ADDIS ABABA UNIVERSITY
COLLEGE OF DEVELOPMENT STUDIES
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DETERMINANTS OF FARMERS' LAND MANAGEMENT PRACTICES: THE CASE OF TOLE DISTRICT, SOUTH WEST SHEWA ZONE, OROMIA NATIONAL REGIONAL STATE

BY
DESTA DAMENA HEYI

JULY, 2009
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A THESIS SUBMITTED TO THE INSTITUTE OF REGIONAL AND LOCAL DEVELOPMENT STUDIES OF ADDIS ABABA UNIVERSITY IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE OF MASTER OF ARTS IN REGIONAL AND LOCAL DEVELOPMENT STUDIES

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Table of Contents

Pages

List of Tables

List of Figures

Acronyms

AAU	Addis Ababa University
ADLI	Agricultural Development Led Industrialization
ARDO	Agriculture and Rural Development Office
BoFED	Bureau of Finance and Economic Development
BoARD	Bureau of Agriculture and Rural Development
CSA	Central Statistical Authority
DAs	Development Agents
DEO	District Education Office
EEA/EEPRI	Ethiopian Economic Association/Ethiopian Economic Policy and Research Institute
EFAP	Ethiopian Forest Action Plan
EPA	Environmental Protection Authority
FAO	Food and Agricultural Organization
FEDO	Finance and Economic Development Office
FGD	Focus Group Discussion
GDP	Gross Domestic Product
FSS	Forum for Social Studies
IUCN	International Union for Conservation of Nature
ILRI	International Livestock Research Institute
KIs	Key Informants
M.A.S.L.	Meter above Sea Level
MoA	Ministry of Agriculture
MoARD	Ministry of Agriculture and Rural Development
MLRA	Ministry of Land Reform Administration
MOPED	Ministry of Planning and Economic Development
NGOs	Non Governmental Organizations

PAs	Peasant Association
SPSS	Statistical Package for Social Sciences
TLU	Tropical Livestock Unit
UNDP	United Nations Development Program
UNEP	United Nations Environment Program
USAID	United States Agency for International Development
WB	World Bank
WCED	World Commission for Economic Development
WFP	World Food Program

Abstract

Land is the most important natural resource everywhere in the world and its importance for developing countries like Ethiopia is even more critical due to their heavy dependency on land resources. However, this vital resource is losing its productivity due to land degradation.

The overall objective of this research was to identify determinant factors of farmers' land management practices in Tole district of Oromia National Regional State. For that a comprehensive research approach which employs both qualitative and quantitative data was used and data were collected both from primary and secondary sources. For primary data collection different data collection techniques which include; household survey, focus group discussions, key informants interviews and personal observation were used. For the household survey, 120 sample household heads were randomly selected from four sample kebeles. For the secondary data collection different documents were reviewed. The collected data are analyzed using descriptive and inferential statistics.

The findings of the research show that the district is facing increasing trend of land degradation. Gullies and rills are common features in the district and large area of land is becoming out of use. On the other hand, land management practices by farmers are found to be low in comparison to the level of degradation. This research more specifically attempted to identify major factors that determine farmers' decision on two relatively common land management practices, terracing and manure application. Accordingly, educational status of farmers, farmers' access to extension services and farmers' training are identified to have significant positive impact both on terracing and manure application. Age of farmers and livestock holding are also identified to have significant positive influence on manure application, but not on terracing. Access to credit is identified to have significant negative influence on terracing and male headed households are more likely to practice terracing. Other remaining factors such as farmers' perception on land degradation problem on their own farmland, farm size and number of economically active household members are not found to have significant influence.

Based on the findings; farmers' training, functional adult literacy training, strengthening extension services, enhancing farmers' involvement in design and implementation of land management practices, expansion of non-farm activities to minimize pressure on land and others are recommended to minimize the problems of land degradation in the area.

CHAPTER ONE

INTRODUCTION

This first chapter gives general information about the research and it has eight sections. Under the first and second sections, background and statement of the problem are briefly discussed. Research objective and questions are presented in the third and fourth sections, respectively. In the fifth section, highlight on the significance of the study is given. The methodology adopted by the research is explained in the sixth section. Scope and limitation of the research and organization of the thesis are described in the remaining two sections.

1.1. Background to the Problem

Land is the most important natural resource allover the world. It is a place from which human beings are exploiting a number of resources (Taffa, 2002). Almost all food production for the world population is derived from land and the need to produce more is increasing from time to time due to an increase in population. For increasing production, either area under cultivation must be expanded or its productivity needs to be increased. Thus, fertility of land is a decisive factor in addition to other technological inputs (Woldeamlak, 2003).

However, land is losing its productivity due to a rising trend of land degradation (ibid). Land resources degradation, resulting from different causes, is threatening long term productivity. Nowadays land degradation is reducing yield significantly and it is more acute in some

parts of the world than others. For example in Central America, 75% of crop land is seriously degraded while in Africa, 20% of the total land area is at risk (Sida, 2007).

Ethiopia is the third among the countries with worst records of soil erosion, following India and Colombia. Ethiopia loses 2 billion metric tons of soil annually, while India and Colombia loses annually 6 billion and 4 billion metric tons of soil, respectively (Abbi, 1995). It is estimated that Ethiopia has already lost about 45% of its arable land in highland areas above 1500 m.a.s.l., which accommodates 88% of the Ethiopian human population, 75% of the livestock population, and 95% of the total cultivated land (Lekew et al., 2000; EEA/EEPRI, 2004/05).

On the other hand, like many other developing countries, Ethiopia is characterized by agrarian economy and about 85% of its total population derives means of survival from agricultural activities. Moreover, the role of agriculture in the overall economy is too large. It contributes 50% of the total GDP and 85% of foreign exchange earnings. Thus, land productivity is one of the key elements for enhancing economic development of the country. In contrast, the level of land degradation has already reached an alarming stage (MoARD/WB, 2007). This land degradation has been recognized to be one of the chronic problems in Ethiopia and many efforts have been made against it. However, the problem of land degradation is continuing and natural resource base is deteriorating at alarming rate (Genene, 2006; Yohannes, 1999).

Hence, factors that are playing a determinant role in improving land productivity need to be given due attention. The users' land management practices are among the key factors in maintaining and

improving land productivity (EEA/EEPRI, 2002). Consequently understanding the factors that determine farmers' decision on land management practices plays significant role in the formulation and implementation of appropriate policies and strategies in the fight against land degradation. Therefore, this research aims to examine different factors that are affecting farmers' land management practices in Tole district of Oromia National Regional State.

1.2. Statement of the Problem

In Ethiopia, the heavy dependence of people's livelihoods on agriculture and inappropriate use of natural resources resulted in fast and vast land degradation (Genene, 2006). On the other hand, development of agricultural sector partly depends on land productivity. However, this resource is seriously threatened by land degradation and aggravates the food security problems in the country through its adverse impact on crop yield. The country couldn't feed its population at present and it will have difficulties doing so in the near future partly due to serious land degradation (Genene, 2006; Kruger et al., 1997).

As a result of severe land degradation and related factors, food insecurity seems endemic to Ethiopia where there are about 5-7 million people who are chronically food in-secured and dependant on food aid each year (USAID, 2003). The country's food production is by far below the food demand of the population, which forced the country to import large amounts of food from abroad. On average, it imports about 400,000 metric tons of food per year (Berhanu, 2004). Furthermore, the country receives very large amount of food aid and the current average amount that it receives to fill the gap is about 720,000 metric tons annually (WB, 2007b).

As indicated above, failure of Ethiopian agriculture to feed the population is partly resulted from cumulative effect of land degradation mainly in the highland part of the country (Kruger et al., 1997; Yohannes, 1999). Therefore, improving productivity of land is so crucial in improving the welfare of the agrarian population in particular and the overall economy of the country in general (WB, 1989 cited in Berhanu, et al., 2004). With the traditional land use and land management system, which is generally inefficient and archaic, it is becoming very challenging for Ethiopia to feed an increasing population. As a result, there should be appropriate land management systems to improve the productivity of land particularly in highland areas where the problem of land degradation is severe (Berhanu, et al., 2004).

To solve the problems of land degradation in the country, a lot of efforts have been made since 1970s. A large number of soil and water conservation activities were implemented in different parts of the Ethiopian highlands in 1970s and 1980s with a huge resource obtained from international community, particularly WFP. However, at the end, the intervention couldn't be sustainable and able to bring the intended impact (Woldeamlak, 2003; Yohannes, 1999). The major factors contributing to the failure were; lack of consideration to local factors that would affect farmers' acceptance of the interventions and the top-down approach which marginalized local communities' participation (Woldeamlak, 2003; Yohannes; 1999 and Krugert al. e, 1997).

So far different researchers have done different studies on land degradation in different parts of Ethiopia. These researchers were mainly focused on: nature of land degradation; traditional farmers' land management practices; ongoing soil and water conservation by

government and other actors; farmers' perception on soil fertility change and on causes of land degradation (Aklilu, 2006; Eyasu, 2002; Genene, 2006; Taffa, 2002; and Yohannes, 1989). 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. Moreover, the major environmental, socio-economic and policy factors that have contributed to accelerated land degradation are fairly addressed. Nevertheless, as far as the researcher's knowledge is concerned, there is a research gap on the issue of what social, institutional, and demographic factors determine farmers' land management practices. In light of this, micro-level researches on determinants of farmers' land management practices have significant importance in-order to design and implement effective land management interventions.

To this effect, this research utilized cross-sectional research design where one-time data is collected and analyzed to identify determinants of farmers' land management practices in Tole district of South West Shewa Zone of Oromia Regional State. The reason why this study district is selected is that it is among the Ethiopian highland districts that are facing problems of land degradation. This district has been identified to have serious land degradation problem and it was indicated that this problem is among the major constraints for crop production in the area. It was further explained that there was no external intervention and adequate local efforts to minimize the existing problem (BoFED, 2007). In addition, in this district, so far no study has been done on issues related to farmers' land management practices.

1.3. Research Objectives

1.3.1. General Objective

The general objective of this research is to identify determinant factors of farmers' land management practices in the study area.

1.3.2. Specific Objectives

The specific objectives are to:

- Identify the nature of land degradation in the study area;
- Identify major land management practices in the study area;
- Assess the challenges in undertaking different land management practices and
- Explore the social, institutional, economic, and demographic factors that determine farmers' land management practices in the study area.

1.4. Research Questions

The research will answer the following major questions:

1) What is the nature of land degradation in the study area?
2) What are the major land conservation techniques or management practices that are utilized by the farmers in the study area?
3) What are the challenges in undertaking land management practices in the study area?
4) What are the major determinants of land management practices in the study area?

1.5. Significance of the Study

Agriculture is the backbone of Ethiopian economy attracting a special attention by the government of Ethiopia for the overall future economic transformation. Various policies and strategies such as, Agricultural Development Led Industrialization (ADLI) were designed in the past years to transform the sector. Among the major factors determining the success of these strategies and policies, sustainable utilization and management of land is one of the critical elements. However, land degradation in general and soil erosion in particular is among the pressing problems that adversely affect the agricultural performance of the country (Woldeamlak, 2003).

Given the magnitude of land degradation problems and research gaps in areas of determinants of farmers' land management practices; this research has big significance. It could encourage researchers for further study on the issue and serve as one of the reference materials. In addition to this, identification of determinant factors is expected to be useful for policy makers, practitioners and decision makers in making informed decision based on realities on the ground.

1.6. Methodology

1.6.1. Research Approach

Land management practices could be affected by different socio-economic and institutional factors that need to be clearly understood. Some of the pre-supposed determinant factors have some political sensitivity, thus collection of data needs to be not only thorough but also

systematic. Consequently, a comprehensive research approach which employs both quantitative and qualitative data was used. These qualitative and quantitative approaches were simultaneously applied to ensure the quality of data and to understand the issue in detail. For quantitative data collection, household survey, where structured questionnaire was administered to sample household heads, was used. Similarly, qualitative data was collected through different PRA tools such as key informants interview, focus group discussions and physical observation. The details of data collection procedures are presented below, under the data collection techniques' sub-section.

1.6.2. Sampling Techniques

For the purpose of this study multi-stage random sampling was employed. Before starting sample selection, kebeles in the district were categorized based on agro-ecology of the district. According to the information from district ARDO, the district has two agro-ecologies. These are temperate (highland) agro-ecology, locally called *beda* and sub-tropical (mid-highland) agro-ecology, which is locally called *beda-dare*. From the total twenty four rural kebeles in the district, five were located in highland agro-ecology, whereas nineteen kebeles were located in mid-highland agro-ecology. After categorization of kebeles, decision was made to take one kebele from highland agro-ecology and three kebeles from mid-highland agro-ecology based on the principle of proportionality to size.

After this decision, all the four kebeles were randomly selected from respective agro-ecologies. Next to that, one '*got*[1]' was randomly

[1] It is the smallest administrative sub-division under kebele and according to the current structure each of the kebeles in the district has three 'gots' under it.

selected from each of the selected kebeles; and from these four *'gots'* 120 household heads (30 household heads from the highland, and the remaining 90 from mid-highland agro-ecologies) were selected using systematic random sampling technique. In selecting the 90 household heads from kebeles in mid-highland agro ecology, principle of proportionality to size was applied.

List of household heads from district inland revenue office was used as a sampling frame in order to randomly select the 120 sample households. It has been learned that the list was prepared by kebeles' administration office and transferred to the office for tax purpose in the current Ethiopian fiscal year.

Table 1.1: Sample Kebeles and Households

S/N	Name of Sample Kebeles	Name of Sample *'Gots'* in the Kebele	Total Number of Households in the *'Gots'*	Total Number of Sample Household heads	
				Number	Percentage
I	**From *Beda-dare* (mid-highland) Agro-ecology**				
1	Besi-Bilida	Shankora and Borche	175	34	19
2	Kursity and Arada Leka	Arada Leka	149	27	18
3	Tume Yeya	Siba	150	29	19
	Sub-total		**474**	**90**	**18.99**
II	**From *Beda* (highland) Agro-ecology**				
1	Malima Tume Chirfa	Yaya	134	30	22
	Total		**608**	**120**	**19.74**

In addition to random sampling technique, which was used to select sample household heads for the survey, purposive sampling method was used to select participants of focus group discussions (FGDs) and key informants interviews.

1.6.3. Type and Source of Data and Its Collection Techniques

To undertake this study, both qualitative and quantitative data that were collected from primary and secondary sources were used. For collecting these data, different techniques of data collection were employed, which include; household survey, focus group discussions, key informants interviews, personal observation and review of different records and documents.

Primary data were largely collected through household survey, key informants interviews, FGDs and personal observations. On the other hand, for secondary data, records of district ARDO and district administration office, different published and unpublished materials from different agencies and government offices such as CSA, Oromia BoFED, South West Shewa Zone FEDO and others were reviewed. These different techniques of data collection were used in-order to get comprehensive data and avoid data gaps. Moreover, they were used for triangulation purpose in-order to check the reliability of collected data. Each of the mentioned data collection techniques are described below.

a) Household Survey

For undertaking the household survey, structured questionnaires, both open ended and close ended, were used. To check the validity of the questionnaire, pre-test was done based on which some amendments were made. Next to that, as farmers in the study area speak Afan Oromo, the questionnaires that initially prepared in English were translated to local language, Afan Oromo.

Four enumerators, all diploma holders, were recruited from the study area and one day intensive training was given to them on techniques of data collection. Following the training, the data collectors were made to exercise data collection on the field for a half day before actual data collection was started. Then discussion was made to make the questionnaires more clear and actual household survey was started and completed during the last weeks of February, 2009. Data at household level were collected by visiting each and every one of the sample respondents; and one PA has been administered at a time to enable

enumerators help each other and allow the researcher to conduct close monitoring and supervision.

b) Focus Group Discussions

In each PA, one (a total of four FGDs) focus group discussion was conducted by the researcher. For this semi-structured open ended questionnaires or check-lists were prepared and the researcher involved people with different socio-economic background on the FGDs. These people with different backgrounds included elders, poor women and men, youth and adult men and women and that helped to get the voice of all, which has a contribution in enhancing the quality of data.

The FGDs focused on the problems of land degradation, land management practices by farmers, determinants of land management practices and related issues. It facilitated to obtain detail qualitative information and the importance of this in supplementing and also triangulating the data from household survey was significant.

c) Key Informants Interviews

Key-informants interview was another tool adopted for qualitative primary data collection and it was used for triangulating data collected through other techniques. For this key informants interviews, semi-structured open ended questionnaires were used and this was administered by the researcher. For the key informants interviews, all development agents (DAs[2]) working in the sample Kebeles, district head administrator, head

[2] According to the existing structure, three DAs with different specialization (natural resources conservation, animal science and plant science) are assigned to a kebele. However, district ARDO indicated that currently only some kebeles have all the three and others have one or two DAs.

and deputy of district ARDO, head for natural resources management section of district ARDO, soil and water conservation and forest protection, development and utilization experts and two professionals from Oromia Agriculture and Rural Development Bureau were interviewed. Altogether sixteen key informants were interviewed.

d) Personal Observations

For further understanding of the realities on the ground, particularly to better understand the nature of land degradation and land management practices, the researcher made personal observation. This also helped in supplementing and triangulating data collected through other techniques.

