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AN ASSESSMENT OF THE CURRENT LAND MANAGEMENT SYSTEM OF NONO WOREDA, OROMIA REGION



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Declaration

I, the undersigned, declare that this thesis is my original work and has not been presented for a degree in other university and all sources of material used for this thesis and all people and institutions that gave support for this thesis have been duly acknowledge:

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Dedication

This work is dedicated to my mother W/ro Gete Angasu, who wants to see my success but fail to see: who is my constant source of joy and pride in her soul.

“Mom, your soul which is my strength is always with me!”

I Love You Mom!

List of Acronyms

CSA	Central Statistical Agency
CRGE	Climate Resilient Green Economy
EEA	Ethiopian Economics Association
FAO	Food and Agricultural Organization
FDRE	Federal Democratic Republic of Ethiopia
FESLM	Framework for Evaluation of Sustainable Land Management
FFRCA	Finfinne Forest Resource Conservation Agency
GDP	Gross Domestic Product
IULU	Indicator of Unsustainable Land Use
MERET	Managing Environmental Resources to Enable Transition to more Sustainable Livelihoods
NGO	Non Governmental Organization
OA	Office of Agriculture
OIDA	Office of Irrigation Development Authority
OLAEC	Office of Land Management and Environmental Conservation
ONWA	Office of Nono Woreda Administration
ONWFED	Office of Nono Woreda Finance and Economic Development
PSNP	Productive Safety Net Programs
SLM	Sustainable Land Management
SLMPI	Sustainable Land Management Project 1

SLMP II	Sustainable Land Management Project 2
UN	United Nations
UNCCD	United Nations Convention to Combat Desertification
UNECE	United Nations Economic Commission for Europe
USDA	United Nations Development Association
WB	World Bank

Definition of Local terms

Kiremt ----- Summer

Belg ----- Spring

Woina Dega ----- Sub-Tropical

Kola ----- Tropical

Woreda ----- District

Kebele ----- Administration level less than District and above village

Chat ----- It's a plant which its fresh leaves and tops are chewed, to achieve a state of euphoria and stimulation.

Teff ----- An important food grain grown in Ethiopia and Eritrea, where it is used to make injera.

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Abstract

Ethiopia is one of the countries of sub-Saharan Africa which most seriously threatened by land degradation. So addressing this problem should be given priority at all level. The aims of this study were to assess the current land management system of Nono woreda, by finding out the way land user manage the land and the interaction between actors of land management system. Finally to generate information on the general land management practice of the woreda using Framework for Evaluation of Sustainable Land Management (FESLM). Data for the study were collected through key informant interviews, and formal questionnaire survey. The formal household survey was administered to a total of 270 households that were randomly selected from three villages using random number table. The qualitative information was summarized while quantitative data were analyzed using SPSS version 20. The results showed that at administrative level the plan and management of the woreda's land is based on national policy which fulfills the requirement of FESLM. The institutional arrangements for land are fairly well defined. However, there is high frequency of overlapping and conflicting roles and responsibilities between institutions of the woreda. At land user level farmers use different type of land management practices. The most commonly used is application of manure, crop residues, crop rotation, grass bunds, stone bunds and soil bunds. Results also reveal that family size, education, access to extension service, livestock ownership and land and access to credit and market positively and significantly affected management of land in a sustainable way. In contrast, availability of nonfarm activity, increment of age of the household and tenure insecurity has negatively impacted. The finding suggests that, government should have to readjust the roles and responsibilities of institutions and future endeavors should focus on intensifying efforts at integrating more young school leavers into agricultural production, improvement in farm income, tenure security, delivery of extension and credit service and increasing a chance of access to market in order to manage land in a sustainable way.

Key words: Land Management, Sustainable Land Management, Land, Framework for Evaluation of Sustainable Land Management, Institutional Framework.

Chapter One

Introduction

5.3. Background and Justification

Land degradation, which manifests itself in the form of soil erosion and nutrient depletion, is a fundamental cause of decline in per capita food production in poor countries. In rural Sub Saharan Africa (SSA), more than 66.7% of over 525 million people depend on agriculture as a livelihood (Diagana, 2003) but productivity of the sector has been disappointingly declining or staying stagnant for the last several decades (Muchena, et al. 2005).

Like many countries of SSA, Ethiopia suffers from problems of poverty, land degradation, and low productivity. What makes these problems rather challenging is that 83% of the country's 82 million people reside in rural areas (UN, 2012) where land is a basic means of survival. Agriculture contributes 84% of employment, 90% of the export earnings and about 45% of the Gross Domestic Product (GDP) (Ethiopian Economics Association/EEA, 2004). Because, rural people derive their livelihood mainly from traditional and subsistence agriculture, farmers in Ethiopia do not have access to the essentials for their existence (Fritzen et al. 2006). Besides, the fact that agriculture is subsistent and highly volatile exacerbates poverty in the country. It is also performing poorly, which has been exacerbated by land degradation (Holden et al. 2004).

The highland of Ethiopia which provides a living space for more than 90 % of the country's human population and for 75 % of livestock population of the country suffers from severe soil erosion averaging 42 tons of soils per hectare per year on cultivated lands (Hurni, 1993). Most of the soils show negative nutrient balance; and up to 2 % of total crop production is lost annually due to soil erosion alone (Koppel, 1995). The physical land forms and features (e.g. steep slopes) are one of the main factors that aggravate erosion by causing runoff, spatial separation of farms, and irregular shapes of land plots and scattered settlements. According to FAO (1986) about 75 % of the Ethiopian highlands are estimated to need soil conservation if they are to support sustained cultivation. Under such scenario, application of improved land management practices is not debatable (FAO, 1986).

Due to this problem, in the successive national development plans, the Ethiopian government has put sustainable natural resource management among the top priority development agendas. The commitment of the government to address land degradation is supported by the actions that are undertaken through different initiatives such as the Productive Safety Net Programs (PSNP) and Managing Environmental Resources to Enable Transition to more sustainable livelihoods (MERET) projects. In the current development plan, agriculture is one of the two priority sectors to drive sustained economic growth and to achieve the development goals of the Growth and Transformation Plan (GTP). The Climate Resilient Green Economy (CRGE) strategy also identified adoption of agricultural and land use efficiency measures as well as increasing carbon sequestration in forestry by protecting deforestation and increasing reforestation as pathways of green growth.

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

Therefore, improved management of land is a fundamental issue of the State development, which may promote more efficient activities of State and Regional institutions, public organizations and enterprises in achievement of their individual objectives.

