo mishaam qooroom hinkane?	1. kinna didasimma 2.Bucha didasimma 3.Wo'i googo murimmanne 4.Trench hinimma 5.Fanya juu 6. Haqquwwa kaasimma 77. La'oommoyyo	
43	Gaassi googinne akeekan sinoommaare, wo'ikaa buchcha egechchi gooqqi mishaamooma hinkid moo'lakkamo?	1. Gaassaanniinsi mishaamoomanne hoffane 2.Gaassiqooroominnem matome 3.Gaassilosammukkannisse mishaamo 77. La'oommoyyo	
44	Hinkido'i hagar uulli baxxanchannette buchchi egechchi losixxa issitakkamok?	1. Harqooxxi oodo'onne 2. Lar allaa'loo oodo'onne 3. Lamonnem	
45	Qoocci buchchi egechchi (abooyyi) qoorooomanne ciimo'o afisoo luwwi mahaa yitakka'a sawwitakkamo?	_____	

Baxxanchi V: Buchchaa Wo'o Egerimmina Xaaxxixxi Hara'amato

46	Hegeeqqi abooyyi Minaadabinne shoota'amaakkoo xaaxxitinne edanch yoo?	1. Eeyya 2. A'a'e	A'a'e yitakkolas, xa'm#47-55
47	Xa'mmichch#46 eeyya yitakkolas ,hinka xaaxxixxi baxaaninnette edamicha issitakkamok?	1. Adi'l mi'n baxaaninne 2. NGO ii uwinne 3.Adi'l mi'n baxxaanine NGO ii uwinne.	
48	Buchchaa wo'o egechchi losanonne lichchi mixxeelli sogitano hinkaa'n ammane aa'lakka'a?	1.Agananne mataagge 2,Agananne lamaagge 3.Agananne sas kore 4.Sas agananne mataagge 5.Sas agananne lamaagge 88.Mullek yoolas (kullehe) _____	
49	Hegeego fuu'lishshi mixxeelliinsi siddakko'i baa'yaatanne bakke'imminne, ka hegeeqqi hawwi quuxonne dabachcha uwwitakamullaanihe?	1. Eeyya 2. A'a'e	
50	Wo'oo buchchaa egechchi mixxeella'n lachchi manninne yoo edamcha hinkid caakkissakkamo (DAs lachchi manna)	1. Horem danaamo 2.Danaamo 3.Qoodamma 4. Horem qoodamma 5.Edamchbee'e	
51	Buchchaa wo'o egerimma moo'oo booradishsha massitakko'i ball yoo??	1. Eeyya 2. A'a'e	
52	Losammi buchchaa wo'oo egechchi aalo'o li'issimmina woraxxi abuullikii hax uulli lichchi bax min issukki luwwi	1. Eeyya 2. A'a'e	

	yoohonnihe?		
53	Xa’mmichch#52 eeyya yitakkolas,issukkiluwwa fintehe.	_____	
54	Harshoom geleddukki uulla abooyyina NGO ii issukki haramat yoo?	1. Eeyya 2. A’a’e	
55	Xa’mmichch#54 eeyya yitakkolas,hegeegonne issukki luwwa fintehe	_____	

Araqa galaxxoommo!.

A.Moqqo’i bee’i (fooqaakko dabachcha): quux moo’oo gaalichi dabaroohane

1, Ki’n hegeegonne buchchi agamchi hawwo abuullaan la’ookkoo yitakka’a sawwitakkamo?

A. Eeyya B. A’a’e Eeyya yitakkolas,ixxuwwi qalbeexxa hinkid laqqakkamo?

2, Ki’n gattenne uulli buchchi agamichchina(aanshamchina) mashka’i mahi ihenaxanokko yitakka’a sawwitakkamo?

3, Uullibuchchi agamchina horror mashka’a yitakka’a ki’n gattenne sawwitakkamok maha?

4, Abuullaan ka buchchi agamchchi hawwi bikkina danaam eeyyitinne dabachcha uwwamoolla yitaaka’a sawwitakammonehe?

A.Eeyya B. A’a’e ki’n dabachchi a’a’e yittakkolasi,mahina?

5, Ki’n hegeegonne uwwamukki wo’oo buchcha egechchi tekinolooje’i caakkishsha abuullaan hinkid awwaxxitamolla

6,Ki’nisanne ki’n gattenne buchchaa wo’oo egechchi baxo baxonne hosishshina horoor qolat ihooluwwi maha?

7, Ki’n hegeegonne uumo’i amaxxi egechcha mishaam isinne awwo’namsakka’a fuu’lishshina mah baxanchi hasisookko?

B. Sagarinne xa’makkam xa’michchuwwa

1, Ki’n hegeegonne buchchi geledimmi hawwi yookkoo yitakka’a sawwitakkamonihe?

A. Eeyya B. A’a’e dabachcha eeyyaa yitakko’ilas,buchchi geleddimmi mashka’a fintehe

2,Ki’n hegeegonne yookki buchchi agamchi hawwo abuullaan qalbeexxitamoo yitaka’a sawwitakammonihe?

A.Eeyya B. A’a’e eeyyaa yitakkolas,ixxuwwi qalbeexxa hinkid laqqakkamo?

3,Ki’n hegeegonne buchchi harshoom geleddimmi horoor xoox mish hawwi maha ?

4, Abuullaan ka buchchi agamichi hawwina laboodabachcha eeyyitinne uwwitamullaa yitaka’a sawwitakamonhe ? A.Eeyya B. A’a’e a’a’e yitakkolas,mahina?

5, Ki’n hegeegonne uwwamukki wo’oo buchcha egechchi tekinolooje’i caakkishsha abuullaan hinkid awwaxxitamolla?

6, Hegeeqqi quuxo moo’oo baxonne anga edam xaaxxittuwwi yo’onnihe?

A.Eeyya B. A’a’e eeyyaa yitakkolas,buchchaa wo’oo moo’oo’isinne hinkido’i baxo baxxamolla?

7, Ki’nisanne ki’n gattenne buchchaa wo’oo egechchi baxo baxonne hosishshina horoor qolati’i ehan dabechi ihooluwwsi maha?