1.6.4. Methods of Data Analysis

For the analysis of data, both descriptive and inferential statistical methods were applied. For that Statistical Package for Social Sciences, SPSS 15.0 for windows was used. Descriptive statistics was widely used in analyzing demographic and socio-economic characteristics of households, farmers' land holding and tenure security, characteristics of farm land, nature of land degradation and land use and management.

For analyzing determinants of farmers' land management practices, binary logistic regression was applied. It was used to see the type of relationship and the degree with which the independent variables influence the dependent variables. Different demographic, socio-economic and institutional variables were considered as determinant factors/independent variables, whereas among different land

management practices identified to be practiced by the farmers, terracing and manure application were taken as dependent variables. The selection of these practices was done by considering the degree at which they are practiced.

1.7. Scope and Limitation of the Research

The research is conducted in Tole district which is located in South West Shewa Zone of Oromia Regional State. The district has a total of twenty five kebeles (twenty four rural and one urban). For the purpose of this research, the urban Kebele was excluded since the research is focused only on the rural part of the district. The twenty four rural Kebeles were, therefore, the universe of this study and from these twenty four rural kebeles, four sample kebeles were randomly selected based on agro-ecology using the principle of proportionality to size. From each of which again one '*got*', four altogether, was selected. At the end, 120 household heads were selected from the four '*gots*' as a final study unit.

Regarding the limitation of the research, the major limitation of this study is that it is based on a one time collected data. Since the issue of determinants of land management is dynamic, this one time data might not be enough to make an overall generalization on the determinants of farmers' land management practices in the study area. Moreover, issues related to land are very sensitive and it has also some relation with politics. Even during the survey, farmers were asking whether the research has any relation with the national election which will be conducted in the coming year. Hence, though many efforts were made and different data collection techniques were employed in-order to ensure the quality of

data, still this apprehension might have some negative impact on the quality of the collected data.

1.8. Organization of the Thesis

The thesis is organized into five chapters. In the first chapter, the introduction of the paper is presented. This covers background to the problem, the statement of the problem, research objectives, research questions, significance of the study, methodology and scope and limitation of the research. Chapter two presents review of the literature. Under this, concepts related to land management, theoretical or conceptual framework and empirical reviews are considered. Description of the study area is given in chapter three. Chapter four is about results and discussions, while conclusions and recommendations are presented in the last chapter.

CHAPTER TWO

LITERATURE REVIEW

This chapter is categorized into three parts: the first part deals with explaining major theoretical concepts and facts related to land management based on scholarly literatures. The second part provides an account of the theoretical/conceptual framework adopted for the purpose of this study. The third part highlights empirical evidences based on practical findings of various researchers.

2.1. Theoretical Concepts

2.1.1. Definition of Major Concepts

There are a number of important concepts that are frequently used in the discussion of land management. The concepts could be defined in different ways based on the context and purpose of the study. Nevertheless, for the purpose of this study, the following definitions are adopted with the intention to make sense of and coherence with the discussion ahead. Some of the key concepts that need to be defined include: fertility of land, land productivity, land degradation and land management.

Fertility of land: "Fertility of land is its suitability for production, the main components of which are climate and soil" (Young, 1989; Pieri, 1992 and Deckers, 1993).

Land productivity: Land productivity could be defined as the capability of soil for producing a specified plant which might be crops, trees, pasture, etc or sequence of plants under a defined set of management practices. This productivity of land is measured in terms of outputs or harvest in relation to the inputs of production factors for a specific kind of soil under a physically defined system of management. Hence: land productivity = soil fertility + management (Eyasu, 2002).

Land degradation: There is no single universally accepted definition for land degradation (Blaikie and Brookfied, 1987 cited in Hussien, 2006). It is a broad concept and defined by different people in different ways. UNEP (1992 cited in MoARD and WB, 2007) defined land degradation as "a reduction of resource potential by one or a combination of processes – including water erosion, wind erosion, a long-term reduction in the amount or diversity of natural vegetation, salinization, or sodification- acting on the land." Similarly, World Commission on Environment and Development (WCED), (1987 cited in Taffa, 2002) defined land degradation as "the loss of utility or potential utility or the reduction, loss or change of features or organisms which cannot be replaced." Young, (1998 cited in Hussien, 2006) gave a more similar definition of land degradation as the process that causes temporary or permanent lowering of current or future productive capacity of land. Alemneh et al., (1997) also defined the concept of land degradation as the degradation of soil, water, climate, and fauna and flora.

In all of the above definitions, the common denominator is that land degradation is actual or potential reduction in the productive potential of land. Almost all countries, rich or poor; arid or humid; cool or tropical; experience some form of land degradation, but the rate significantly

varies among different countries based on variation in their biophysical, social and economic structure. Yet some developing countries appear to be trapped in a 'downward' spiral of interlinked ecological and economic decline (WCED, 1987 cited in Taffa, 2002). Nowadays, land degradation induced by soil erosion is creating a concern far beyond the realm of discrete event. Land degradation poses chronic environmental and economic burdens on the already fragile economies of developing countries. Developing countries particularly those located in tropics bore the brunt of land degradation because of the torrential rainfall that often causes runoff, fragile soil type, and rapid population growth that increase the pressure on the natural vegetation cover. This part of the world is characterized by an ever increasing population growth, poor land management practices, vulnerable soils, and hostile climates that add up together and fosters erosion, which eventually leads to land degradation. Land degradation is the main cause of; falling crop yields, rising deforestation, erratic water supplies, and an ever-expanding prospect of dry and dusty range land (Taffa, 2002). The eroded soil is often accumulated where it is not used for any productive purpose. Silt generated by soil erosion accumulates in rivers, reservoirs, harbors, estuaries, and other waterways causing additional problems on other sectors, and economic activities. Hence, a vital resource disappears from where it is desperately needed only to be dumped where it is equally unwanted, destructive and impossibly costly to remove (ibid).

In sub-Saharan Africa land degradation has increased three fold in the last three decades as increasing number of people are forced to move out of the good bottom lands to the fragile hill sides owing to population growth and increasing demand for new land (Taffa, 2002).

Wise land use: *means* using the land within its capability in a way that could ensure the sustainability of its productivity. In other words it is a use of land without soil degradation, especially through erosion, so as to keep it permanently productive. This could develop economic sustainability. But in most cases this is not practiced (Taffa, 2002).

Land management: this is a broader concept which refers to an activity on the ground, using appropriate technologies in the respective land use system for the improvement or maintenance of productivity of land. This might include activities such as soil and water conservation, soil fertility management, controlled-grazing and several other land management practices (Hurni, 2000 cited in Yilkal, 2007).

Sustainable land management: this is a land management approach that emphasizes at finding economically viable, socially acceptable and ecologically sound solutions at a local level, which could promote participatory land management practices to deal with land degradation. In doing this due emphasis is given to the use of appropriate technologies (ibid).

2.1.2. Land Tenure System

2.1.2.1. Land Right Systems

Transferability and security of land are the two important dimensions by which land right system could be characterized. According to these, there are two extreme systems. The first one is the perfect market model and the second one is the opposite one. In the first case everything is determined by market and all rights of land are marketable and security

c. Customary land tenure systems

This one refers to indigenous property right regimes, which commonly includes heritable use rights which can encourage long-term investments in land improvement since this type of tenure can be very secure. Though not defined at the individual level, they can be defined at the community or clan level, and are more pertinent to subsistence-oriented, low population density societies (Toulmin and Quan's, 2000 cited in EEA/EEPRI, 2002)

2.1.2.2. Land Tenure System in Ethiopia

The land tenure system in Ethiopia has different features. The one in pre-1975, during imperial regime, was more complex and probably it is the most complex one in the world. It was characterized by diversity of official property right regimes. That complexity is noted as playing a major part in hindering any serious progress toward a meaningful reform of the system. There were different variety of classifications and approaches used to describe the land tenure system. During that period; rist/kinship, communal, diessa/village, private, state, church, and other land tenure types or land tenure designations were used. Among these; rist/kinship, private, church, and state holding systems are the commonly recognized ones (EEA/EEPRI, 2002).

From these common tenure types; rist system was characterized by the principle of acknowledging access to land by all descendents of people from common ancestor. This access to land includes use rights and transfer rights without land alienation. On the other hand, Gult is a tenure type that can be considered a variant to rist and rist-Gult, which is often

easily confused with Rist. Gult doesn't give a right on land as in the case of rist, but it gives a right to tax the benefits from land. Moreover, Gult is not transferable, while Rist-gult is transferable. Rist system, with its Gult rights over those land holders, had been an important element for controlling peasantry by the regime through those elites holding such rights (ibid).

During the last period of imperial regimes, private tenure was recognized to be the dominant system and it was affecting larger proportion of country's population. That was created by way of land granting by crown to members of army that were from the northern part of the country and loyal to the regimes in the conquered areas. Land under this system was sold and exchanged, but due to the fact that land originally belonged to government, individual holders had no absolute right. Serious land concentration, exploitative tenancy, and insecurity have characterized the private tenure system (EEA/EEPRI, 2002).

That tenure system during imperial regime was considered to be hindrance to development of Ethiopia. It was also considered to be the most important cause of political grievance to the overthrow of the regime. Land tenure was characterized by institutional inadequacy-lack of necessary legal framework, absolute arbitrary control of land rights, and lack of well organized and transparent land administration (ibid).

Then land proclamation took place in 1975. It was an event during which Ethiopia undertook a major land reform. Land came under public control and all land was nationalized. Tenancy/landlordism was abolished and land was distributed to individual peasant farmers. Which in-fact resulted in fragmentation of land with reduced fallow (Aklilu, 2006).

During Derge regime, land belonged to the state and farmers had access to land through mandated peasant associations. The farmers have usufruct rights to land in peasant associations where they reside. But their right was subjected to proof of permanent physical residence, and ability to farm continuously and meet administrative dues and obligations. About 70% of the farmers got access to land through state mandated peasant associations (Aklilu and Tadesse, 1994; Tesfaye, 2003).

There are no fundamental differences between the legal framework of the current government and that of the Derge regime on issues related to rural lands. Similar to the previous regime, land is still under public control. Among the differences, land administration is now a de-concentrated function of regional governments and its control has now become directly under political bodies than technical ministries, which had been the case during Derge regime. In addition to that the land re-distribution which was stopped by Derge starting from 1989 had been re-started by the current government, though in some regions it seems no more land redistribution as anticipated (Tesfaye, 2003; EEA/EEPRI, 2002).

2.2. Theoretical/Conceptual Framework

There are different factors that could determine land management. These determinants of land management are operating at different levels and scales which might include plot, household, village, region, nation, and international levels. Among these factors some have direct influence on land management; to cite examples, type of soil, topography of the land and the climate have a large impact on whether soil erosion is likely to be a problem and what options are feasible to deal with it. Demographic and socioeconomic factors have also influences on land management.

From these factors again some have direct effects; if access to markets is considered, it determines the profitability of alternative practices. However, some factors such as population pressure have indirect effects by leading to smaller farm sizes and often to more fragmented holdings, which may reduce farmers' ability or incentive to fallow or to invest in land improvements (Pender et al., 2001).

The factors at household level such as households' endowments of physical assets; such as farm size, land quality, livestock and savings, human capital which includes; education, training and farming experience and social capital, for instance; cultural norms, family and ethnic relations may also determine development pathway and land management practices pursued by particular households. Moreover, government policies, programs and institutions may influence development pathways and land management practices and their implications for productivity, resource conditions, and household welfare at many levels. Macroeconomic policies, trade and market liberalization policies, will affect the relative prices of commodities and inputs in general throughout a nation. In addition to that infrastructure development, agricultural extension, conservation technical assistance programs, land tenure policies and rural credit and savings programs affect awareness, opportunities, or constraints at a village or household level, which further affects land management practices (ibid).

For this research, the conceptual framework illustrated in Figure 2.1 is adopted. It is adopted since it shows the factors that are determining land management practices in comprehensive way. It indicates that land management is determined by household, village and regional/national levels factors. Household factors include physical capital, human capital

and social capital; whereas village level factors include population pressure, access to markets, agricultural potential, local prices/markets, presence of programs and local institutions. Similarly, regional/national factors include population growth/migration, prices and technologies available.

The frame work, generally indicates how the complex interplay of various factors at different levels determine land management; which in turn affects current agricultural production and ultimately influence farm income and welfare.

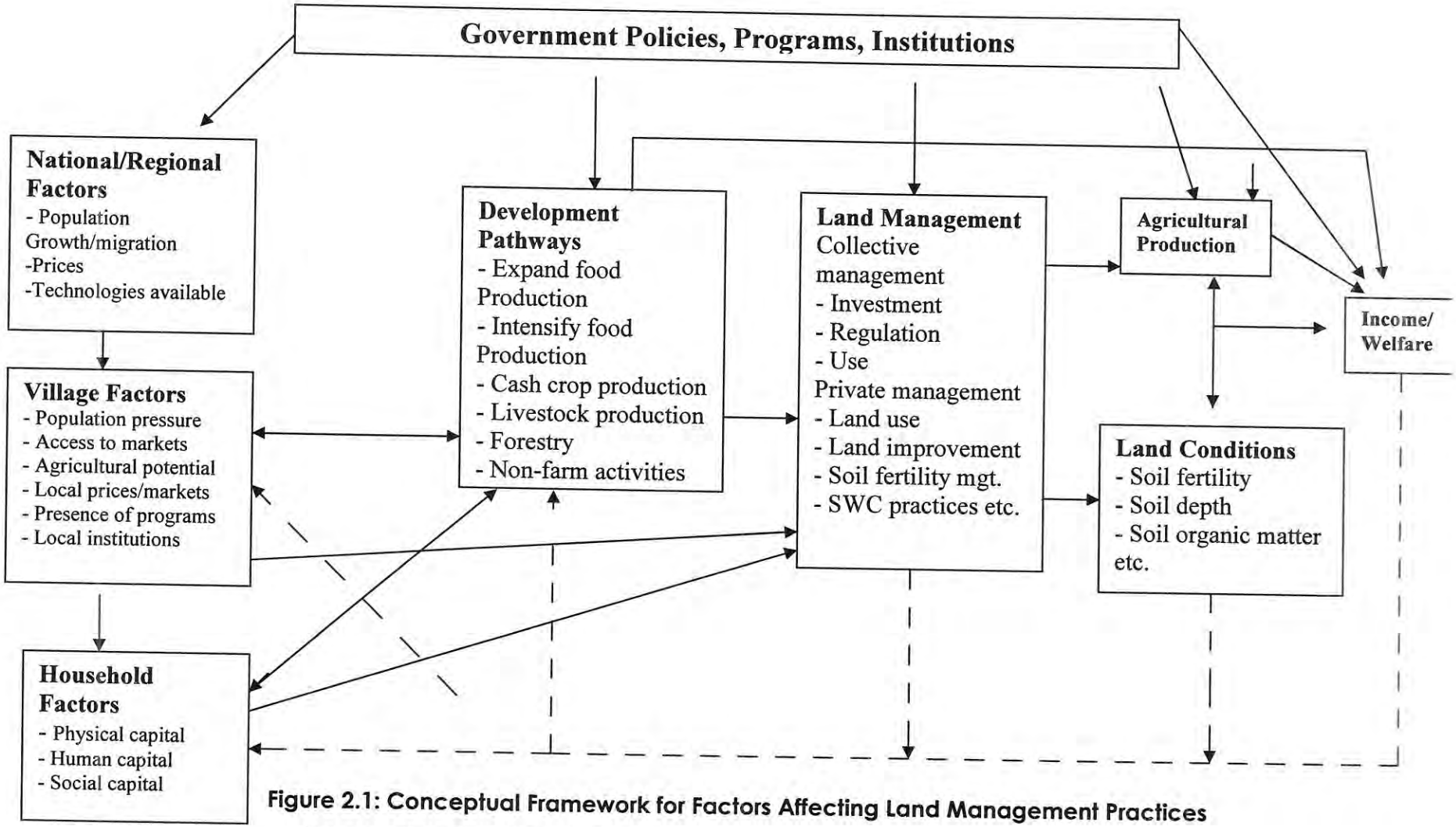

Figure 2.1: Conceptual Framework for Factors Affecting Land Management Practices

Source: Pender et al., 2001

2.3. Empirical Review

2.3.1. Land Degradation in Ethiopia

Land degradation in Ethiopia has become a serious problem affecting all spheres of social, economic and political life of the population. It is one of the major challenges to agricultural development and food security of the country. The rate of the country's land degradation is very high. A large portion of the agricultural land, which is mainly located in the highland part of the country, is affected by severe to moderate land degradation. Of the total area of agricultural land, around 45% is seriously eroded and 23% has reached the point of no return (Kruger et al., 1996 cited in Yilikal, 2007). Land degradation in the densely populated highland part of the country is more severe. Though in the past highland areas were rich and fertile, currently many areas in the highland have become unproductive in the past few decades causing the collapse of farming system (WB, 2007).