In improving the land management system, it is important to identify of existing interaction between land and land users, land management levels existing in this system and the competences of actors involved in the system as regards taking decisions on the land use in a better and more efficient way, balancing private and public interests. Inefficient, unforeseeable and subjective actions of State and local institutions complicate and hinder the implementation of the interests of landowners. They reduce the chances of using the property or lease object according to the interests in so far as they do not pose threats to the interests of inhabitants of the particular territory. Thus, subjective and inefficient land

management system hinders national socio-economic development and ecological goals according to the sustainable development guidelines and poses threats to the trust of society in the national political system (Auzins and Kapostins, 2012). It is essential to consider land management requires good interaction, interrelation and collaboration of many involved parties. By giving due attention to these facts, this study focuses on assessment of the Nono Woreda's current land management system and comparing with the perspectives of different approaches and principles of Sustainable Land Management. Thus this study assesses the current land management system of the Woreda in the light of Sustainable Land Management Principles.

5.4.Statement of the Problem

Ethiopia is one of the countries of sub-Saharan Africa most seriously threatened by land degradation, and addressing this problem has consistently identified as a major priority for Ethiopia in virtually all national strategies and policy documents. Land degradation poses an acute challenge to rural livelihoods, particularly for 85% of the population who depend on subsistence agriculture and livestock husbandry. It also threatens the integrity and function of ecosystems of global and national significance (Crepin, 2005).

As a cause the country's diverse landscape plays a major role for the country's land degradation. In the highlands, where most of the population lives, the terrains have cut into deep river valleys and mountain sides with steep slopes, due to tectonic movement, volcanism and geological erosion over millions of years. This terrain when it loses its vegetative cover, it is very prone to land degradation (McCornick, et al., 2003).

Deforestation and mismanagement of wetlands is also a leading cause of soil erosion and thus land degradation. It results principally from: (i) the conversion of forests and woodland to cropland, and (ii) harvesting of forests for fuel wood to meet the energy needs of a rapidly growing population (World Bank, 2005). Since most of the Nono woreda people use the forest resources for their daily life activities, there is a great human interference on the natural forest and the beneficiaries pose threats to the ecosystem health of the natural forest. This has resulted in the deterioration of forest resources, reduction of biodiversity, incidence of soil erosion, land degradation and desertification. The mismanagement of

wetlands is proving to be a significant cause of land degradation. When well managed, wetlands recharge the water table by facilitating the percolation of water, reduce floods and soil erosion by slowing down surface runoff and reducing overflow into river banks downstream, and play an important role in microclimate stabilization. Furthermore, the edges of wetlands provide pasture for livestock, particularly during the dry season.

In addition to the stated causes of land degradation studies have identified that population pressure, unsustainable agricultural practices, overgrazing, climatic shocks, insufficient tenure security, inadequate soil conservation practices, and poverty, high costs or limited access of farmers to fertilizers, fuel and animal feed, limited or lack of farmer access to credit and underdeveloped markets as a major causes of land degradation in Ethiopia (World Bank, 2005).

Most soil loss in Ethiopia is from cultivated lands in the highlands, which lie at altitudes between 1,700 m and 2,600 m asl. In these areas much land degradation can be attributed to the absence of adequate soil conservation practices. Without such practices, in vulnerable areas, up to 400 tons of fertile soil per hectare is lost annually from land with little or no vegetation cover. Thus the absence, or inadequacy, of such measures must in practice be regarded as a significant cause of land degradation.

This is demonstrated in areas where traditional soil conservation measures have been implemented (such as in Konso and Hararge areas) as well as modern techniques (such as in Tigray). Some of these measures have led to significant improvements in the sustainable management and productivity of the land. They have included the construction of terraces, soil bunds, micro-basins and cut-off drains, area enclosures for the protection of regenerating natural vegetation, as well as tree-planting, especially on slopes and in watersheds. However, in Nono woreda, even though farmers and other bodies have been practicing some soil conservation activities, there is no as such effective activities of soil conservation practice. In order to take decisions on the land use of the woreda in a better and more efficient way by balancing private and public interests, even the level of interaction between land and land users, land management levels existing in this system and the competences of actors involved in the land management system of Nono woreda is

not well known. Even if the woredas land is being degraded in irreplaceable and aggravated manner, there is gap of knowledge on their current land management, so as to fix the problem. This creates a worsen challenge for the woredas' land resource sustainability.

Therefore, improved land management that ensures better resource use and promotes long-term sustainability is basic to future food production and to the economic welfare of rural communities. To this end, the present research aims to fill some of the gaps in research on how the land is being managed in Nono Woreda.

5.5.Objectives

❖ General Objective

- ✓ The main objective of this study is to assess and evaluate the current land management system of Nono Woreda in the light of Sustainable Land Management Principles.

❖ Specific Objectives

- ✓ To assess the status of the land management condition of the area;
- ✓ To examine policy, institutional and technical issues that need be addressed in land management in the Woreda
- ✓ To assess the potential and the constraints of the Woreda's land management system, with an overview of its environmental and socio-economic impact;
- ✓ To come up with the possible strategic recommendations need to be considered.

5.6.Research Questions

To achieve the stated objectives the study focused on the following research questions;

- a. What are the current land management systems being used by the Woreda?
- b. What are the potentials and constraints of the current land management system of the Woreda in order to assure Sustainable Land Management?
- c. Are they (land users and administrative body) managing the land in a sustainable way?

- d. What are the policy, institutional and technical issues that need to be addressed in land management in the woreda and what is their current status?

5.7. Significance of the Study

This study deals with the current Land Management System of the Woreda. Since it is provided with relevant and concurrent information on current land management system of the woreda, it is useful for other researchers who are interested to make another study around the topic.

Furthermore, it is useful for the government body and interested sectors of this issue by providing overview of the current land management system of the woreda in order to take actions and could be used for correction of the current land management in the area. At the end, the study provides an important recommendation so as manage land in a sustainable way.

5.8. Scope of the Study

The systematic assessment of sustainability of current or planned land uses/management can be hampered by too many detailed data that are difficult to interpret, lack of baseline information from which to compare change, or data that are inconsistent over time or over geographic areas (USDA, 1994).

Therefore, this study also not compare over time changes on land resources; like soil mineral content, water, species of biodiversity and etc., rather than investigating the process of co-operation and interaction of participants and identifications of their current interaction with land resources. Since land management is also process of co-operation and interaction of many participants, which determines the objectives and restrictions of land use, taking the development possibilities of relevant populated area according to the various interest into account, (Auzins and Kapostins, 2012).

1.7. Conceptual Framework

Based on the review of literature, I adopted a conceptual framework that links the assessment and evaluation and the performance of functional relation of the land management levels that show us the current land management system of the Woreda.

According to Auzins and Kapostins (2012), land management includes different measures for increasing the efficiency of land resources use and protection thereof for a longer period of time and does not depend on the position of any individual or organization, but more related to the results of interaction of various organizations in different land management levels. It is a process of co-operation and interaction of many participants, which determines the objectives and interaction of land use, taking the development possibilities of relevant populated area according to the various interests into account.

Depending up on this to assure sustainable land management, it should be noted that the actors involved in a sustainable land management system are mutually interrelated. That mean, such interrelation within the scope of the system may insure maximum conformity of the decisions taken with changes in internal environment of economic activity and external challenges.

As it is known different land management systems of various countries essentially serve for multipurpose land use, looking from the point of view of the states, regions, and actual land processors interests. According to this, material interests of different actors are being balanced in institutional environment with the socio-economic and ecological interests of the society. Thus this concept is adopted as a framework for this study due to the fact that, in evaluating land management processes, the measures include therein and status of participants, functional objectives of the state, and regional institutions, tasks set for fulfillment thereof, regulation in the field of land use and protection as well as entrepreneurial, social and ecological aspects in the land use may identify formally different land management system (Auzins and Kapostins, 2012).

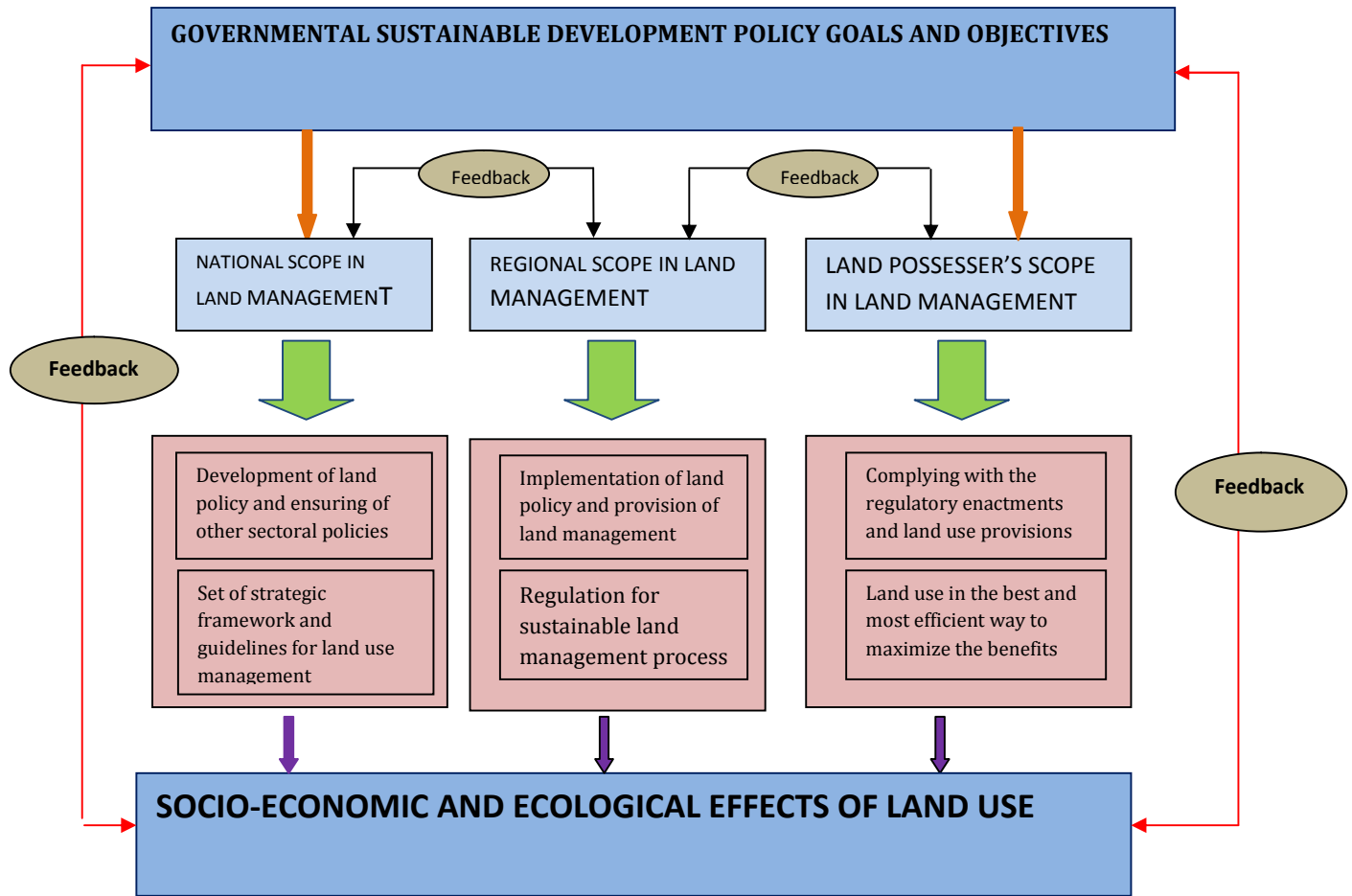


Fig 1: Functional relation of land management levels in the sustainable development context

Source: Adopted from “New land management law for providing a sustainable land management in the Republic of Latvia” by A. Auziņš and E. Kapostiņš, 2012, pp. 5.

In addition to this for analyzing the sustainability aspects in the fields of land management, I conceptualize the process of sustainable land development which is identified by Smyth and Dumanski (1993).

To analyze the sustainability aspects in the fields of land management:-

- 🌐 Material, social and ecological needs of individuals of the society should have to be identified.
- 🌐 The needs of individuals of the society with the utility and resources at the disposal of the society should have to be balanced.