Due to the high degree of degradation, important renewable natural resources such as soil, water, forest and other forms of biodiversity are highly deteriorating in the Ethiopian highlands. This problem is further aggravated by the expansion of agriculture to marginal areas (Gete, 2002). On the other hand these highlands accommodate 88% of the Ethiopian human population, 75% of the livestock population, and 95% of the total cultivated land (Woldeamlak, 2003).

Land degradation, particularly soil degradation has significant negative impact on productivity of land. This is because; soil degradation and soil

productivity are inversely related. That is, where degradation is taking place at a higher rate the productivity is less and vice versa, other things remain the same. It is manifested by a reduction in the actual or potential productivity of soils. This productivity of soil is significantly affected in Ethiopia due to the serious soil degradation in the country (MOPED 1994, cited in Abbi, 1995). It is indicated that the soil in cropping land of Ethiopia is not sufficiently fertile to support the required level of food production. Soils in highlands of Ethiopia are becoming resistant to fertilizer since they are degraded to the extent of not absorbing water with fertilizers, thus resulting in low crop yield (Abbi, 1995).

With regard to geographical location, areas in South and North Gondar, Northern and Eastern Shewa, Tigray, Wello and Eastern highlands have faced severe problems of soil degradation. In general about half of Ethiopian highlands are already significantly eroded and from this about 52% of agricultural lands are seriously eroded that they will not be able to sustain farming in the future (Abbi, 1995).

In general, the extent of natural resources degradation in Ethiopia, especially the degree of soil erosion, nutrient depletion and deforestation in high land areas, above 1500 m.a.s.l., of the country is very high. A significant amount of arable land in the highlands of the country is lost due to land degradation which has different causes behind it (Lekew, et al., 2000).

2.3.1.1. Causes of Land Degradation in Ethiopia

The causes/contributing factors for land degradation in Ethiopia are complex and diverse. It is the result of complex interactions between

physical, chemical, biological, socio-economic and political issues of local, national or global nature. Among the causes of land degradation, some are; population growth, expansion of agriculture to forests and marginal lands, poverty, land ownership problems which are related to land tenure and government policy, political instability and maladministration, overgrazing, inappropriate agriculture, and large scale expansion of irrigated agriculture (Taffa, 2002; Betru, 2003; Aklilu, 2006; Gete, 2002). Some of these causes are discussed as follows.

2.3.1.1.1. Socio-economic and Institutional Factors

There are different socio-economic and institutional factors that are causing land degradation. These factors are causing land degradation through their impact on the decision of people regarding land use and management practices. Some of these factors include population pressure, poverty, land holding system, local institutions and organizations, and farmers' perception and attitudes (Abbi, 1995; Lekew et al., 2000; Taffa, 2002).

Population Pressure

An increasing rate of population growth is among the major causes of land degradation in Ethiopia. This is because the increasing population leads to the requirement of more agricultural production which requires more land with the existing technological level. Getting this new agricultural land is not a simple task and it resulted in the expansion of farming activities to erosion prone marginal areas, serious deforestation, a decrease in fallow period and continuous cultivation (Habtamu, 2006; Hussien, 2006).

Dense population and primitive farming practices combined with intensive rain and rugged topography intensified land degradation problem in the country. The high population growth made steep fragile areas to be included into cultivation, thus accelerating rate of soil erosion (Betru, 2003).

The country has already lost its forest resources, mainly due to population pressure. Different scholars as cited in Hussien, 2006, indicated the declining trend of forest cover in Ethiopia through time. This is presented by the following paragraph.

In 1960s, Brieten (1961) estimated that about 37% of the total area of the country was covered by forest. UNDP, FAO and MoA (1984) estimated that at the beginning of 20th century about 35.4% of the country's landmass was covered by forest. IUCN (1990) also estimated that 87% of the high land area of the country was covered by natural forest in the early 19th century. It was also estimated by the same author as 40% of the total area was covered by natural forest in the early 20th century and reduced to 15% in 1955 and to 4% in 1984. NCS (1990) and EPA (1997) further estimated the country's current forest reserve to be less than 3%.

The annual rate of deforestation in the country is estimated to be 80,000 to 200,000 hectares (Gete, 2002). Another author, EFAP (1994 cited in Hussien, 2006) also estimated annual rate of deforestation in Ethiopia to be 150,000 to 200,000 hectares. The increasing population which leads to increasing demand for more agricultural land, fuel wood, construction material and other forest products is the major cause for this deforestation (Gete, 2002).

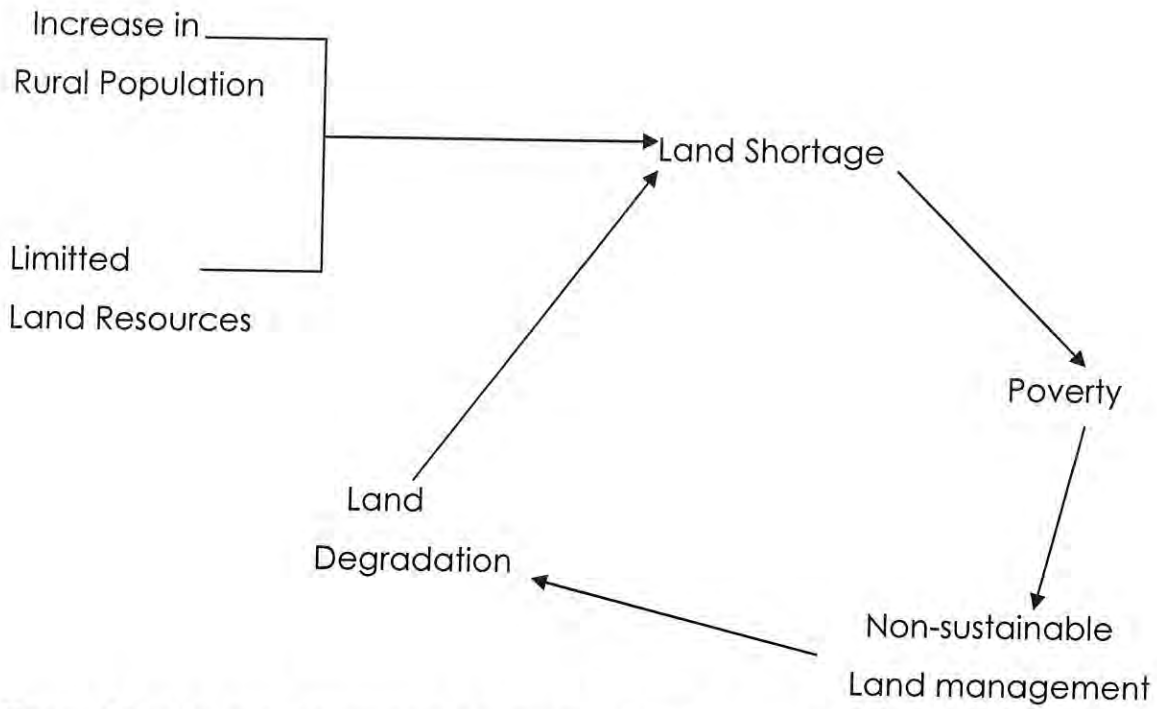

Figure 2.2: Linkage between Population, Poverty and Land Degradation
Source: FAO, 1994 cited in Aklilu, 2006.

Land Tenure and Land Policy

Policies related to land, particularly policies related to land tenure system, could discourage people from undertaking conservation activities. This is because, when people feel insecure, their planning horizon is limited and they are cultivating land for short-term purposes rather than for long term benefits. They are not interested in undertaking physical conservation measures and tree planting since they require longer period to give return (Habtamu, 2006; Betru, 2003).

Land tenure security is among the important factors that are determining farmers land management practices and improving land productivity. Farmers that do feel more secured on their holding are more likely to produce more and undertake long term investment for the improvement of their land (Mirgissa, 1994; Aklilu and Tadesse, 1994).

In Ethiopia, the current land tenure policy doesn't guarantee tenure security to farmers. It doesn't give an incentive to undertake investment in conservation and improvement of land resources. As a result the problem of tenure security is identified to have detrimental effects on agricultural productivity and natural resources conservation (Hoben, 2000 cited in EEA/EEPRI, 2002).

Due to the above facts, rural land policy in Ethiopia has remained to be a topic of debate. The current debate on land issues in Ethiopia center on efficacy and efficiency of a state controlled tenure system and its flexibility in evolving towards individual tenure arrangements. In other words, there is a dichotomy of views on state versus private ownership (Tesfaye, 2003; EEA/EEPRI, 2002).

2.3.1.1.2. Natural Factors

In addition to socio-economic and institutional factors, there are also natural factors that are contributing to land degradation in Ethiopia. The most important one are slope of the land and high intensity of rainfall. Steep relief is among the major natural causes for land degradation in the country. Rain with high intensity on bare unprotected soil is also resulting in erosion by water in the Ethiopian high lands (Lekew et al., 2000). The erosivity of rainfall is a function of its intensity and distribution. Intense tropical storm, which is poorly distributed (only within the months of June to September is the major cause of erosion in most highlands of the country. The erodability of soil which is a function of its intrinsic properties (texture, structure, organic matter content) and degree of vegetation cover are other determining factors for loss of soil through runoff. Mountainous and undulating terrain characterizes relief in most highlands

of Ethiopia; this coupled with poor physical and chemical properties of some soils make most of the highlands erosion prone (Lekew et al., 2000).

2..3.1.2. Consequences of Land Degradation in Ethiopia

In general, the global store of arable land and grazing land continues to decline due to degradation emanating from urbanization, unsustainable agricultural practices and deforestation. And a significant portion of the remaining arable and grazing land is under considerable pressure from compaction by livestock and farm implements, over-use of fertilizers and pesticides, salinization, alkalization or acidification, depletion of nutrients, water and wind erosion, and deterioration of drainage. Especially, Sub-Saharan Africa wherein Ethiopia is found is facing serious environment and development problem (Taffa, 2002)

For Ethiopia, the issue of land degradation is so vital since the livelihood of the biggest portion of the country's population and the overall economy of the country depend on agriculture. Land degradation is seriously affecting agricultural production and the food security of the country's population. Nowadays, it is becoming one of the important problems of food insecurity in the country (Aklilu, 2006).

This is for the reason that, the high degree of land degradation in Ethiopia, especially the degradation in the form of soil erosion is one of the major environmental problems that have negatively affected the performance of agricultural sector as well as the overall economy. Accordingly, the livelihood of Ethiopian population is threatened by the increasing trend of land degradation (Yilkal, 2007; Aklilu, 2006, Habtamu, 2006).

The impact of land degradation on Ethiopian's agricultural economy is very large. Ethiopia is losing 30,000 hectares of land on annual basis due to degradation and so far more than 2 million hectares have already been severely damaged (MoARD and WB, 2007). The country is losing a significant volume of soil every year due to soil erosion. The annual loss of soil in highlands of Ethiopia was estimated to range from 20 to 100 tons/hectare per year which leads to an annual productivity loss on cropland of 0.1% to 2% of total production for the country (Lekew et al, 2000).

There are also other studies that identified the severe impact of land degradation on the Ethiopian agricultural economy. Shibiru and Kifle (1998, cited in EEA/EEPRI, 2004/05: 215-216) presented that;

> *The immediate and future cost of land degradation for a nation has been an issue in the field of environmental economics with increased momentum in recent times. The annual loss in grain production due to soil degradation was estimated at 40,000 tons in 1997, which reached 170,000 tons in 2000.*

That was equated to a loss of US$ 150 million by Barbier, (1998, cited in EEA/EEPRI, 2004/05). EPA (1997 cited in EEA/EEPRI, 2004/05) estimated the loss to be 17% of the potential agricultural GDP of the country. However, none of these estimates take in to consideration the cumulative impact of soil degradation, but instead a constant productivity loss of each year was taken in to account. In general the agricultural economy of the country is highly threatened by land degradation induced by specifically accelerated soil erosion.

2.3.2. Land Management Practices in Ethiopia

There were different efforts against the problem of land degradation in Ethiopia. Especially, in 1970s and 1980s big efforts were made to reverse the problem of land degradation. There were huge investments during that period on land conservation. However, the impact of those efforts did not live up to curbing the impact of land degradation in a meaningful and sustainable manner. Various reasons are often given for the lack of success. Among these the most commonly cited factors include failure to consider indigenous land management practices, high initial cost which is not affordable by poor farmers and also trying to apply uniform techniques in different agro-ecological regions (Aklilu, 2006).

Traditionally through time, farmers have developed different soil conservation and land management practices of their own. With those practices the farmers are able to sustain their production for centuries. 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 ditches and furrows, contour ploughing, fallowing, crop rotation, farmyard manure and agro-forestry (Betru, 2003).

Due to the increased problem of land degradation, in 1970s soil and water conservation measures were introduced as land management practices. 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,

This study identified perception about soil erosion problem, farmers' attitude to try new technology, participation on conservation training, plan of a farmer to continue in farming career in the following five years and farmers' perception about effectiveness of the technology in arresting soil erosion to have significant positive influence on farmers' decision to retain conservation structures. Farmers' contact with development agents, educational attainment of the household head and land tenure security were identified to have weak and positive influence on the farmers' decision to retain the introduced structures. Age of the household head and land holding size are identified to have significant negative influence, whereas variables such as livestock holding, off-farm employment and distance from farm plots were identified to have weak negative influence.

As it is explained above, both the reviewed studies were conducted in areas where there were interventions by external actors. The first study identified factors that are influencing farmers' adoption and continued use of stone terraces and the second study focused on the identification of factors that influence farmers' decision to retain or remove soil and water conservation structures that were constructed on their cultivated land with external support.

However, this study is conducted in a district where there has been no external support in land management practices at all. Hence, the focus here is not on identification of factors that could influence farmers' decision to adopt, using on continuous basis or retain the introduced techniques. But it deals with the identification of factors that could determine land management practices that farmers undertake by their own initiatives.

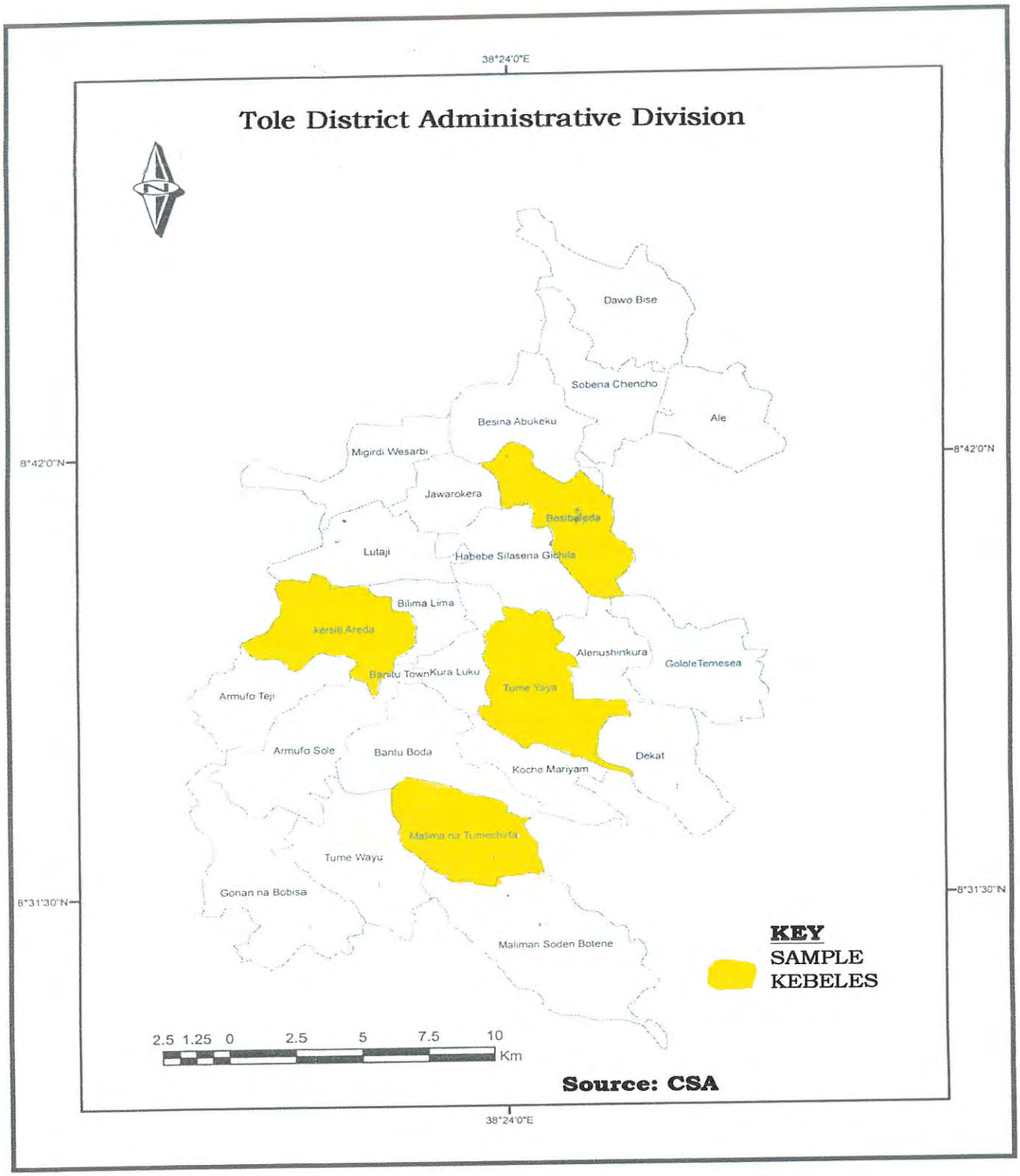

Figure 3.2: Map of Tole Administrative District Indicating Sample Kebeles

3.3.8. Energy Supply

The largest portion of the population is using bio-mass energy sources, which includes firewood, charcoal, cow dung and crop residues. This has an adverse impact on environment in-general and on productivity of land in-particular. This biomass energy is among major causes of land degradation in the study area. In addition to this commercial energy source (petroleum products) is used to some extent and the district capital has hydro electric power service (BoFED, 2007).