- And also from the land owner's and society's point of views, taking the social and ecological aspects of land use into account, acquisition, aggregation, analysis of information and synthesis of **conclusions** regarding the use of each particular land unit in the best and most efficient way should **have to** be addressed.
- Since the aim is to use the land resource for a current need and sustain for the future, the long term and short term goals of sustainable land use should have to be specified.
- Land-use planning and development of alternative development plans, discussion and approval thereof is also needed to analyze the sustainability aspects of land management.
- In order to avoid the bad use of land resource and take the corrective action and show the correct and efficient way of land use depending up on sustainability objectives, provision of supervision on land use is needed. Therefore, the question of how they are providing supervision on land use should have to be addressed.
- The way in which the Woreda prepare information regarding the alleged necessary changes in both the specification of the land use objectives and regulatory enactments regulating the land use related procedures should have to be assessed.
- Changes in the needs of individuals of the society and their link to utility should have to be identified.

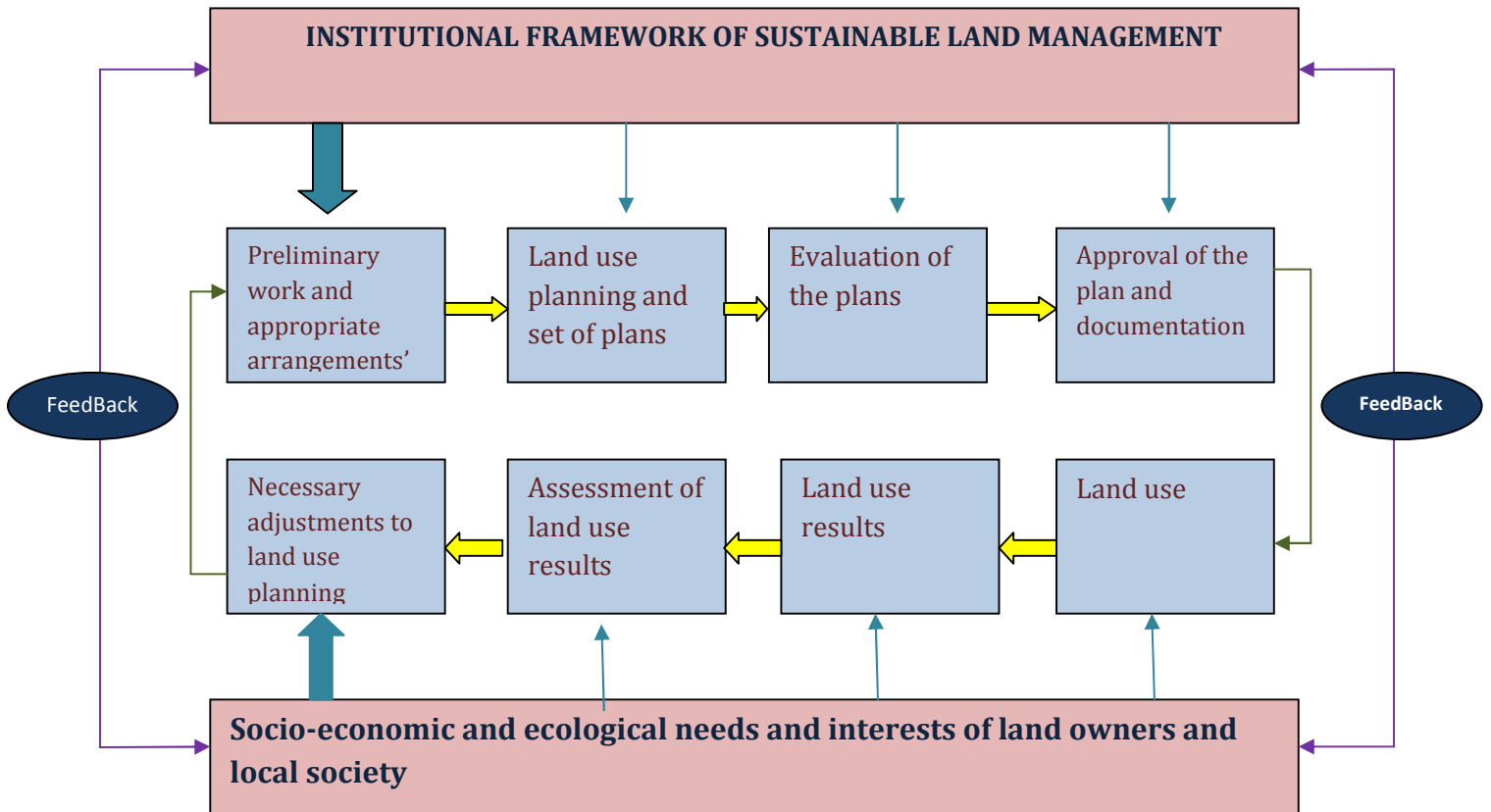


Fig 2: Functional model of the sustainable land management process

Source: Adopted from “New land management law for providing a sustainable land management in the Republic of Latvia” by A. Auziņš and E. Kapostīņš, 2012, pp. 8.

Generally based on the concepts that I discussed in the earlier section, the summary of concepts that I conceptualized as a framework of my study is, land management process and the basic principles to be implemented are determined by the national sustainable land use policy and its implementation in local governments and land users. And it is described by the activities of institutional framework, land-use planning, preparation works, land use, and system of indicators.

1. **Institutional framework;** so as to ensure the legal basis necessary for this process, respecting property rights and guaranteeing their protection, without endangering the property rights of each individual of the society and constantly

- promoting the observation of material, social and ecological interests of different social groups in land use issues.
2. **Land-use planning;** which deals with development of a uniform land policy and the implementation of the spatial planning system, taking society's dominating socio-economic and ecological interests into account.
 3. **Preparation works:-** which deals about activities of information gathering regarding interests of the landowners, aggregation and systematisation thereof, on one hand, and finding out opinions of society's individuals living in particular territory regarding it's preferable social and ecological development directions, on the other hand.
 4. **Land use:-** land use according to the enforced development plans of particular territory is the starting point of examination or, in other words, putting theoretical formulations of land management into practice.
 5. **A system of indicators:-** which should be determined for the evaluation of economic, social and ecological effects obtained as a result of land use.

1.8. Organization of the Thesis

This thesis is organized into five chapters. Chapter 1 provides a detailed background and justification of the study, statement of the problem, objectives of the study, research question, significance and scope of the study, conceptual framework, and organization of the study. Chapter 2 provides review of related literature. Chapter 3 to provides methodology of the research and description of the study area. Chapter 4 presents results of the research and its discussion. Chapter 5 presents conclusion with discussion on some fundamental issues related to the study and useful recommendations based on finding of the study.

Chapter Two

Literature Review

2.1 Concept and Definition of Land Management System

Land management is the actual practice of the use(s) of the land by the local human population, which should be sustainable (FAO, 1991). In a broader sense it includes land-use planning; legal, administrative and institutional execution; demarcation on the ground; inspection and control of adherence to the decisions; solving of land tenure issues; settling of water rights; issuing of concessions for plant and animal extraction (timber, fuel wood, charcoal and peat, non-wood products, hunting); promotion of the role of women and other disadvantaged groups in agriculture and rural development in the area; and the safeguarding of traditional rights of indigenous peoples (FAO, 1995).

Land management involves the implementation of fundamental policy decisions about nature and the extent of investments in the land. From an institutional perspective, the land management includes: formulation of land policy, legal framework, resource management, institutional arrangements, and land information management (Auziņš and Kapostiņš, 2012). It entails governmental and private initiatives, as well as the contributions of a society (UNECE/HBP/140, 2005). And also it includes different measures for increasing the efficiency of land resources' use and protection thereof for a longer period of time and does not depend on the position of any individual or organization, but is more related to the results of interaction of various organizations in different land management levels. This show us, as land management is a process of co-operation and interaction of many participants, which determines the objectives and restrictions of land use, taking the development possibilities of relevant populated area according to the various interests into account (Auziņš and Kapostiņš, 2012).

2.2 Why we Need Land Management?

Land is the foundation for all life-sustaining processes on Earth. Land supports the vast proportion of Earth's biodiversity and underpins a wide range of ecosystem goods and services that humanity depends on for survival. Above all, land use in agriculture and

forestry plays an important role in global prosperity, benefiting billions of people including a large number who depend entirely on farming and forest products for their livelihood (Adams & Eswaran, 2000).

However, demand for production of food, livestock feed, wood, and fiber to support a rapidly growing population is leading to increased pressure on land resources and to unsustainable land-use practices. As a result, most natural ecosystems and agro-ecosystems around the world are facing unprecedented risks of land degradation and loss of biodiversity. What makes it the most worsen thing is, the pace, magnitude, and spatial manifestation of land degradation are further exacerbated by effects of climate change, especially in dry lands, which are inhabited by more than 2 billion people who depend directly on the land for their livelihoods (Adams & Eswaran, 2000).

As Adams & Eswaran (2000) stated, globally land degradation affects 33% of the Earth's land surface, with consequences for more than 2.6 billion people in more than 100 countries. According to the United Nations Convention to Combat Desertification (UNCCD), land degradation is considered as a reduction or loss in arid, semi arid, and dry sub-humid areas, of the biological or economic productivity and complexity of rain fed crop land, irrigated crop land, or range, pasture, forest and wood lands resulting from land uses or from a process or combination of processes, including processes arising from human activities and habitation patterns (Stringer, 2008).

As Lal (1997) stated, land degradation is a major threat to biodiversity, ecosystem stability, and functions. A wide range of plant and animal species are threatened by habitat loss resulting from poor land use practices that lead to degradation. Loss of biomass through vegetation clearance and increased soil erosion produces green house gasses that contribute to global warming and climate change. According to Stringer (2008), because of the interconnectivity of ecosystems across scales, land degradation triggers destructive processes that can have cascading effects across the entire biosphere. The impacts of land degradation therefore extend far beyond local or regional scales.

Therefore, improved land management that ensures better resource use and promotes long-term sustainability is basic to future food production and to the economic welfare of

rural communities. Because of the dynamic aspects of land management, a flexible and adaptive "process" approach for monitoring the quality and quantity of the world's land resources (such as soil, water, plant nutrients) and for determining how human activities affect these resources is essential. However, the systematic assessment of sustainability of current or planned land uses can be hampered by too many detailed data that are difficult to interpret, lack of baseline information from which to compare change, or data that are inconsistent over time or over geographic area (USDA, 1994).

2.3 Land Management System in Ethiopia

Ethiopia is one of the most environmentally degraded countries in the world. Even if there are various symptoms of land degradation in Ethiopia, the major manifestation of land degradation is soil erosion. And the major causes are population pressure, deforestation, unsustainable agricultural practices, overgrazing, climatic shocks, insufficient tenure security, and inadequate soil conservation practices (Crepin, 2005).

According to Hurni (1993) due to these causes, soil erosion in Ethiopia has been estimated to average 42 tons per hectare per year on cultivated highlands, nearly 10 times the rate of soil formation. In economic terms, soil erosion in 1990 was estimated to have cost (in 1985 prices) nearly Ethiopian currency (ETB) 40 million in lost agricultural production (i.e. crop and livestock) while the cost of burning dung and crop residues as fuel was nearly ETB 650 million. Thus in 1990 approximately 17% of the potential agricultural GDP was lost because of soil degradation. The permanent loss in value of the country's soil resources caused by soil erosion in 1990 was estimated to be ETB 59 million. This is the amount by which the country's soil stock should be depreciated in the national accounts or which should be deducted (as capital depreciation) from the country's Net National Income (Bojo and Cassells, 1995). Therefore, Ethiopia suffers from problems of land degradation and low productivity. What makes these problems is that 83% of the country's 82 million people reside in rural areas (UN, 2012).

Due to these facts, Ethiopia has been in a continuous struggle to achieve the three objectives of increasing agricultural production, reducing poverty, and ensuring

sustainable use of the natural resources, especially since the early 1990's (Birhanu et al, 2010).

A number of programs and projects for SLM have been implemented in Ethiopia since the early 1970, aimed at promoting private and collective efforts to conserve natural resources; while the intervention prior to 1990 was technology-oriented and top-down with little participation of beneficiaries in decision making. The interventions since 1990s have been relatively more participatory and institutional factors have received better attentions (Fitsum et al, 2002).

Based up on this Ethiopian government has developed and is implementing the Ethiopia's strategic investment framework for SLM. This sets key priorities for SLM investments, sets out a strategy for scaling up SLM based on best practice lessons and defines the approach and mechanisms for coordination, consultation, participation, and monitoring and evaluation. The government also established a national SLM platform (which comprises a multi sectoral and stakeholder national steering committee, and technical committee, supported by the secretariat (Ministry of Agriculture, 2008).

In an effort to complement the land rehabilitation activities of some earlier initiatives a national SLMPI was launched in 2008 with primary objectives of reducing land degradation in agricultural landscapes and improving the agricultural productivity of smallholder farmers. The main project components were watershed management (scaling up best practices), land certification (strengthening land tenure) and project management (knowledge management). After this project has been successfully closed by fulfilling its initial aim at September 2013 its follow up project (SLMPPII) has been launched. SLMPII aims to reduce land degradation and improve land productivity of smallholder farmers through the provision of capital investments, technical assistance and capacity launching at national and sub-national levels (FDRE SLMPII, 2013).