3.4. Land Use and Management

According to the information from district ARDO, the major land use types in the district include; arable land, grazing land, forest land and land under different construction. On the other hand, land use pattern is among the factors that play key role in aggravating or minimizing the problem of land degradation. The total land in the district is classified by its use type. Table 3.2 indicates that, 72.96%, 13.40% and 4.90% is arable land, grazing land and forest land, respectively. The remaining is used for different construction and other purposes.

Table 3.2: Land Use Pattern of Tole District

S/N	Land Use Types	Area (hectares)	Percentage
1	Arable land	29,928	72.96
2	Grazing land	5,496.50	13.40
3	Forest land	2,009	4.90
4	Land under different construction	2,103.50	5.13
5	Others	1,482	3.61
	Total	41,019	100

Source: Tole District ARDO

Per the information from district ARDO, all the arable land in the district is cultivated. Even in the last production season, the cultivated land, 30,012 hectares, was more than the existing arable land, which shows expansion of crop production to grazing and forest land.

The current pressure on land is already recognized and land degradation became a problem of the people in the district. The study conducted in 2007 by Oromia BoFED indicated that land degradation is one of the major factors challenging crop production in the district. It was further indicated that efforts that are undertaken to change the situation are not significant. Table 3.3 indicates soil and water conservation activities that have been done in the last five years in the study area. As indicated in the table, the activities are primarily construction of physical soil and water conservation structures.

Table 3.3: Soil and Water Conservation (SWC) Activities in Tole District

S/N	Type of SWC Activities	Unit	Years				
			2004	2005	2006	2007	2008
1	Terracing	Km	51.70	75	5.25	21.49	26.45
2	Check-dam	M^3	-	530	120	420	428.75
3	Water ways	Km	1.4	2.5	0.75	1	1
4	Ditch	Km	0.40	0.75	0.25		
5	Planting trees**	No	NA	NA	NA	NA	NA

** it has been undertaken, but no data is available.

Source: Tole District ARDO.

To summarize, the chapter presented brief description on the location and size, bio-physical and socio-economic characteristics, and land use and management of the study district. It is indicated that the livelihood of

the population depends on subsistence agriculture. Crop production expands at the expense of grazing and remaining forest lands due to an increase in human population. Generally, there is high pressure on land resources and land degradation became major challenge in undertaking agricultural activities. On the other hand, efforts that have been made so far are inadequate to control land degradation problem. By taking into consideration the existing land degradation problem, this research is conducted on determinants of farmers' land management practices in Tole district and the following chapter presents the findings.

CHAPTER FOUR

RESULTS AND DISCUSSIONS

This chapter presents results and discussions. It is divided into five sections/parts. The first part explores demographic and socio-economic characteristics of the survey participants. The second part focuses on land holding and tenure security of the sample households. Characteristics of farmland and nature of land degradation in the study area are discussed in part three. The fourth part deals with land use and management practices employed by the sample households and the fifth and the last part investigates the major determinant factors of farmers' land management practices using logistic regression model.

4.1. Respondents' Background Information

The study uses a sample of 120 households to identify determinants of farmers' land management practices in Tole district of Oromia National Regional State. The respondents were limited to household heads and their background information is presented in the following sub-sections.

4.1.1. Demographic Characteristics

This sub-section deals with demographic characteristics of the sample households. The summary of the respondents' demographic characteristics is presented in Table 4.1.

Age and Sex Composition and Family Size

Table 4.1 shows that out of the total 120 sample households, the majority, 110 (91.7%) are male household heads, and the remaining 10 (8.3%) are female household heads. With regard to age structure of the respondents, the majority (61.6%) of the respondents are between the age of 25 and 45 years old, while only 6.70% are below 25 years old (Table 4.1). The mean age of the respondents is 41.28, the maximum and minimum ages are 78 and 19 years old, respectively.

The family size of the respondent households varies from 1 to 13 members. The majority of the sample households have large family size; of the total, 71.70% of the sample households have a family size of five and more (Table 4.1). The mean family size is about 6.18.

Table 4.1: Respondents' Demographic Characteristics

Attributes	Category	Frequency	Percentage	Cumulative Percentage
Sex	Male	110	91.7	91.7
	Female	10	8.3	100
	Total	120	100	
Age	Less than 25	8	6.7	6.7
	25 – 35	43	35.8	42.5
	36 – 45	31	25.8	68.3
	46 – 55	19	15.8	84.2
	Above 55	19	15.8	100.0
	Total	120	100.0	
Family Size	1-2	9	7.5	7.5
	3-4	25	20.8	28.3
	5-6	33	27.5	55.8
	7-8	26	21.7	77.5
	>=9	27	22.5	100.0
	Total	120	100.0	

Source: Field Survey, February, 2009.

Dependency Ratio

Table 4.2 presents age and sex structure of the total population under the sample households. There are a total of 742 household members, from which 397 (53.50%) are males, while the remaining 345 (46.50%) are females. Out of the total household members, 48.52% are found below age of 15 years old, which is higher than the regional and national averages, which are 47.60% and 44.98%, respectively (CSA, 2008). This indicates higher future pressure on resources in this district than regional and national averages.

Based on the survey result, total age dependency ratio (the ratio of population below 15 years old and above 64 years old to population within 15 to 64 years old multiplied by 100) is 102.18%. From this, under aged dependency ratio (the ratio of population under 15 years old to population 15 to 64 years old multiplied by 100) is 98.09%; while the old aged dependency ratio (the ratio of population above 64 years old to population 15 to 64 years old multiplied by 100) is 4.09%.

The high under aged dependent implies further pressure on land and other resources in the future. Even during focus group discussions, participants expressed fear about the adverse impact of large young population on resource sharing in the future. They further noted the declining trend of land holding size of parents as they continue to offer some part of their land to their children forming their own households. Moreover, participants of FGDs indicated that adverse impact of ever increasing young population is not only limited to resource sharing, but it goes beyond that through destabilizing the peace of the community. During FGDs, it was reported that there is already a lot of resource based

conflicts, especially among family members. Hence, unless there is an improvement in the level of socio-economic development of the area to absorb and productively employ the youth, which may include improvement in the agricultural productivity and development in industrial sector, the threat of overpopulation could be large and difficult to reverse.

Strengthening population planning program and expansion of girls' education can help to control further population growth. On the other hand, expansion of the non-farm sector may give an alternative livelihood strategy and reduce the pressure on natural resources.

Table 4.2: Age and Sex Structure of Total Population under Sample Households

Age Category	Sex of Household Members				Total	%
	Male	%	Female	%		
Below 15	191	25.74	169	22.78	360	48.52
15 – 64	192	25.88	175	23.58	367	49.46
Above 64	14	1.89	1	0.13	15	2.02
Total	397	53.50	345	46.50	742	100

Source: Field Survey, February, 2009.

4.1.2. Socio-Economic Characteristics of Sample Household Heads

4.1.2.1. Education Background of the Respondents

Education status of a society, particularly literacy level, is among the key factors determining development and growth (Todaro and Smith, 2009). However, Table 4.3 shows that 49.20% of the sample respondents are

illiterate. About 18.30% can read and write without attending any formal school. Only the remaining (32.6%) have got a chance to join formal schools and even from this as it can be observed from the following table, the proportion of respondents is declining as education level is going up. From total respondents, 21.7% reached first cycle primary school (1-4), 6.7% reached second cycle primary school (5-8), 2.5% and 1.7% reached grade 9-10 and above grade 10, respectively.

Table 4.3: Educational Status of the Respondents

Educational Status	Frequency	Percentage	Cumulative Percentage
Illiterate	59	49.2	49.2
Literate	22	18.3	67.5
1-4	26	21.7	89.2
5-8	8	6.7	95.8
9-10	3	2.5	98.3
above 10	2	1.7	100.0
Total	120	100.0	

Source: Field Survey, Tole District, February, 2009.

4.1.2.2. Major Economic Activities and Income Sources

According to the information from district ARDO and key informants, subsistence rain fed agriculture is the major economic activity for the population in Tole district. Similarly, major economic activity for all respondents (100%) is farming.

Accordingly, Table 4.4 indicates that sale of crops constitute major cash income source for 99.20% of total respondents. Agriculture in the area is characterized by mixed farming, i.e. crop production and animal husbandry. Consequently, 37.50% of respondents are getting additional income from sale of livestock. Moreover, some 3.30% of respondents

reported to get income from petty trade, and only a single individual reported to get income from remittance.

The household survey, FGDs and key informants interview indicated that the level of farmers' income diversification is very limited; especially the majority of resource poor farmers have little choice to diversify their income. This adversely affects their life. According to FGDs and key informants' view, resource poor farmers are farmers with less number of livestock and other productive factors. Hence, particularly for this group of people, diversification could be indispensable to supplement their farm income.

Table 4.4: Sources of Income

Sources of Income	Frequency	Percentage
Sale of Crops	119	99.2%
Sale of livestock	45	37.5%
Remittance	1	.8%
Petty trade	4	3.3%
Major income source		
Sale of Crops	119	99.2
Others	1	.8
Total	120	100

Source: Field Survey, Tole District, February, 2009.

4.1.2.3. Types of Crops Grown

Type of crops grown is among the factors that are affecting land degradation. This is because type of crops grown affects the level of tillage, soil nutrient uptake or restoration and hence can aggravate or minimize degradation. To cite an example, production of '*teff*' requires fine land preparation to allow the small *teff* seed to germinate. This fine

tillage makes the soil vulnerable to erosion during the early part of the main rainy season (Bezuayehu et al., 2002).

Table 4.5 shows that the major crops grown in the area include *teff*, wheat, chickpea, barley, bean and pea. Among these, a largest number of respondents are primarily producing *teff* and wheat. Chickpea and barley production is also practiced by large proportion of respondents throughout the district. However, the proportion of farmers that are growing bean and pea is less, and such crops are commonly grown in highland agro-ecology of the district. Furthermore, key informants and participants of FGDs indicated that farmers in highland agro-ecology are commonly producing *enset*, which is not practiced by farmers in other part of the district. In this highland agro-ecology, *teff* production is less, yet it is dominant crop in mid-highland agro-ecology.

Table 4.5: Average Productivity of Major Crops Produced by Respondents

S/N	Type of Crops	Yield per Hectare	Producers	
			Frequency	Percentage
1	*Teff*	6.47	101	84.17
2	Wheat	9.01	100	83.33
3	Chickpea	6.93	84	70
4	Barley	7.76	33	27.50
5	Bean	6.27	13	10.83
6	Pea	6.07	7	5.83

Source: Field Survey, 2009

All contacted groups, including respondents of the survey, were asked about the trend in crop yield. As it can be observed from annex 2, 91.70% of the total respondents reported an increasing trend in their crop yield

per hectare in recent years. About 7.5% of the respondents mentioned as there is a declining trend of crop yield and only an individual indicated as there is no change. They were also asked the factors that resulted in the change of trend in crop yield. The reasons mentioned by respondents reported an increasing trend include; better application of chemical fertilizer, better farming practice, application of improved seed, compost application and better weather condition. On the other hand, the reasons mentioned by respondents that reported a declining trend in crop yield were increasing in the price of chemical fertilizer and frequent cultivation of land (see Annex 2).

Participants of FGDs and key informants further indicated that there is an increasing trend in crop yield in recent years. They mentioned that the increasing trend is resulted from better application of chemical fertilizer and improved seed and better farming practices.

4.1.2.4. Livestock Holding

According to the information from district ARDO, farmers in the study area are practicing mixed farming, which means crop production and livestock rearing. Participants of FGDs and key informants indicated that farmers in the district are using their livestock for draught power, for transportation, to supplement household food supply and their income. They further indicated that especially during emergencies livestock are important source of income and they are also serving as insurance.

For the same purpose, the survey respondents are practicing livestock rearing. Table 4.6 indicates that from the total respondents; 15% have 0.01

to 2.00 livestock in TLU, 27.5% have 2.01 to 4.00 livestock in TLU, 55% have more than 4 livestock in TLU and only 2.5% of the respondents have no livestock at all.

Table 4.6: Livestock Holding of the Respondent Households

Livestock Holding Size (in TLU)	Frequency	Percentage	Cumulative Percentage
0	3	2.5	2.5
0.01-2.00	18	15.0	17.5
2.01-4.00	33	27.5	45.0
4.01-6.00	24	20.0	65.0
6.01-8	18	15.0	80.0
8.01-10	10	8.3	88.3
>=10.01	14	11.7	100.0
Total	120	100.0	

Source: Field Survey, 2009.

The sample households have a total of 635.67 livestock in TLU. The average livestock holding of respondents is found to be 5.29 TLU. This is less than the district average, which is 6.74 TLU per household according to the information from Tole district ARDO.

According to participants of FGDs and key informants view, in recent years, the communities perceive having large number of livestock as disadvantageous since there is shortage of grazing land due to expansion of crop production. They further indicated that the return from livestock rearing is less when compared to crop production and hence using land more for crop production is advantageous than using it for grazing.

Table 4.7 shows, 87.50% of the total respondents also reported having large number of livestock to be disadvantageous. Their justification is that there is serious shortage of livestock feed and having less number of

livestock that is only needed to support crop production is better rather than having large number from which no benefit could be obtained. According to the respondents view, it is not possible to provide adequate feed for large number of livestock and consequently good yield couldn't be obtained. Through FGDs, it was investigated that the situation of livestock feed during harvesting period is somewhat better due to the availability of crop residues.

Table 4.7: Respondents Perception on Having Large Number of Livestock

Perception	Frequency	Percentage	Cumulative Percentage
Advantageous	15	12.5	12.5
Disadvantageous	105	87.5	100.0
Total	120	100.0	

Source: Field Survey, 2009.

It was further explained that quality of livestock belonging to farmers with large numbers is poor in comparison with those with less. Moreover, large livestock holders lost large numbers of their livestock through drought. Based on these arguments, FGDs concluded that small numbers of livestock with improved management is more important to get the expected result.

The above mentioned shortage of livestock feed is cited by all contacted groups including professionals and district administrators. The survey respondents were asked about the trend in the availability of livestock feed. As it is presented by Table 4.8, about 80.8% of the respondents reported that availability of livestock feed is declining from time to time. Only 14.2% of the respondents reported an increasing trend in availability of livestock feed and they justified that with better availability of crop

residues due to improved crop production resulted from better application of chemical fertilizer.

Participants of FGDs and key informants indicated that previously the dominant livestock feed in the study area was grazing land, but now that is changed and crop residues have become the most important source of livestock feed since the importance of hey and grazing land is declining from time to time. They mentioned that increasing human population that resulted in expansion of farming to grazing land is the underlying cause for colonization of grazing lands. Similarly, from the total survey respondents, about 84.2% indicated crop residue to be the first most important source of their livestock feed. Only 9.2% still claim grazing land to be most important source of their livestock feed (Table 4.8).

The downside of using crop residue for livestock feed is that it aggravates soil nutrient depletion as it diverts crop residue that would have been used for soil fertility management. Crop residue is an important source of soil organic matter. This could be even improved through residue treatment, which will greatly influence the nutrient cycling dynamics. Complete removal of crop residue can cause a large drain on the nutrient stock, decline in soil organic matter content, and degradation of physical properties. In many African farms including Ethiopia, crop residues are rarely recycled since they are largely used as fodder, fuel or construction material (Eyasu, 2002). Similarly in the study area crop residues are not recycled and they are used for fodder. Table 4.8 shows that about 98.33% of the surveyed households are using crop residues for fodder though order of importance varies among respondents.

Table 4.8: Sources of Livestock Feed and Trend in Its Availability

Sources and Trend in Availability	Frequency	Percentage
Trend in Availability of Livestock Feed		
Decreasing	97	80.8
Increasing	17	14.2
No change	6	5.0
Total	120	100.0
Sources of Livestock Feed		
Crop Residues	118	98.3
Private Grazing Land	77	64.2
Hey	48	40.0
Communal Grazing Land	4	3.3
Most Important Source of Livestock Feed		
Crop Residues	101	84.2
Private Grazing Land	11	9.2
Hey	5	4.2
Communal Grazing Land	1	.8

Source: Field Survey, 2009.