2.4. Sustainable Land Management

a) Definition and Concept of SLM

As Zweifel(1998) noted in his book “The realities of gender in SLM”, sustainable land management deals with essential elements of the global life support. It is a knowledge-based procedure that helps integrate land, water, biodiversity, and environmental management (including input and output externalities) to meet rising food and fiber demands while sustaining ecosystem services and livelihoods. Therefore, SLM is necessary equipment to meet the requirements of a growing population (World Bank, 2006).

Zweifel(1998) also noted that Sustainable land management deals with essential elements of the global life support system. Since experience with the detrimental effects of resource exploitation has become widespread, there has been growing awareness that productive lands are getting scarce, land resources are not unlimited, and that the land already in use needs more care. The health and wealth of all people depend on the quality of the land resources, but those who are directly using them may be the first to experience decline in the quality of the land. In developing countries the majority are direct land users who have an immediate interest in using the production potential of their resources, but also in maintaining this potential as the basis for their livelihood and survival. However, a delicate balance of production and protection, and the overall goal of sustainable development cannot be reached without giving due consideration to SLM.

b) Scope of Sustainable Land Management

Different land management of various countries essentially serves for multi-purpose land use, looking from the point of view of the states, regions and actual land processor’s interests. Within the scope of the system material interests of different actors are being balanced in institutional environment with the socio-economic and ecological interests of the society. Thus in evaluating the land management processes, the measures included there in and public status of participants, functional objectives of the state and regional institutions, tasks set for fulfillment thereof, regulation in the field of the land use and

protection as well as entrepreneurial, social and ecological aspects in land use may identify formally different land management levels (Dale, et al., 1999).

According to Auzins and Kapostins(2012), Sustainable land management system includes three main elements, which form land management levels. The actors involved in land management – the state, region and legal possessors of land, represent each level. Each element of the system has a specific competence in land use issues.

Auzins and Kapostins(2012), posited state authorities as a first level, which determine strategic guidelines for land use and priority sectors of national economy in relation to the objectives and tasks of national sustainable development policy. Relevant institutions ensure development, implementation and co-ordination of a sectoral policy in national management system. Such issues as the land use for development of infrastructure of national economy, for modernisation and expansion of the State security and protection system, as well as for nature protection measures for the preservation of species' diversity and utilisation of waste produced in national economy are solved in this level.

According to Auzins and Kapostins (2012), the second level is represented by regions, which take specific decisions on the possibilities of land use in accordance with the interests of local inhabitants and land users, taking the self-preservation possibilities of the biological system at a specific site, as well as positive and negative externalities into account, which are caused by the land use according to the interests of landowners.

The final level includes legal possessors of land who, to a great extent, determine the efforts of the preceding land management levels to promote the land use in such a way as to preserve the reproductive capacity of renewable biological resources. It means that, in determining the use of a specific land unit in the best and most efficient way, ecological aspects of land use should be taken into account.

It should be noted the actors involved in a sustainable land management system are mutually interrelated. Such interrelation within the scope of the system may insure maximum conformity of the decisions taken with changes in internal environment of

economic activity and external challenges and leads to efficient way of land management (Auzins and Kapostins, 2012).

In general, Land management involves the implementation of fundamental policy decisions about nature and the extent of investments in the land. From an institutional perspective, the land management includes: formulation of land policy, legal framework, resource management, institutional arrangements, and land information management. The content of the land management process and the basic principles to be implemented are determined by the national land use policy and its implementation in local governments and land users. Based upon this, to assess the performance of the current land management of a given area there is framework adopted by many countries of the world which is called Framework for Evaluation of Sustainable Land Management (FESLM) which is provided for substantiation of the evaluation process and efficiency growth of operational systems of rural farm-steads (Smyth and Dumanski, 1993). According to Smyth and Dumanski (1993), these FESLM consist; evaluation of the performance of the given districts institutional framework, land-use planning, preparation works, land use, and a system of indicators.

c) The Need of SLM Practice, its indicators and role for Socio-Economic development and Environmental Resource Conservation

It is widely understood that land degradation is reducing the productive capacities of cropland, rangeland and woodland during a time of rising demand for food, fiber, fuel, freshwater, fodder, household energy and income. This is particularly alarming in Africa, where land is the key asset of the rural poor (FAO, 2009). Therefore, land degradation is clearly a cause for concern. It puts the productive potential and general well being of communities at risk because it results in a significant reduction in economic, social and ecological benefits of land for crop, livestock and tree production purposes. Land degradation also has important implications for climate change mitigation and adaptation, given that the loss of biomass and soil organic matter releases carbon into the atmosphere (Stocking and Murnagha, 2000). In addition to this, continuous occurrence of land degradation may become a consequence for severe problems, with repercussions not only for the welfare of individual rural households, but also at the community, district, sub-

regional, regional, national and global levels. In general, whether the problem is expressed as soil or forest loss, reduced water availability, or poor yields on tired soil, such impoverishment of the land is being driven by inefficient or unsustainable land management practices, and inappropriate or competing land uses (Vlek et al. 2008).

SLM which is the adoption of land use systems that, through appropriate management practices, enables land users to maximize the economic and social benefits from the land while maintaining or enhancing the ecological support functions of the land resources, is the key entry point for improving land resource resilience and productivity within the context of the potentially devastating effects of climate change in Sub-Saharan Africa, bridging the needs of agriculture and environment, with the twin objectives of:

- Maintaining long term productivity and ecosystem functions (land, water, biodiversity); and
- Increasing productivity (quality, quantity and diversity) of goods and services (including safe and healthy food) (FAO, 2009).

SLM practices increase carbon sequestration and/or reduce emissions, contribute to adaptation to increased climate variability and longer term climate change. This is principally through improving the ecosystem services provided by the soil – leading to increased biomass production, hence, more reliable crop yields (notably through diversification of crops, mixing of crops, livestock and trees) – and in turn building resilience in agricultural livelihoods. This will also benefit rural people who are not directly involved in agriculture but eat locally grown produce, those involved in agro-processing or agribusinesses and ultimately urban dwellers who depend on rural areas for their food supplies (FAO, 2007).

Furthermore, Smyth and Dumanski (1993) submitted that, SLM combines technologies, policies and activities that are aimed at integrating socioeconomic principles with some environmental concerns. This is to ensure that agricultural production system simultaneously fulfils the five pillars of the Framework for Evaluation of Sustainable Land Management (FESLM) which are to maintain or enhance production/services (productivity), reduce the level of production risk (security), protect the potential of

natural resources (protection), be economically viable (viability) and be socially acceptable (acceptability).

In general, the FESLM provides a logical pathway analysis procedure that is able to guide evaluation of land use sustainability through a series of scientifically sound steps (Dumanski and Smyth, 1993). It is made up of three main stages which are identification of the purpose of evaluation (specifically land use systems and management practices), definition of the process of analysis (consisting of the evaluation factors, diagnostic criteria, indicators and thresholds to be utilized) and an assessment endpoint that identifies the sustainability status of the land use system under evaluation. An assessment of end point is based up on indicators of land management (Gameda et al., 1997). Indicator is a number or other descriptor that represents a set of land use conditions. It should also be able to convey meaningful information about a change or trend in those conditions over time. It can also represent in summarized form the total effect of many variables, as in the use of crop yield as an indicator of soil fertility. Indicators can be derived from qualitative and quantitative measurements. However, they become standardized and comparable only when they are transformed into a numerical form (Pieri *et al.*, 1995). The purpose of indicators is to guide policy changes and management decisions at all levels, from the farm to the national and even global level. They are sometimes needed to monitor the effects of agricultural policies on soil fertility.

Indicators are already in regular use in some areas, especially at a farm level. Indicators to evaluate changes in the quality of land resources at a national or district level still need to be developed. We particularly need indicators for evaluating the sustainability of land management systems. In the development of land quality indicators, Dumanski and Pieri (1997) recognized the application of the pressure-state-response (PRS) framework. This is because land quality should be viewed, not only in terms of the physical condition, but also in terms of how the land is being managed, and the political and social environment for instituting improvements. Therefore, the framework is a convenient representation of the linkages among the pressures exerted on the land by human activities, changes in the quality of resources, and the response to these changes as society attempts to release the pressure or to rehabilitate land which has been degraded.

Therefore, Sustainable Land Management (SLM) strategies and practices can enable farmers and communities to become more resilient to climate change by increasing food production, conserving soil and water, enhancing food security and restoring productive natural resources (Woodfine, 2009).

2.5. Local Knowledge on Land Management

Indigenous knowledge includes the complex of practices and decisions made by local people. It is based on experience passed from one generation to the next, but nevertheless, it changes, adapts and assimilates new ideas (Oudwater & Martin, 2003). Failing et al.(2007), define local knowledge as the full variety of insights, observations and beliefs related to a particular decision that do not stem from conventional scientific expertise (Some of the holders of this knowledge are long-time community residents, some are aboriginal people, some are resource users with specialized knowledge such as fishers, farmers or hunters).

Local knowledge should not be seen as the simple counterpart to scientific knowledge; it includes cultural, as well as technical knowledge and is interlinked with social and political knowledge and skills (Oudwater & Martin, 2003).

Research result in Turkey indicates that, despite a heavy reliance on scientific knowledge as the primary source of information in land management, many resources are in decline. To combat this trend, researchers have been relying upon the knowledge of local land resource users as an important supplement to scientific knowledge in designing and implementing management strategies (Close & Hall, 2005).

In recent years, increasing evidence has been assembled to support the view that local knowledge is fundamental to the management of land resource. However, this knowledge has tended to be neglected in management plans due to the notion that local knowledge is fragmented and subjective, and thus lacking in scientific merit. This view is currently undergoing re-evaluation as the importance of local knowledge is being increasingly recognized, especially in light of the failures of management policies derived solely from the use of scientific knowledge (Close & Hall, 2005).

As Fetien et al.(2002) described local innovation on water and soil management in Northern Tigray, Ethiopia Inventory results on local innovations for soil and water conservation showed that farmers innovate in such practices as trapping silt and water to create land, planting local fodder grasses to reinforce terraces, diverting water into river side terraces, using water infiltration furrows shaded by planted grass, spreading manure through irrigation water, collecting animals dung to fertilize plots and re-vegetating slopes with indigenous trees. The development agents (DAs) play a key role in encouraging farmers to experiment with new ideas. They can help farmers find options for testing and help evaluate the results together with farmers, rather than trying to transfer ready-made technologies that may not suit the local preferences or agro-ecological conditions. The knowledge generated through the farmers' experiments leads not only to the creation of site-appropriate technologies. It also increases farmers' capacity to adapt to changing conditions. So these and other studies showed that as indigenous knowledge is the best suit for land resource management than the readymade technologies (Birhanu et al., 2002).

Chapter Three

Methodology of the study and Description of the study Area

3.1 Study area description

3.1.1 Nono Woreda and its location

Nono Woreda is located at about 210 km south west of Addis Ababa, in West Shoa zone of Oromia National Regional State, Ethiopia. It is named after the Nono Oromo, a subgroup of the Macha Oromo, who lives in this area. Between 2007 and 2008, a number of kebeles were separated from this woreda to create Jibat Woreda. Nono covers an area of over 815.53 km² with altitude ranging from 1400 to 2250 meters. The district comprises 33 peasant associations (kebeles) and two urban kebeles. It borders with Jibat woreda in the north, in the south Jima zone, in south east Southern Peoples Regional State and in the west Dano woreda, while in the east Nono borders with Ameya woreda of Oromia region. Silk Amba is the administrative county seat of the woreda.

3.1.2 Topography and climate

The area is characterized by flat lands and moderately steep rolling hills with valley bottoms. The altitude of the woreda ranges between 1400 meters to 2250 meters a.s.l. The woreda has two agro-climatic zones with 70.59% and 29.41% of kola (tropical) and woinadega (sub-tropical) types respectively. The “long” rainy season, kiremt (summer), starts in June and continues until September with the highest concentration of rain is in July and August. The number of rainy days varies from woinadega to kola, where the latter is characterised by lower amount of rainfall and the dominant soil type in the woreda is vertisol. As in many provinces of Ethiopia, Nono is characterised by a season of small rains between April and May which is called belg (spring) season and a season of high rain between June and September which is called kiremt (summer) season. According to the data gathered at Zone level, Nono gets annual mean rainfall of maximum 900-1500mm, while its agricultural potential is high and the mean annual temperature is 18 °c.