Respondents were asked about the major purposes for which they are using the income they are getting from sale of livestock. Table 4.9 shows the purposes for which the respondents are using the income they are getting from sale of livestock. It indicates that from the total 117 respondents that have livestock; 79 (67.5%) are using the income they are getting from sale of livestock to buy agricultural inputs such as fertilizer, seed and others and about 57.3% of the respondents are using it to pay taxes and other social obligations. About 11.1%, 7.7%, 2.6%, 2.6% and 0.9% of the respondents are using the income they are getting from sale of livestock to buy farm oxen, to buy food grain, to cover expenses of wedding ceremonies of their children, to buy clothes for their family members and to pay for land rent, respectively.

Table 4.9: Purposes for Which Income from Sale of Livestock is Used

Purposes	Frequency	Percentage from the total 117 respondents that have livestock
To buy agricultural inputs (fertilizer, seed and others)	79	67.5
To pay taxes and other social obligations	67	57.3
To buy farm oxen	13	11.1
To buy food grain	9	7.7
To cover expenses of wedding ceremonies of their children	3	2.6
To buy clothes for family members	3	2.6
To pay for land rent	1	0.9

Source: Field Survey, 2009.

4.1.2.5. Access to Extension Services and Farmers' Training

Access to Extension Services

A large proportion of the sample population, 78 respondents (65%), reported having access to agricultural extension services. The services they get include technical advice on the utilization of chemical fertilizer, improved seed and pesticides; better farming methods; soil and water conservation (terrace and check dam construction and compost preparation); and to some extent technical advice on the use of new technologies. Nevertheless, it has been learned that extension workers are more focused on the promotion of inorganic chemical fertilizer and improved seed utilization. This is consistent with the fact that for nearly three decades a series of fertilizer extension programs have been implemented in Ethiopia. Mineral fertilizer application was considered as the easiest way to maintain or improve soil fertility and increase

agricultural productivity (Eyasu, 2002). It has been indicated by participants of FGDs and key informants that recently there are some efforts to supply improved variety of heifers and poultry and provide technical assistance on animal fattening and poultry.

Farmers' Training

Farmers' training is not widely practiced and only few individuals have got chance to get training on different issues. Fig 4.1 indicates that only 28 farmers have ever participated on different farmers' trainings and this is only 23.3% of the survey respondents. It further shows that from these trainees, 7 farmers got the training before 10 years and the remaining have got trainings in the last ten years. From the farmers that have got training, the majority, 23 farmers (82.2%), were trained for 1 to 4 days; while the remaining farmers were trained for relatively longer days.

The major contents or topics of trainings reported by the respondents were related to soil and water conservation activities. They were focused on issues like construction of physical soil and water conservation structures (check dam and terrace construction), seedling raising and planting of trees, application and use of chemical fertilizers, and only a few reported to have got training on compost preparation.

In general, participants of focus group discussions, key informants and officials at district level mentioned the inadequacy of farmers training due to lack of budget. Yet, all of them affirmed the significance of farmers' training for enhancing agricultural productivity and improving natural resources conservation.

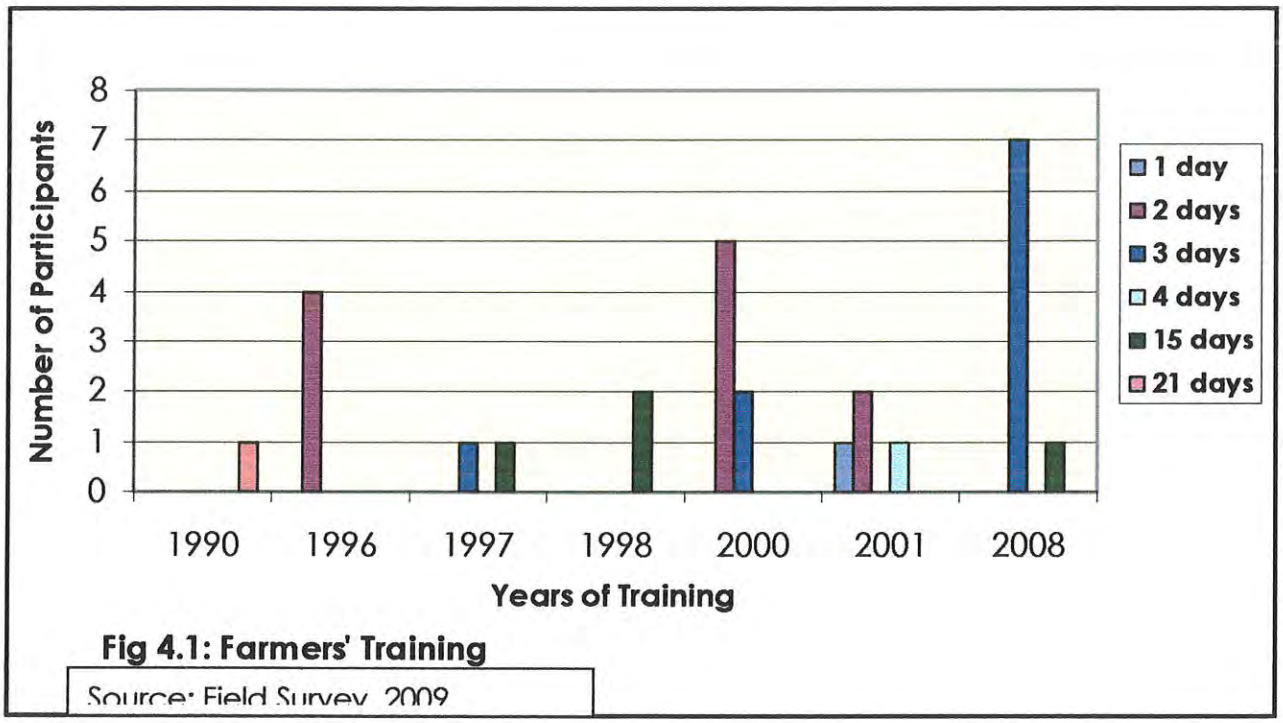

Fig 4.1: Farmers' Training

Source: Field Survey 2009

4.2. Farmers' Land Holding and Tenure Security

4.2.1. Land Holding

The survey results indicate that all the sample household heads have access to land. Regarding mode of land acquisition, Table 4.10 indicates that out of the sample household heads, the majority (73.3%) were given land by government through kebele administration during the past regime. There were also people that got access through other mode of land acquisition which include; gift from parents (23.3%), inheritance (14.2%), rent (14.2%), sharecropping (10.8%) and gift from other relatives (1.7%).

Table 4.10: Mode of Land Acquisition for Sample Household Heads

Source of Land	Frequency	Percentage
Inheritance from parents	17	14.2%
Gift from parents	28	23.3%
Gift from other relatives	2	1.7%
Rent	17	14.2%
Allocated from Kebele	88	73.3%
Share cropping	13	10.8%

Source: Field Survey, 2009.

The average total land holding size of the respondents is 2.8 hectare, whereas the average farmland and grazing land holding is 2.2 and 0.6 hectares, respectively. The mode for both total and crop land holding is 2 hectare for the sample household heads. Although, the size of holding varies, all except an individual have farmland for crop production. From the total respondents, about 29.2% reported that they don't have sufficient land to feed their family. They indicated as they need on average 1.50 hectare additional land to sustain their family. The need for additional land varies from 0.50 hectare to 3 hectares based on the family size and current land holding size of the needy households.

The estimated minimum area of farmland required for a household to attain food security in Oromia regional state is over 1 hectare (EEA/EEPRI, 2002). According to this estimate, 20.8% of the total sample household heads doesn't have enough land to be food secured since their land holding for crop production is 1 hectare and below. As indicated in the above paragraph, the percentage of farmers that reported to have inadequate land is higher than this figure which is calculated simply

based on their holding size without considering other factors, like productivity of land.

Regarding the trend in land holding size, the majority of the respondents (65.80%) indicated that there is no change in their holding. About 19.20% reported as their holding is declining over a period of time and 15% reported an increase in their holding (see Annex 3). The prominently cited reason for a declining trend in land holding is sharing of land to children. Fifteen percent of the total respondents mentioned as their land holding is declining since they shared for their children. Nowadays, sharing from parents became the most important way to get access to land for newly formed households. There are also few individuals that reported as their holding is declining since their land was taken by government for infrastructure development.

On the other hand, the most frequently stated reason for households with an increased holding is inheritance from parents. Furthermore, there are individuals that have got land from their parents through gift and from redistribution of communal land by kebele (see Annex 3).

4.2.2. Farmers' Perception on the Existing Land Tenure System

Almost all (99.20%) of the respondents indicated that the current land tenure system is good to them. Farmers stated various reasons for supporting the current land tenure, which include: easy access to land through share cropping and renting; more tenure security than before due to land certification and declining trend in land redistribution. EEA/EEPRI (2002) came across with similar findings where the majority (61%) of the interviewed farmers perceives as the current land tenure system is good to them. The difference in the degree of support might be

due to the fact that the study by EEA/EEPRI was conducted at macro level in all regions of Ethiopia except Gambela regional state and this study is undertaken at micro level in one district implying differences across regions and districts.

According to the findings of FGDs, during the past regime it was not possible to rent land and to give land for share cropping. But now this is allowed and renting land for farmers for a period of three years5 and giving land for share cropping is possible. This not only creates an opportunity for landless people to have access to land, but also gives chance for those who own large size of land and can't fully utilize it to rent or sharecropped-out part of their land and earn income. Furthermore, participants of FGDs explained that there is no problem of ownership and tenure insecurity under the current land tenure system. Table 4.11 shows the findings of the survey.

Table 4.11: Farmers' Justifications for Saying the Current Land Tenure System is good

Justifications	Frequency	Percentage from the total Valid Cases (118)
Land can be acquired easily enough	33	28.0%
More secured than before	108	91.5%
Can buy and sell land	1	.8%
There is no problem with ownership of land	106	89.8%

Source: Field Survey, Tole District, February, 2009.

[5] Three years is the maximum period for which a farmer can rent-in or rent-out his land to an individual according to the current land tenure system. If it is for long-term investment the maximum rent period is 15 years. This is told by district ARDO officials and also farmers involved in focus group discussions.

Regarding the ownership of land, the respondents (100%) pointed out that the owner of land is government and farmers have usufruct right and also they could bequeath to their offspring. The majority, 89.8% of the respondents indicated as there is no problem with ownership of land under the current land tenure system. During the focus group discussions, it was indicated that in the last regime, the right farmers had on land under their holding was less. It was not possible to give land for share cropping and renting of land was also not possible, but now that is changed. Moreover, they mentioned as frequent land redistribution during the last regime was a big threat to them and this is currently changed, too.

All sample survey participants, focus group discussants and key informants were asked whether privatization of land is more helpful for better utilization of land by improving land management practices and enhancing investment on land. Surprisingly all the three groups were unanimous in emphasizing the problem associated with privatization, and how it can harm the community rather than benefiting them.

All farmers participated in focus group discussions, key informants including those at regional level and district level officials revealed the same opinion on the problems of privatization of land. They explained that privatization of land will make the farmers landless since the majority will be subjected to distress sell of their land in time of crisis and end up landless. This will lead to concentration of land in the hands of few individuals who have the capacity to buy land, and the rest majority will become tenant, that is just like bringing back the system of land lord and tenant relation. Such system makes the majority to become servant, even that will depend on the good will of landlord. If the owners choose

mechanization, the tenants may not even get a chance to work for the landlords. On the other hand, under development of the non-farm sector (industry and service) to absorb the rural mass that would migrate to urban centers due to eviction can easily make the issue more complicated. This finding is inconsistent with the findings of EEA/EEPRI, (2002) which showed that 90% of the surveyed households indicated as they will not sell their land wholly or partially if they were given the right to own their plots.

The participants of FGDs and key informants mentioned as the current land tenure system which makes land under public control is good also for improving land management practices and enhancing long term investment. This is because of government's regulation that requires proper land management as precondition to maintain the land under custody. Government has also made clear that it will take legal actions on those users that are not well managing the land under their holding. But, the key informants and district level officials indicated that there is no clear guideline to implement the existing rules and regulations. As a result the rules and regulations just remain on the paper, and so far no action has been undertaken in the area on those farmers that are misusing their land.

Respondents were also asked whether the current land tenure system gives equal right to men and women; 97.5% of the respondents reported that women have equal right with men. Only an individual said, on land men have more right than women since the tradition allows men to play greater role in deciding on big issues like land. Participants of FGDs and key informants also indicated that the current land tenure system gives equal right to men and women. However, the women are not actively

involved in deciding on land related issues due to cultural reasons rather than legal matters. It is indicated that, even while a household is renting land to other people, wives are simply asked to sign since the legal procedure requires it; otherwise the decision to rent is made by husband himself. This indicates the need to aware women on the legal right they have to decide on their holding.

4.2.3. Long Term Investment by Farmers

Long term investment on land is an investment activity which is undertaken with expectation of long term benefit. Investment by farmers on their land is considered to see the relation between long term-investment and land tenure security. Although almost all the sample farmers reported as the current land tenure system is good to them, only 11.7% are reported to have ever planned and practiced long-term investment on their plots. With regard to the type of their investment all of them indicated that they have planted trees, mainly eucalyptus and to some extent junipers trees. The findings of the focus group discussions showed that this planting of trees is commonly practiced on farms around homestead. It was explained that this planting of trees is undertaken mainly for construction purposes, and to generate income from sale of poles.

Farmers were asked about the major constraints to long-term investment and some of the factors mentioned include: insufficient size of farm land; poor infrastructural development; lack of technical support and credit facilities. Table 4.12 indicates that for about 38.3% of the total respondents insufficient farm size is the first most important obstacle to undertake long term investment on the land under their control. Next to that poor

infrastructure development is reported by 33.3% of the respondents to be the first important limiting factor. Lack of technical support and lack of credit facilities were mentioned to be the first most important determinant factors to undertake long-term investment on land by 15% and 5% of the sample household heads, respectively.

The relationship between land tenure security and long-term investment was discussed with participants of FGDs and key informants. All agreed that there is strong relationship between long term-investment and land tenure security, yet they noted that the issue of tenure security is not a problem nowadays. Hence, factors other than tenure security should be given due attention to encourage farmers to invest on their land.

Table 4.12: Major Constraint of Long Term Investment by Farmers

First Major Constraint	Frequency	Percentage
Absence of tenure security	2	1.7
Lack of credit facilities	6	5.0
Lack of technical support	18	15.0
Insufficient size of Farm Plots	46	38.3
Poor infrastructural development	40	33.3
Lack of Water	2	1.7
Labor Shortage	1	.8
Total	115	95.8

Source: Field Survey, 2009

4.3. Characteristics of Farmland and Nature of Land Degradation

4.3.1. Characteristics of Farmland

Characteristics of farmland are among the key factors that are affecting land use type and nature of land degradation in a given area. In view of

this, farmland characteristics of the sample household heads were considered, mainly in terms of its slope. Accordingly, Table 4.13 shows 42.9% of the respondents are cultivating flat land; 10.1% are cultivating gently sloping land; 36.13% are cultivating moderately sloping land and the remaining 10.9% are cultivating steeply sloping land.

Table 4.13: Slope of Land under Crop Production

Slope	Frequency	Percentage
Flat	51	42.9%
Gently Sloping	12	10.1%
Moderately Sloping	43	36.1%
Steeply Sloping	13	10.9%
Total	119	100.0%

Source: Field Survey, 2009.

Key informants from district ARDO and participants of FGDs indicated that more than half of the farmers are cultivating erosion prone areas. Per the findings from FGDs, there are sloppy areas that shouldn't be under cultivation due to its nature, but now it is becoming under cultivation due to population pressure. This is indicated to be among major factors in aggravating land degradation.

4.3.2. The Nature of Land Degradation

Magnitude and Trend of Land Degradation

The level of land degradation in the study area is high and it is also well recognized by the farmers. Rills and gullies are commonly observed on farm and grazing lands. Seventy four out of the total 120 (61.7%) of the survey respondents reported to be well aware of the problem of land degradation in their respective Kebeles. Fifty eight (48.3%) have indicated

as some part of land in their respective kebeles became out of use due to land degradation that resulted mainly from soil erosion. The respondents mentioned, on average 13.15 hectares of land has become unviable for any productive activity due to land degradation in their respective kebeles. However, the survey respondents, FGDs and KIs explained the difficulties to estimate the total land that became unproductive due to erosion induced land degradation. Yet, all groups were unanimous regarding the severity of land degradation and existence of land that become unviable for any productive activity in each of the sample kebeles. They recommended a detailed survey to estimate the magnitude of the problem and the amount of land which is already out of use.

Thirty six (30%) of the surveyed households also indicated the presence of land degradation on their own plots; half of these respondents mentioned that they lost some part of their land. These farmers reported to have lost on average 0.42 hectare of land per household due to the problem.

Respondents that mentioned to have suffered degradation problem on their farmland were asked about the trend of the problem. Accordingly, 50% of them reported an increasing trend of the problem, 38.9% said it is declining, and the remaining 11.1% stated as there is no difference (Table 4.14).

Similarly, farmers with land degradation problem that reported an increasing trend were further asked to rate on the magnitude of degradation: about 33.3% of them reported to experience very severe land degradation; whereas about 66.7% reported to experience moderate land degradation problem on their farmland.

Table 4.14: Trends of Land Degradation on Farmland of Farmers with Land Degradation Problem on Their Own Farmland

Trends of Land Degradation	Frequency	Percentage from the total 120 respondents	Percentage Within the group
Trend			
Increasing	18	15.0	50.0
Declining	14	11.7	38.9
No difference	4	3.3	11.1
Total	36	30.0	100.0

Source: Field Survey, 2009.

Indicators of Land Degradation

The surveyed households were asked for the indicators of land degradation problem on their own farmland. About 88.9% of the respondents that experience some degree of degradation on their own plots, reported to observe rills and gullies; 30.6% reported to experience decline in yield; 19.4% reported to observe decrease in the soil capacity to grow variety of crops; and 38.9% reported to have observed decline in depth of top soil on their own plots. The key informants and participants of FGDs listed similar indicators of land degradation. They all emphasized the expansions of gullies and rills.

Professionals and district level officials underlined that unless adequate support is provided by higher level officials, through allocating adequate budget in order to mobilize and train the farmers to undertake effective land management practices, a large area of land may soon become out of use due to degradation caused by erosion. Participants of FGDs explained that natural water ways are commonly found every where and there to drain excess water from farm plots. These waterways are often considered as communal property, which caused inappropriate

utilization. Consequently, the water ways are becoming big gullies expanding year after year, yet individuals are not taking initiatives to protect and rehabilitate these gullies. Thus, FGDs' participants underscore the urgency of government intervention in organizing and mobilizing the local communities for collective action.

Participants of FGDs also noted the rate of decline in the capacity of soil to give good yield as an important indicator of land degradation. They elaborated that the productivity of land is declining from time to time for both grazing and crop production, which in turn necessitate applying more and more inorganic chemical fertilizer to get the same output.

Figure 4.2: Sample from Gullies in Kursity and Arada Leka kebele

Around Mangura village, Photo by Researcher, February, 2009

Figure 4.3: Sample from Degraded Areas in Tume Yeya kebele

Around Siba Village, Photo by Researcher, February, 2009

Causes of Land Degradation

Different factors have contributed for the existing land degradation problem. The findings of FGDs, key informants interviews with professionals at different levels and district level officials showed that population pressure, and poor land use and farming practices due to low level of awareness of farmers are the major causes for the problem. According to the findings, population pressure which resulted in deforestation, expansion of farming to marginal areas and grazing lands, and over grazing is the underlying cause for land degradation. Furthermore, the FGDs' participants mentioned less attention by concerned government offices to take immediate action to be another important contributing factor for the problem. On the other side, key informants from district ARDO emphasized shortage of budget to be the restraining factor to take action.

Similarly survey participants identified; land steepness, poor farming practices, lack of awareness among the community, high intensity of rainfall and deforestation to be the most important causes of land degradation. Among these factors land steepness and poor farming practices are identified to be the most important ones by 25.8% and 19.2% of the total interviewed farmers, respectively.

Impact of Land Degradation

Regarding the impact of land degradation in the study area, participants of FGDs and key informants mentioned that land degradation is seriously affecting livelihood of the local community at least from two directions: on one hand there is land that is becoming out of use due to

degradation; and on another hand the need to apply more chemical fertilizer is increasing from time to time due to the decline in soil fertility.

Despite the increasing trend of land degradation, participants of FGDs stated, so far it has been possible to halt decline in crop yield through relatively better application of inorganic chemical fertilizer in comparison to previous period. But the net income from crop production is negatively affected by an increment in the price of fertilizer and other agricultural inputs. This is further worsened by the hiking in the price of all other consumption goods that farmers are buying from market.

Proposed Solutions for the Problem of Land Degradation

All contacted groups, including survey respondents, participants of FGDs and key informants were asked to propose solutions for the increasing trend of land degradation in the area. Most of the key informants and participants of FGDs were suggesting commitment by concerned government bodies to deal with the issue. According to their view, so far no adequate attention has been given by the government towards the problem of land degradation in the study area and that is aggravating the problem. They further noted, land is the basic resources for the local community and the country as well; and unless there will be strong efforts from the government to curb the existing trend of degradation, the result would be disastrous or even irreversible. Their justification for the need of concerned government bodies' active involvement is the overall low level of farmers' awareness which resulted in low farmers' initiatives to tackle the problem of land degradation.

The stated low level of farmers' awareness on the existing land degradation problems seems consistent with the findings of household survey. Only 61.7% of the survey respondents reported to have recognized the presence of land degradation problem in their respective Kebeles. This figure is relatively small as the problem of land degradation in all the sample kebeles is easily observable through mere physical observation. Gullies and rills are every here and there and it doesn't require any expertise to understand presence of degradation problem, yet about 38% of the respondents seem not to take note of it. The expectation was that greater number of respondents would have already felt the problem of land degradation in their respective kebeles.

Similarly, survey respondents have also proposed different actions to minimize the problem of land degradation. Among the proposed solutions, construction of physical conservation structures was given more weight. Some 45.83% of the respondents proposed construction of physical conservation structures as a viable solution to curb degradation. The proposed structures include: construction of check-dam, terrace and ditch, cut-off drains, and contour farming. Moreover, the importance of awareness raising among the community members was also underscored by the respondents. Similar to the findings of FGDs and key informants interviews, the importance of government support in land management practices is also emphasized. Respondents stressed the supreme importance of government support for both physical conservation practices as well as awareness raising activities.

Potential Difficulties in Undertaking Proposed Solutions

About 27.5% of the sample respondents mentioned challenges such as poor community participation, lack of commitment by professionals, less

attention by government, land steepness, and shortage of labor as major threats to implement the proposed solution. Among these, however, poor community participation followed by labor shortage was emphasized. They explained that especially in-order to rehabilitate the already degraded land, active community participation is very crucial; without which rehabilitation of the already degraded land and halting the worsening trend of land degradation is unlikely. Furthermore, they emphasized the importance of concerned government offices' involvement for the enhancement of this community participation and provision of technical support.

Similar challenges were identified by participants of FGDs and key informant interviews. Key informants emphasized lack of commitment by government to be the most challenging factors for pursuing the proposed activities. They indicated that there is no adequate budget for activities related to land management practices and the problem of land degradation didn't get attention as it should be. Professionals from district ARDO, said that the trend of land degradation is worsening from time to time, but there is no significant intervention by the government to reverse the situation. As a solution they recommended government's commitment through raising community's awareness level, enhancing participation, and mobilizing local resources, and implementing integrated action against land degradation. These groups further expressed their worries that if the government will not take degradation as a top agenda and take immediate action, degradation could cause severe consequences that would even be difficult to reverse.

In summary, all contacted groups (key informants, participants of FGDs as well as the sample households) have strongly suggested active

community participation and government support as a remedy for the problem. All have agreed in suggesting active community participation as vital and irreplaceable in making the interventions sustainable.

4.4. Farmers' Land Use and Management Practices

4.4.1. Farmers' Land Use

All the interviewed farmers are using part of their land for crop production; nearly half of them reported to allocate some part of their land for grazing; and a few of them reported to use some land for woodlots. Thus farming, grazing and woodlots constitute land use in the study area.

Respondents reported different determinants in deciding the purpose for which they are using their land, i.e. land use type. Table 4.15 shows that 90.8% of the respondents indicated fertility level of land to be the primary determinant factor in deciding land use type, followed by livestock holding size of the farmers reported by 20.8% of the respondents; economic status of farmers reported by 18.3% of the respondents and labor availability reported by 9.2% of the farmers.

Table 4.15: Determinants of Land Use Type

Determinants	Frequency	Percentage
Economic status	22	18.3%
Labor availability	11	9.2%
Livestock holding	25	20.8%
Fertility level of land	109	90.8%

Source: Field Survey, 2009.

4.4.2. Farmers Land Management Practices

There are different land management practices that are undertaken by the farmers in the study area to maintain or improve the fertility level of their land. These are practices with short term and relatively long-term effects and can be seen separately.

Land Management Practice with Short Term Effect

For short term effect, farmers in the study area are commonly applying chemical fertilizer. Almost all (98.3%) of the respondents are applying inorganic chemical fertilizer regardless of differences in their socio-economic background. They indicated that it is impossible to expect any yield without applying chemical fertilizer mainly due to a decline in the fertility of land. This concept is consistent with previous findings that indicated as chemical fertilizer is commonly applied due to decline in soil fertility (Reij, Scoones and Toulmin, 1996).

They further mentioned that, even though a very high increment in its price is becoming a challenge, inorganic chemical fertilizer could be easily available and can be applied on large areas of land as far as the individual is able to afford its price. Moreover, it is cited that inorganic chemical fertilizer gives better yield within very short period of time.

With regard to the sample farmers' intensity of inorganic chemical fertilizer application, on average they are applying 1.80 quintal per hectare of farmland. This average is greater than the average for Oromia region which was found to be 0.92 qt./ha, only about 46% of the Ministry of

Agriculture's recommended level (EEA/EEPRI, 2002). Whereas, the sample household heads are applying about 90% of that recommended level.

Out of the total respondents, 67.5% of them indicated that they have difficulties in applying chemical fertilizer. The most frequently mentioned difficulties by this group are high fertilizer price which is becoming unaffordable to the poor, and problem of timely deliver of fertilizer. About 38.3% of the respondents emphasize more on high price of fertilize as the most important problem; and 4.17% reported untimely delivery to be the most important problem; and 24.17% reported to have problems of both. Moreover, they have indicated that currently supply of fertilizer on credit basis is reduced; and the farmers are expected to directly buy fertilizer and indicated this to be among the challenges associated with fertilizer use. Farmers reported, previously everybody was getting fertilizer on credit basis and were required to pay their loan after harvest, but now it is becoming difficult to get on credit basis. From the respondents, only 57.5% have reported to have got fertilizer on credit basis during last production season. Even this group indicated that what they got was not enough to cover their land and those who have the capacity purchased from market to fill the gap.

During FGDs too, participants raised the problem of high price of chemical fertilizer and lack of timely supply as essential challenges. It was indicated that high price of chemical fertilizer is particularly affecting poor farmers, especially those who don't have adequate farmland and are taking rent from others. This is because the price of land rent is also highly increasing in the past few years.

Participants of FGDs were asked to comment on relative price of food grain and that of chemical fertilizer in the local market. They explained that, even though the price of grain is also increasing, the farmers couldn't cope with the high price of chemical fertilizer. The participants said, the need to apply more chemical fertilizer is increasing from time to time since the capacity of land or soil to give yield with less intensive application of fertilizer is declining. The need to apply more quantities of chemical fertilizer and the increase in the price of all consumable goods makes the farmers to face challenges.

Land Management Practice with Long Term Effects

In addition to inorganic chemical fertilizer with a short term effects, farmers in the study area are practicing land management practices with relatively long-term effects. But the level of application of the identified practices is not significant as compared to inorganic chemical fertilizer. Among the land management practices with relatively long term effects, Table 4.16 shows that a greater number of farmers (67.7%) are applying organic manure on their farm land. This is followed by ditch which is practiced by 62.5% of the total farmers and terrace construction which is practiced by 61.7%. And it has been noted that only 4.2% of the respondents' leave crop residues on farm land in-order to maintain or improve productivity of land.

Table 4.16: Land Management Practices with Relatively Long-Term Effect

Land Management Practices	Frequency	Percentage
Manure application	81	67.5%
Terrace application	74	61.7%
Check dams	22	18.3%
Cut of drain	46	38.3%
Leaving crop residues on farm land	5	4.2%
Ditch	75	62.5%
Planting trees	12	10.0%

Source: Field Survey, 2009.

The interviewed farmers as well as participants of FGDs indicated that low level of crop residues application is not only due to lack of knowledge about its importance, but it is because crop residue is becoming primary source of livestock feed.

Regarding application of organic manure, key informants from district ARDO informed that it is only on small scale basis. They emphasized that the greatest proportion of farmers that are applying manure are practicing it only at micro level, on farmlands located at their homestead. Those that are applying on farmland that is located out of close to homestead are insignificant in number. They further noted that the majority of farmers are not using manure for fertilization even at their homesteads, as manure is commonly used as source of fuel in the area. Those who are applying manure are also applying part of it and use the rest for cooking fuel.

Participants of FGDs as well mentioned that farmers are using manure more for fuel than applying it on farmland. They discussed that this is not only due to lack of awareness problem on the importance of manure for

improving the fertility of soil, but due to shortage of firewood as a result of deforestation which is caused primarily by population pressure.

According to Key informants, efforts are being exerted by development agents' in-order to improve farmers' awareness on land management practices. Development agents sensitize the community about facts related to problem of land degradation and measures that need to be taken to minimize it during public meeting. But, professionals from district ARDO explained as these efforts lacks consistency and focus as they are not supplemented by specific trainings due to budget constraint. As a result, the level of land management practices with long term effects remained minimal as compared with the scale of the problem.

4.5. Determinants of Farmers' Land Management Practices

For the low level of farmers' land management practices described in the above sub-section, different socio-economic and institutional factors are expected to play determinant role. Among these factors, tenure security is a major institutional factor that could significantly affect farmers' land management practices. But as it has been reiterated above, 99.2% of the interviewed farmers perceive the current land tenure system to be good for them and reported that they don't have any problem with the existing tenure system to invest on their land. Hence, there seems no ground to take the issue of tenure security as a determinant factor in adversely affecting farmers' land management practices. Participants of FGDs expressed that the current land holding certification gave confidence to farmers on their land holding security. They further noted that if there had been any plan for any potential land re-distribution in the future, government would have not grant land holding certification to holders.

According to their view, there is no threat of future land redistribution that could prevent the farmers from investing on their land.

Thus, as a prelude to the analysis only other factors such as educational level, age, livestock holding, access to extension services, land holding size, number of economically active members of the household, training, access to credit facilities and farmers perception on existing land degradation problems are assumed to be potential determinants of land management practices. And an attempt has been made to find out some sort of relationship between these factors and two land management practices that are selected for being practiced by relatively large number of farmers. The selected land management practices are manure application from fertility management practices and terracing from erosion protection measures.

The two land management practices are taken as dependent variables, whereas the factors mentioned above are taken as independent variables for the analysis.

4.5.1. Inferential Statistical Analysis

Binary logistic regression model is applied to analyze the relationship between factors that are identified as independent variables and the land management practices (terracing and manure application) which are taken as dependent variables. It is used to predict the presence or absence of a characteristics or outcome based on the value of a set of predictor or independent variables. Before proceeding to the analysis, model fitness is considered both for terracing and manure application. The Hosmer and Lemshow Statistic indicates that the model adequately

fits the data in both cases (terracing and manure application). This is because the significance value in both cases is greater than 0.05. It is 0.108 incase of terracing and 0.743 incase of manure application.

Educational Status of Farmers

The first variable that is considered as independent variable is educational status of the respondents. It is expected to have significant positive influence on different land management practices due to its impact in raising the level of farmers' awareness and improving their planning horizon. Consistent with this expectation, binary logistic regression showed educational status of farmers to have a predictive power in explaining application of terracing. Using the odds of terracing among illiterate farmers as a reference, farmers with better educational status have much higher chance of applying terracing. It indicates that a one unit increase in the educational level of farmers leads to an increase in the odds of terracing by a factor of 2.228. This result is statistically highly significant ($p<0.001$) (Annex 4). The finding of positive association between farmers' educational status and terracing is consistent with initial assumption and it is also similar with previous study conducted by Habtamu, 2006, which identified educational status of farmers to have positive influence on farmers' decision to retain introduced soil and water conservation structures.

In case of manure application also binary logistic regression showed educational status of farmers to have predictive power, though the relationship is less strong. A one unit increase in the farmers level of education leads to an increase in the odds of manure application by a factor of 1.527 and the result is statistically significant ($p<0.05$) (Annex 5).

This less strength in the relation of farmers' educational status with manure application could lead to the conclusion that farmers with better educational status focus more on introduced land management practices than the indigenous ones.

Age Category of Farmers

Binary logistic regression model showed that there is no significant relationship between age of farmers and terracing, but the relationship is positive since the value of Exp(B) is greater than 1 (Annex 4). This is inconsistent with previous study conducted by Aklilu in 2006 which showed age of farmers to have positive and significant influence on adoption of introduced stone terraces.

However, it is observed that binary logistic regression model indicated age of farmers to have predictive power in manure application. A one unit increase in the age of farmers is found to have increased odds of manure application by a factor of 1.419 and the result is statistically significant ($p<0.05$) (Annex 5). The positive and significant relationship could be explained by the fact that older farmers have better experiences in indigenous land management practices.

Sex of Farmers

Most of the land management practices require more labor force. Hence, male headed households are expected to better undertake different land management practices, as better endowed with labor. Women are often faced much tighter labor constraints than male farmers and male-headed households, and women are sometimes inhibited from making

decisions about land management practices while their husbands are away (Benin, 2006). In addition to that women are commonly busy in household activities and the prime responsibility they are usually assuming in child rearing. In this research too, negative and significant relationship between sex of household heads and terracing is observed and the result is statistically significant ($p<0.05$). For the analysis, male sex is given a code of 1 and for female sex code 2 is given. Taking male headed households as a reference group; the odds of applying terracing among female headed households was only .235 times that of the male headed households (Annex 4). The finding is in conformity with the assumption; men are more likely to practice terracing than women.

With regard to the relationship between sex of household head and manure application, no significant relationship is observed.

Access to Extension Services

Access to extension services is assumed to improve farmers' attitude towards land management practices. This is because farmers with access to extension services are expected to have better access to information which could play significant role in improving land management practices. Per the expectation, the analysis indicated farmers' access to extension services to have predictive power in terracing. Using the odds of terracing among farmers' with no access to extension services as a reference, farmers' with access to extension services have much higher chance of applying terracing. Farmers with access to extension services are found to have increased odds of applying terracing by a factor of 2.475 higher when compared to farmers with no access to extension services and the result is statistically significant ($p<0.05$) (Annex 4). This is

consistent with initial assumption and the finding of previous research by EEA/EEPRI, 2002, which founded participation in extension to contribute positively to farmers' behavior to build terraces. Another previous study also indicated that contact of farmers with extension agents related with use of more long-term land management practices (Benin, 2002).

The analysis further showed farmers' access to extension services to have predictive power in manure application (Annex 5). Using the odds of manure application among farmers' with no access to extension services as a reference group, farmers' with access to extension services have much higher chance of applying manure. Farmers with access to extension services are found to have increased odds of manure application by a factor of 2.396 higher when compared to farmers with no access to extension services and the result is statistically significant ($P<.05$).

Livestock Holding

Farmers' livestock holding size could be considered as one indicator for better availability of resources or resource endowments. On the other hand better availability of resources is assumed to have positive impact in farmers' land management practices. Hence, greater livestock holding is expected to have positive influence in farmers' behavior to improve their land management practices.

Between livestock holding and terracing, no significant relationship is observed (Annex 4). This is inconsistent with previous study which indicated farmers' livestock holding size to have significant negative influence on the adoption of stone terraces (Aklilu, 2006). In case of

manure application, the analysis indicated larger livestock holding of farmers to have predictive power. Using the odds of manure application among farmers' with no livestock holding as a reference, farmers' with livestock holding have higher chance of applying manure. A one unit increase in livestock holding is found to lead to an increased odds of manure application by a factor of 1.616 and the result is statistically significant ($p<0.01$) (Annex 5). This could be explained by the fact that farmers with more livestock have better availability of manure which could be more than what they need for cooking fuel.

Farm Size

Farmers' with larger farm size are anticipated to practice better land management practices. This is because when farmers have larger farm size, they could plan different management practices due to their adequate holding size to pilot it. But no significant relationship is observed between farm size and both terracing and manure application (Annex 4 and 5).

This is not consistent with initial assumption and findings of previous studies. Earlier study conducted by EEA/EEPRI in 2002 indicated that farmers with larger farm size were less likely to be engaged in long-term land management practices. Insecurity feeling of farmers with greater holding was presented to be justification for the negative effect of large farm size. But for this study insecurity feeling couldn't be an issue since the sample households reported that they don't have security problem on their holding. Another previous study indicated farm size to have positive and significant influence on adoption of introduced stone terraces, but the

same study identified farm size to have significant negative influence on continued use of introduced stone terraces (Aklilu, 2006).

Number of Economically Active Household Members

Households with larger number of economically active labor are supposed to be better in undertaking different land management practices, since they are less likely to have shortage of labor which is required to do land management activities. In contrast to this, logistic regression analysis indicated that there is no significant relationship between number of economically active household members and application of both terracing and manure application (Annex 4 and 5).

This unexpected finding could be explained by the fact that larger number of economically active household members are found in households with relatively larger household size, where there are also larger number of dependent household members. Hence, they are likely to be busier in accomplishing short-term objectives of feeding the large household members than being engaged in long-term land management practices.

Farmers' Training

Farmers' training is among important institutional supports that are likely to significantly improve farmers' land management practices. In line with this assumption, farmers' training is observed to have predictive power in terracing. By taking odds of terracing among farmers with no training as a reference, farmers with training have higher chance of applying terracing. Farmers with training are found to have increased odds of

terracing by a factor of 3.698 higher when compared to farmers with no training and the result is statistically significant ($p<0.05$) (Annex 4).

Farmers' training is also observed to have predictive power in manure application. Based on odds of manure application among farmers with no training as a reference, farmers with training have much higher chance of applying manure. Farmers' training is found to have increased odds of manure application by a factor of 5.357 higher when compared to farmers with no training and the result is statistically significant ($p=0.01$) (Annex 5).

Access to Credit Services

Resource availability is generally expected to positively influence farmers' land management practices. Hence, access to credit is expected to have positive relationship with farmers' land management practices.

However, the analysis indicated that farmers' access to credit services negatively associated with application of terracing. Farmers with access to credit services are found to be statistically different from farmers with no access to credit in their practice of terracing and the relationship is highly statistically significant ($p<0.01$). Accordingly, the odds of applying terracing by farmers with access to credit were only .328 times that of farmers with no access to credit services (Annex 4). With regard to the relationship between farmers' access to credit services and manure application, no significant relationship is observed.

The observed relationship could be due to the fact that those farmers that are commonly taking credit are the poor ones, with less land holding and

other resources. For this group of people the priority is feeding their family than planning for long-term benefits.

Perception of Degradation Problem on Own Farmland

There is a general understanding that the better the farmers perceive problems of land degradation, the better they act to improve their land management practices. Nonetheless, no significant relationship is observed between farmers' perception of degradation problem on their own farmland and their practices of both terracing and manure application (Annex 4 and 5).

This insignificant relationship might be due to the fact that though they are aware of the degradation problem on their land, yet they might not feel the real impact of the problem, i.e. decline in yield. For more comprehensive understanding, there might be a need to conduct further research. The insignificant relationship is consistent with previous study that indicated as perceptions of erosion problem have no significant influence on the decision of farmers to continue using introduced terraces (Aklilu, 2006).

To sum up, the chapter presents the major body of the thesis that is results and discussions. It presents descriptive analysis of sample respondents' background, farmers' land holding and tenure security, characteristics of farmland and nature of land degradation and farmers' land use and management. Moreover, the chapter presents logistic regression analysis on the factors influencing farmers' decision to practice terracing and manure application. The following chapter presents conclusions and some achievable recommendations based on the findings of the research.

CHAPTER FIVE

CONCLUSIONS AND RECOMMENDATIONS

5.1. Conclusions

The findings of the study indicate that the livelihood of the farmers in the study area depends on subsistence agriculture. The major economic activities for all the sample households is farming and the major income source for 99.2% of the respondents is sale of crops. They are producing crops, primarily teff and wheat, which requires fine tillage that expose soil for erosion. In addition to sale of crops, since they are practicing mixed farming, 37.5% of the farmers are getting income from sale of livestock. This indicates how their livelihood depends on land resources.

On the other hand the findings indicate that the study district has a serious land degradation problem which appears to be one of the major challenges for crop production. Gullies and rills are commonly observed in the study area. The most important causes for this land degradation in the study area are; land steepness, poor farming practices, lack of awareness among the community, high intensity of rainfall and population pressure. About half of the farmers in the study area are practicing crop production in erosion prone areas and still there is an expansion of crop production to more marginal areas due to population pressure. This expansion of crop production resulted in shortage of grazing land, deforestation and increasing trend of land degradation.

Regarding the consequences of land degradation, the livelihood of the community in study areas is affected at least from two directions. On one hand they are losing land due to degradation and on another hand the

need to apply more chemical fertilizer is increasing from time to time due to the decline in soil fertility. This problem of land degradation is recognized by local actors, including concerned government offices, participants of FGDs and the majority of the sample respondents. About 61.7% of the respondents reported to be well aware of land degradation problem in their respective kebeles. About 36 (30%) of the sample respondents indicated presence of land degradation problem on their own plots too; half of these respondents mentioned that they lost some part of their land due to land degradation. Professionals in the district and community members underlined that unless strong action is taken by all concerned government body and the local community, land degradation will cause severe problem and in the long run it might reach at irreversible stage.

It was observed that so far no significant efforts were made by concerned actors to minimize land degradation problem in the district. Farmers' land management practices, except application of inorganic chemical fertilizer, are also at low level when compared with the level of the problem. Inorganic chemical fertilizer is used by almost all farmers (98.3% of the respondents) and it was reported expectation of yield with out applying chemical fertilizer is unlikely due to land degradation. However, farmers in the study area are currently facing some challenges in fertilizer application. These are lack of fertilizer on credit basis as before, high price and lack of timely supply.

Among the land management practices with relatively long term effect that are practiced by farmers in the area; manure application, terracing and ditch are identified to be the major ones. Check dams and cut of drain are also practiced to some extent. Farmers that are leaving crop

residues on farmland are insignificant in number. Participants of FGDs and key informants well explained that crop residues are not commonly used for soil fertility management since nowadays it is becoming major source of livestock feed. Moreover, it has been found that cow dung is primarily used for cooking fuel. Professionals and participants of FGDs indicated that even those farmers that are applying manure for soil fertility maintenance are applying only small amount and use the rest for cooking fuel mainly due to lack of other options .

The identified land management practices with relatively long-term effects are not uniformly practiced by all farmers. That is due to different socio-economic and institutional factors that determine/influence farmers' decision to practice land management practices. Some determinant factors are identified through logistic regression analysis by taking terracing and manure application among land management practices that are undertaken by farmers in the study area.

From the considered factors; educational status of farmers, access to extension services and farmers' training are found to have significant positive influence on terracing. In contrast, access to credit is found to have significant negative influence on terracing. It was further found out that male headed households are more likely to practice terracing than female headed households.

On the other hand, educational status of farmers, age of farmers, access to agricultural extension services, farmers' training and livestock holding size are identified to have significant positive influence on farmers' decision to apply manure on their plots. The remaining considered factors such as farmers' perception on land degradation problem on their own

farmland, farm size and number of economically active household members are not found to have significant influence both on terracing and manure application.

In general, among the considered socio-economic and institutional factors that influence farmers' decision in land management practices; educational status of farmers, farmers' access to agricultural extension services and farmers' training are the very important ones in the study area.

5.2. Recommendations

The findings of the research indicate that there is worsening trend of land degradation problem in the study district. On the other hand, so far no significant efforts were made against the increasing problem of land degradation. Hence, it is helpful to consider factors that could influence land management practices. Especially identification of determinant factors in farmers' land management practices has paramount importance in dealing with the problem. Therefore, based on the findings of the research, the following actions that are believed to play significant roles in improving land management practices and solving or at least minimizing problems of land degradation are recommended.

- The importance of manure application and crop residue in improving and maintaining fertility of soil is well recognized by the farmers. In contrast, farmers are using crop residue for animal feed and they are primarily using cow dung for cooking fuel. This has resulted from lack of options and hence, alternative sources of livestock feed and energy sources need to be sought to allow farmers to use crop residue and manure for the maintenance and improvement of fertility of land. In doing this, the role of expansion

of fodder crops in enhancing use of crop residue for soil fertility maintenance and management is significant. To maximize efficiency in energy utilization for cooking, promotion of affordable fuel saving stove could play considerable role in reducing use of cow dung for cooking fuel. It was found that currently only few households in the district are using it due to lack of awareness and problem of supply. In the long run, rural electrification is the best option in providing alternative energy source and enhancing manure application.

- In making interventions in land management practices, there should be active participation of local stakeholders, primarily farmers. This helps to integrate indigenous land management practices with the introduced ones and enhance easy adoption and sustainable use of effective introduced practices.
- For maintaining and improving crop production in the short-run, there should be adequate supply of fertilizer. Paradoxically, despite the accelerated land degradation, no reduction in yield has been observed in the study area. This is because the negative impact of land degradation is offset by good application of inorganic chemical fertilizer. However, the identified problems with this are that currently farmers are not getting it on credit basis as before and the price is also going up. Moreover, farmers are not getting it at the right time. Hence, provision of fertilizer on credit basis and timely supply of fertilizer by concerned body are strongly recommended.
- Population pressure is among the major causes of land degradation in the study area. Expansion of non-farm activities should be given due attention by all concerned bodies in-order to minimize pressure

on land. Moreover, population program need to be strengthened to control further population pressure.

- Access to extension services, farmers' level of education and farmers' training are found to have positive and significant influence on terracing and manure application. Hence, strengthening farmers' access to extension services and maximizing service coverage could play significant role in improving farmers' land management practices. Farmers' training is another factor with significant positive influence on farmers' decision to undertake land management practices. On the other hand, it is very limited and from the total interviewed farmers those that have ever received training are less than a quarter. The major reason for this is reported to be shortage of budget and for the same reason the currently constructed farmers' training centers in all kebeles are also not functioning. Hence, to improve farmers land management practices and also make use of the farmers' training centers on which big resources have been invested, all concerned bodies should give due emphasis to farmers' training on land management. Moreover, there should be an arrangement of adult functional literacy training since farmers' literacy level is found to have significant positive influence on farmers' land management practices.
- Female headed households are found not to likely practice terracing. This might be due to the labor shortage and limited access they have to information. To improve this they need to be given priority by all related interventions.
- For designing effective land management program, local specific factors need to be given due attention. Similarly, comprehensive study at macro or national level on determinants of farmers' land

management practices can have significant role in getting better understanding on the issue. Such macro-level studies can also serve as a guide to local level studies on determinants of farmers' land management practices. Thus, concerned actors should give attention to the importance of conducting research specific to determinants of land management practices at national level.

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ANNEXES

Annex 1: Total Livestock in Tole District

S/N	Livestock Type	Number
A	Cattle	
1	Oxen	26,165
2	Cow	22,275
3	Growing Bull	7,970
4	Heifers	6,855
5	Calves	14,380
	Total cattle	77,645
B	Shoats	
1	Sheep	24,616
2	Goats	15,403
	Total Shoats	40,019
C	Equines	
1	Horse	3,266
2	Muel	4,369
3	Donkeys	11,311
	Total Equines	18,946
D	Poultry	24,337
E	Beehives	
1	Modern beehives	26
2	Traditional beehives	2,874
3	Transitional beehives	82
	Total	2,982

Source: District ARDO

Annex 2: Trend in Crop Yield and Reasons for Change

Trend in Crop Yield and Reasons for Change	Frequency	Percentage
Trend in Crop Yield		
Increasing	110	91.7
Decreasing	9	7.5
No change	1	.8
Total	120	100.0
Reasons for Increasing Trend		
Application of compost	3	2.5
Better application of compost and chemical fertilizer	2	1.7
Better application of chemical fertilizer	65	54.2
Better application of chemical fertilizer and better farming practice	7	5.8
Better application of fertilizer and improved seed	16	13.3
Better farming practice	12	10.0
Good weather	5	4.2
Reasons for Declining Trend		
Increasing price of chemical fertilizer	8	6.6
Increasing price of chemical fertilizer, frequent cultivation of land	1	.8

Source: Field Survey, 2009

Annex 3: Trend in Land Holding Size and Reasons for Change

Trend and Reasons for Change	Frequency	Percentage
Trend in Land Holding		
Increased	18	15.0
Decreased	23	19.2
No change	79	65.8
Total	120	100.0
Reasons for Increasing Trend		
Distribution of communal land by kebele	1	.8
Expanding it to grazing land	1	.8
Getting by inheritance	14	11.7
Given by parents	1	.8
Reasons for Decreasing Trend		
Sharing to children	18	15.0
Shared with ex-husband	1	.8
Taken by government for infrastructure development	2	1.7
Vilagization program of past regime	1	.8

Source: Field Survey, 2009

Annex 4: Binary Logistic Regression for Terracing

Assumed Independent Variables	Wald	Sig.	Exp(B)	95.0% C.I.for EXP(B)	
				Lower	Upper
Educational status	13.122*	.000	2.228	1.444	3.438
Age category	2.562	.109	1.300	.943	1.792
Sex	4.055**	.044	.235	.058	.962
Access to extension services	5.277**	.022	2.475	1.142	5.363
TLU holding category	.042	.838	1.024	.816	1.285
Farm size	.092	.761	1.056	.741	1.506
Number of economically active household members	.261	.609	1.065	.837	1.355
Farmers' Training	5.950**	.015	3.698	1.293	10.577
Access to credit services	8.193*	.004	.328	.153	.704
Perception of degradation problem on own farm land	1.305	.253	1.623	.707	3.728

*, ** significant at 1 % and 5% levels, respectively.

Source: Author's Calculation from Field Survey, 2009.

Annex 5: Binary Logistic Regression for Manure Application

Assumed Independent Variables	Wald	Sig.	Exp(B)	95.0% C.I.for EXP(B)	
				Lower	Upper
Educational status	4.813**	.028	1.527	1.046	2.228
Age category	3.968**	.046	1.419	1.006	2.002
Sex	.750	.386	2.027	.410	10.033
Access to extension services	4.673**	.031	2.396	1.085	5.290
TLU holding category	10.696*	.001	1.616	1.212	2.154
Farm size	1.350	.245	.801	.551	1.164
Number of economically active household members	.230	.631	1.063	.827	1.367
Farmers' Training	6.724*	.010	5.357	1.507	19.050
Access to credit services	.092	.761	.888	.412	1.913
Perception of degradation problem on own farm land	1.305	.253	1.667	.694	4.004

*, ** significant at 1 % and 5% levels, respectively.

Source: Author's Calculation from Field Survey, 2009.

Appendix 6: Definitions of Variables in Binary Logistic Regression

Variables	Definition
Dependent Variables	
Terracing	Application of terracing by the farmers; 0 if the farmers don't apply terracing and 1 if apply.
Manure	Application of manure by the farmers; 0 if the farmers don't apply manure and 1 if apply.
Explanatory/Independent Variables	
Education	Educational Status of HH heads; 1 if illiterate, 2 if literate, 3 if grade 1to 4, 4 if grade 5-8, 5 if grade 9 to 10 and 6 if above grade 10.
Age	Age of HH heads measured in years
Sex	Sex of HH heads; 1 if male and 2 if female.
Access to Extension	Dummy, 0 if household doesn't have access to extension services and 1 if the household has access.
Livestock Holding	Number of livestock in TLU
Farm Size	Farm size in hectare
Number of Economically Active Labor	Number of Economically Active HH Members in the HH
Farmers' Training	Dummy, 0 if the HH didn't take part in training; 1 otherwise
Access to Credit	Dummy, 0 if the HH doesn't have access to credit; 1 otherwise
Perception	Dummy, 0 if the HH head didn't perceive erosion problem on own farm; 1 otherwise

APPENDIXES

Appendix 1: Household Survey Questionnaire

Part-I: General Information

Household Identification Number		Kebele	

1.1. Identification

a) Respondent Identification (General)

Name of respondent	
Age in completed years	
Educational status	
Religion	
Ethnic group	
Date	
Supervisor's name	
Signature	

b) Identification of house hold

S/n	Name of house hold members (Start from the head)	Relationship	Sex 1=M 2=F	Age (in completed years)	For members 10 years and above		
					Marital status	Educ. Status	Major Economic activity

Relationship	Marital Status	Education	Economic activity
1=head	1=single	1=illiterate	1=farming only
2=spouse	2=married	2=literate	2=farming and petty trade
3=child	3=widowed	3=grade 1-4	3=petty trade only
4=other relative	4=divorced/	4=grade 5-8	4=student
5=non relative	separated	5=grade 9-10	5=government employee
(Specify)		6=above grade 10	6=others (specify)

1.2. What is your major economic activity?

a) Farming

b) Petty trade

c) Petty trade and farming

d) Others (Specify)

1.3. What are your income sources? (Multiple answers are possible)

a) Sale of crops d) Petty trade

b) Sale of livestock e) others (Specify)

c) Remittance

1.4. What is your major income source? (Only one answer)

a) Sale of crops d) Petty trade

b) Sale of livestock e) others (Specify)

c) Remittance

Part-II: Land Holding and Land Tenure

2.1. Do you have access to land for use? a) Yes b) No

2.2. If yes, could you tell me the mode of acquisition of your own plots?

a) Inherited from parents f) Allocated by Kebele

b) Gift from parents g) Sharecropped

c) Shared from relatives h) Purchased

d) Cleared forest i) Others (specify)

e) Rented

2.3. What is the total size of land under your holding for different purposes?

a) <0.50 d) 2.0-3.0

b) 0.50-1.0 e) 3.0-5.0

c) 1.0-2.0 f) >5.0

2.4. What is the total size of land that you are using for crop production?

a) <0.50 d) 2.0-3.0

b) 0.50-1.0 e) 3.0-5.0

c) 1.0-2.0 f) >5.0

2.5. What happened to your holding? a) Increased b) Decreased c) No change

2.6. What are the reasons for increasing or decreasing? _____

2.7. What right do you have on the land under your holding?

a) Usufruct right b) Absolute ownership c) Others (Specify) _____

2.8. How do you perceive your current landholding to support the household?

a) Insufficient b) Sufficient d) Excess

2.9. If it is insufficient, how much more land do you require to sustain your family? (in hectare)

2.10. Have you encountered with any land re-distribution in the last ten years?

a) Yes b) No

2.11. If no, do you expect any land re-distribution in the future? a) Yes b) No

2.12. If yes, when it will happen?

2.13. How do you come to know as there will be re-distribution?

2.14. What is your total land holdings under different use in hectare = _____

2.15. What is your land size by types of use?

Land by types of use	Current landholding in hectare
Land for crop production	
Land for grazing	
Others (specify)	

2.16. Who is the owner of the land in the current land tenure system?

a) The state b) The community c) Individuals d) Others (Specify)

2.17. Do you think the current land tenure system (land holding) is good to you?

a) Yes b) No

2.18. If yes, in what way? (Multiple answers are possible)

a) Land can be acquired easily enough

b) More secure than before

c) Can buy and sell

d) There is no problem with ownership

e) Others (Specify) _____

2.19. If no, explain why? (Multiple answers are possible?

a) There is no security

b) Can't buy and sell land

c) It is difficult to acquire land

d) Other (Specify) _____

2.20. If you said no, what do you think to be the solution? Please list down the solutions.

2.21. Can you tell me who administer land? (Allocate, regulate, etc.)

a) The state (Kebele administrator)

b) Local people

c) Elders and traditional leaders

d) Others (Specify) _____

2.22. Do you think you can retain your current land holding in the future?

a) Yes b) No

2.23. What is your opinion on the relationship between land tenure security and land degradation?

a) They have very strong relationship

b) They have strong relationship

c) They have less relationship

d) They have no relationship

2.24. Do you think women have equal rights with men regarding land ownership?

a) Yes b) No

2.25. If no, what are the reasons? _____

2.26. Have you ever planned and practiced long-term investment on your farm plot?

a) Yes b) No

2.27. If yes, what was the type of investment? _____

2.28. What do you think the major constraints for long term investment on farm plot? (Indicate their order of importance by giving rank)

a) Absence of tenure security _____ d) Insufficient size of the farm plot _____

b) Lack of credit facilities _____ e) Poor infrastructural development _____

c) Lack of technical support _____ f) Other (Specify) _____

2.29. Do you think that there is a relationship between land tenure security and long-term investment on farm plot?

a) Yes b) No c) I don't know

2.30. If yes, explain the relation. _____

2.31. What is your opinion on the assumption that tenure security is a pre-condition for investing on farmland?

a) Yes it is b) No it is not c) I don't know

2.32. Is there any thing you want to be changed in the current land tenure system?

a) Yes b) No

2.33. If yes, what you want to be changed?

Part-III: Land use and Management

3.1. For what major purposes are you using your plots? (Multiple answers are possible)

a) Crop production d) Renting

b) Grazing e) others (specify)

c) Giving for sharecropping

3.2. If you are renting your land to others, what is the reason for that?

a) I do prefer it because I do not want to do farm activities

b) I do not have farm oxen

c) I do not have seed

d) I do not have money to buy fertilizers

e) I am aged and I can not work

f) I am handicapped and I can not work on farm

g) Others (specify)

3.3. What are the factors that are determining the use type of your land?

a) Economic status d) Fertility level of the land

b) Labor availability e) others (specify)

c) Livestock holding

3.4. What types of land management systems are you practicing in order to maintain/improve the productivity of your land? (Multiple answerers are possible)

a) Application of manure f) Leaving crop residues on farm land

b) Using chemical fertilizers g) Ditch

c) Terracing h) Planting trees

d) Check dams i) Others (List all)

e) Cut of drain

3.5. What do you practice most to improve the fertility of your soil?

a) Application of manure f) Intercropping

b) Using chemical fertilizers g) Crop rotation

c) Terracing h) Planting trees

d) Fallowing i) Others (Specify)

e) Leaving crop residues on farm land

3.6. Why you are using more of the specified method? Explain your reasons

_____

3.7. Is there any difficulties in applying the specified method? a) Yes b) No

3.8. If yes, mention these difficulties. _____

3.9. Are you currently using chemical fertilizers? a) Yes b) No

3.10. If yes, what amount are you applying per hectare by type of fertilizer? _____

3.11. If you are using chemical fertilizers, how are you getting it?

a) On credit basis b) on cash basis c) Through other means (Specify) _____

3.12. If you are not practicing any land management practice, what are the reasons? __

3.13. How do you perceive the fertility of your land?

a) Improving b) Declining c) The same

3.14. If the fertility of your land is declining, what are the reasons? (Multiple answers are possible)

a) Frequent cultivation of land without fallowing f) High price of chemical fertilizers

b) Deforestation g) Overgrazing

c) Over cultivation h) Lack of manure

d) Location of farm plots around steeper slopes i) Others (Specify) _____

e) Run off erosion

3.15. What varieties of crops do you grow?

_____,_____,_____,_____,_____,_____

3.16. What is the yield per hectare (four qarti[6]) for each of the crop type?

_____,_____,_____,_____

3.17. What about the trend of crop yield through time?

a) Increasing b) Decreasing c) No change

3.18. Please explain the reasons for your answer by order of importance.

_____

3.19. How do you describe the slope of your cultivation land?

a) Flat c) Moderately sloping

b) Gently sloping d) Steeply sloping

3.20. Do you have a problem of land degradation in your Kebele?

a) Yes b) No

3.21. If yes, is there any piece of land that became out of use due to degradation in your Kebele? a) Yes b) No

3.22. If yes, please tell me the estimate of total area that became out of use in hectare?

_____

3.23. Please, explain the major causes for this land degradation. _____

3.24. Is there land degradation problem on your own farm land? a) Yes b) No

3.25. If yes, what are the indicators for the existence of the problem?

a) Presence of rills and gullies

b) Decline in yield

c) Decrease in the soil capacity to grow variety of crops

d) Decline in depth of top soil

e) Others (Specify) _____

3.26. If there is a problem of land degradation on your farm land, what is the trend of the problem?

a) Increasing b) Declining c) No difference d) Unknown

3.27. If it is increasing, what is the magnitude of the problem?

a) Very severe c) Low

b) Moderate d) Unknown

3.28. Out of the land under your holding, is there any amount of land that became out of use due to land degradation? a) Yes b) No

3.29. If yes, please tell me the estimate of the area in hectare that became out of use due to land degradation. _____

3.30. What are the major causes for this land degradation?

_____

[6] Qarti is a local measurement unit of land which is equivalent to fifty meter by fifty meter

a) Frequent cultivation of land without fallowing
b) Deforestation
c) Over cultivation
d) Land steepness
e) Intensity of rainfall
f) Others (Specify) _____

3.31. What actions do you suggest to minimize the problem of land degradation?

3.32. Are there difficulties to implement the actions that you proposed? a) Yes b) No

3.33. If yes, what are these difficulties? _____

3.34. What solutions do you propose to tackle these difficulties? _____

3.35. If land will be privatized and you can do what ever you want with your land, do you think you will improve your land management practices? a) Yes b) No

3.36. If yes, why?

Part-IV: Livestock Holding

4.1. What looks like your live stock holding by types of livestock?

Livestock types		Number of livestock
Cattle	Oxen	
	Cows	
	Growing Bull	
	Heifers	
	Calf	
	Others (Specify)	
Sheep		
Goats		
Equines	Donkey	
	Horses	
	Muel	
	Others (specify)	

4.2. What benefits do you get from your livestock holding? Please explain by types of livestock that you are holding. _____

4.3. What is the trend of your livestock holding by types of livestock holding?

Livestock types	Trend of Livestock holding (choose one) a) increasing b) decreasing c) no change	Reason for your answer
Cattle		
Sheep		
Goats		
Equines		

4.4. Is large size of livestock holding advantageous or disadvantageous?

a) Advantageous b) Disadvantageous c) I don't know d) Others (Specify) ___

4.5. Please explain the reasons for your answer. _____

4.6. What are the sources of feed for your livestock by order of importance (put the rank on the blank space provided)?

a) Hey _____ d) Communal grazing land

b) Crop residues _____ e) Others (list them) _____, ____

c) Grazing land _____

4.7. What is the trend of livestock feed?

a) Decreasing b) Increasing c) No change d) Others (Specify) _____

4.8. Explain the reasons for your answer. _____

4.9. For what purpose you are using the income that you are getting from sale of animals?

a) To buy food grain

b) To buy farm oxen

c) To buy agricultural inputs (fertilizers, seed and others)

d) To pay taxes and other Social obligations

e) Others (Specify)

Part-V: Farmers' Training and Participation in Extension Services

5.1. Do you know about any land management practices? a) Yes b) No

5.2. If yes, from where did you get the information about land management practices?

a) I have learned from life experience

b) I have learned from my friends

c) I have learned from Development Agents

d) I have learned through media

e) others (Specify)

5.3. Do you have an access to any extension services? a) Yes b) No

5.4. If yes, what services are you getting? List them _____

5.5. Have you ever participated in any training on land management related issues?

a) Yes b) No

5.6. If yes, when was the last time you received training?

5.7. For how long it was given?

5.8. What were the major contents of the training?

Part-IV: Farmers' Access to Credit Facilities

6.1. Do you have access to credit services?

a) Yes b) No

6.2. If yes, from where do you get the service? (Specify the sources)

a) From friends and relatives

b) From local micro finance institutions

c) Others (specify)

6.3. What are the criteria to get credit services from the mentioned sources? (List them separately for each credit sources if there are more than one)

6.4. For what purpose are you using the credit that you are getting?

a) To buy food items b) To buy fertilizer c) To buy other agricultural input

d) For other purposes (Mention them)

Appendix 2: Questionnaire for Key Informants Interviews

1. What is the average land holding of households? Is the current holding sufficient to feed the family? What percentages of households in the area have enough land to sustain their family?

2. What is the trend of land holding size over a period of time and what are the reasons?

3. Who is the owner of land in the current land tenure system? What are the advantages and disadvantages of this?

4. What rights do farmers currently have on the land under their holding?

5. Is there a prospect of land re-distribution in the future? What are the reasons for your response?

6. What is the nature of land degradation in the area?

7. If there is a problem of land degradation, what are the indicators?

8. What are the contributing factors for land degradation?

9. What is the trend of productivity of land through time? Give justifications for your response.

10. What land management system the farmers are using?

11. Which practices are commonly used and why?

12. What challenges are there in farmers land management practices?

13. What are the determinant factors for land management practices?

14. Are there problems in land management practices? If yes, what solutions are you proposing for the improvement of land management practices?

15. What specific mechanisms the farmers are using to improve the productivity of their land?

16. What relationship could exist between farmers' perception on existing land tenure security and land management practices? Please explain in detail.

17. What income sources do the farmers have? Which one is the major source of income?

18. For what purposes the farmers are using their land? Describe by their order of importance.

19. What are the important determining factors for farmers to decide on use type of their land?

21. What is the trend of livestock holding by the farmers in the area? Give reasons for your response.

22. Describe the major feed sources for livestock by order of importance.

23. What is the trend of these livestock feed by feed type? Explain reasons for your response for each feed type.

24. What are the importances of livestock?

25. What relationship is there between long-term investments of farmers on their land and tenure security?

26. Is there any thing that needs to be done to the existing land tenure system in order to improve land management practices in particular and land productivity in general?

27. If yes, what is that?

28. Do the farmers have any access to extension services? If yes, what services are they getting?

29. Do access to extension services have any role in improving farmers' land management practices? If yes, in what way?

30. Are farmers in the area getting any training in land management practices? If yes, how frequently it is given and what major areas are covered by the training?

31. What interventions are there by government and NGOs in the area with regard to land management system?

Appendix 3: Guideline for Focus Group Discussions

1. What is the major economic activity of the community in your Kebele?
2. What challenges are there in undertaking this economic activity?
3. How do people in your Kebele get access to land?
4. What is the trend of household land holding size?
5. What are the contributing factors if there are any changes?
6. What prospects are there for land re-distribution and why?
7. Under the current land tenure system, what rights do the farmers have on their land and who have the ownership right over the land?
8. How do you evaluate the land tenure security under the current system?
9. What are the advantageous and disadvantageous of the current land tenure system?
10. How do you describe the productivity of land over time?
11. If there are changes, what are the contributing factors?
12. What mechanisms are used by the farmers to improve the productivity of land?
13. What challenges are there in using those mechanisms?
14. What do you propose to improve the productivity of land?
15. How do you describe the status of land degradation in your Kebele?
16. If there are problems of land degradation, what are the indicators for the problem?
17. What are the causes for land degradation?
18. What factors are aggravating the problems?
19. What land management system the farmers are practicing?
20. What are the major important determinant factors in land management system?
21. What are the challenges in practicing land management system?
22. How do you evaluate farmers' perception on the existing land tenure security?
23. What relationship is there between their perception & land management practices?
24. Who do you propose to improve farmers' land management practices?
25. What are the determinants of farmers' long-term investment on their farm land?
26. What are the major livestock feed in the area?
27. What is the trend in the availability of livestock feed?
28. If there is change, what is the cause?
29. What is the trend in livestock holding by the community in the area?
30. What challenges are there in livestock production? If there are challenges, what are the causes?
31. For what purposes the communities are using their livestock?

Declaration

This thesis is my original work and has not been presented for a degree in any other university and that all sources and materials used for this thesis have been dully acknowledged.

Declared by:	**Confirmed by:**
Name: Desta Damena	Dr. Ignatius Mberengwa
Sig: _____	_____
Candidate	Academic Advisor
Date: 17/07/09	Date: 17/07/09