3.1.3. Population

Based on to the 2007 National Population and Housing Census, in 2011 an estimated population of 86,664 lives in Nono Woreda (CSA, 2011). It is predominantly a rural district, with only less than 10% of people living in urban areas. This is in line with the data available for the whole West Shoa Zone, where almost 90% of people live in rural areas. Thus, a density of 106 people per km² is high for a rural district. Estimations show that the population is growing at a rate of over 2.7% per year. Immigration from other parts of the country has contributed to the high rate of population growth in the area. Apparently, the population is rising continuously and putting huge pressure on the land and remaining forest fragments. The major immigrant populations in Nono are from eastern and western Hararge zones of Oromia Regional State and Amhara Regional State. As agriculture is by far a predominant economic activity of Nono, population growth may be a primary reason for land shortage and landlessness in the near future.

3.1.4 Means of livelihood and sources of income

There are various sources of livelihood and income for local communities living in the woreda. These include growing crops and chat, livestock production, honey, timber and other non-timber forest products. These products serve either for household consumption or for cash income or both. For example, honey and chat are exclusively for income and field crops and livestock are for both house hold consumption and income. Certain community members also earned their daily income from trading and daily labor. Maize, sorghum, teff, and wheat are the major field crops grown in the woreda. Fruits (like mango, banana, papaya, avocado and vegetables (pepper, tomato, onion, cabbage, and carrot) are also grown in the area. Livestock like cattle, equine, sheep, goat, chicken and apiculture are common in the area.

3.1.5. Land use/land cover

The major land use categories of the district are agriculture, grazing land, settlement and forest.

Table 1: Land use types and proportion share for Nono Woreda

Type of land use	Total (ha)	% of total
Farm land	55766.52	68.39
Settlement	12229.5	15
Forest	8968.8	11.05
Grazing	2935.08	3.59
Others	1630.5	1.99
Total	81,530.4	100

Source: OANW, February 15, 2014

3.2 Type of investigation

The idea of this research had its genesis from author's interest about land management studies. This research is the first study to be made on the study area on the selected topic. For this reason, this research took an explanatory approach. According to Sekaran (2002), an explanatory study is undertaken when not much is known about the situation at hand, when no information is available on how similar problems or research issues have been solved in the past. The aim will be to gain familiarity with the issues, and to gain a deeper understanding about the topic.

3.3 Method of Data Collection

The methodology that has been applied by the study has been chosen in order to assess and deduce conclusions about the current land management system of Nono Woreda. During data collection, contact was first made with the woreda's Administration office, Office of Agriculture, Office of Rural Land Administration and Environmental Protection,

and Office of Irrigation Development Authority. Data collection processes were started after the district Administration office had written an official letter to the selected PA leader and development agents. The various data collection tools employed were physical observation and key informant interview to collect mainly qualitative information, and household survey to collect mainly quantitative data from representative households. In addition to these data collection tools, secondary data was also used to understand land management related institutions arrangement of the woreda and for formation of background information.

3.4 Sampling Design

Sampling procedures involve multiple stages. First, three kebeles were purposively selected from Nono woreda namely, Hurumu Jibat, Metu Sillasie and Gololle. This criterion is among the three criteria (climate [which is a main cause for natural ecosystems shaping and variation], agricultural productivity, and socio-economic [used to measure individual's, family's or a given area's economic and social position in relation to others, based on income, education, and occupation]); which are most suit to study the land management level. Therefore, three villages for the study were selected purposefully based on the presence of variation. Out of these, the first kebele was located in the periphery of other woreda's temperate area and not as such productive; the second village was located in an intermediate area in its productivity level while the third village was in a most productive area. Second, 270 households were randomly selected from the chosen kebeles and comprising 90 for each kebele. A detailed questionnaire was administered to household heads. In addition to questionnaire, key informant interview was also used to collect the needed information. The sample population for the interviews were included the land users and local authorities representatives. Data also stem from secondary sources, mainly from different government departments.

3.4.1. The Questionnaire

For this study closed-ended and open-ended questions were designed in order to get responses, which narrow down the field of enquiry, since the respondents chooses among fixed responses.

The questionnaire is consisted of three parts (Appendix 1.1). The first part is designed to gather information about the land user's behavior and attitudes as regards the demand and supply of the basic infrastructures, the second part is designed to assess the land user's experience with land management practices, land user's responses on econometric returns of land management practices and their evaluation of the facilities and services offered, which related to the practices of sustainable land management, and the third part was asking for classified data. Questionnaires were developed and modified based on the information gathered during the informal survey and translated to the local language "Afan Oromo" to simplify for the enumerators. The questionnaires were pre-tested using randomly selected farmers from the sampled households to evaluate whether they were prepared in the way that clarify communication between interviewer/researcher and interviewed. The necessary adjustments to the questionnaires were then made before fully duplicating.

3.4.2 Key Informant Interview

The technique of personal interviewing is undertaken in order to reach the objectives since it is the most versatile and productive method of communication and provided with: "The skill of guiding the discussion back to the topic outlined when discussions are unfruitful while it has the disadvantages of being very costly, time consuming and can introduce bias through desires of the respondent to please the interviewer" (Aaker & Day, 1990: 164).

For the purpose of this project semi-structured face to face interviews were conducted involving three interest groups: local authorities, experts of the woreda offices and land users. The choice was based on researcher's knowledge about different educational and leadership levels among interviewees, their different lifestyles and ages.

3.5 Database

The study conducted surveys in the 3 kebeles and 270 households. Most of the information collected pertains to the current land management system of the woreda. Secondary data were collected from the woreda's different offices which describes the relation between land users and the concerned governmental organization and roles and responsibilities of that institution. Key informant interview was also conducted, which pertains to the current

land management system of the woreda. A summary of the database collected through the study is given below:

- Household composition, occupations and education
- Household assets (land, livestock, access to infrastructure and services)
- Factor acquisition and disposition (land, labor and credit access)
- Income (crop income, livestock income, and other income)
- Agricultural technology and practices (crop technologies)
- Participation in collective action (mass mobilization)
- Land use, tenure and land rights (tenure security, terms of land acquisition and disposition)
- Crop production (land management practices, use of purchased inputs, and labor inputs)
- Community natural resource management (enclosures, woodlots and forests, energy sources for cooking)
- Factors of production and markets (labor, draft animals, farm implements, credit and savings)
- Human welfare and natural resource outcomes (changes in human welfare, and natural resource conditions)
- Livelihood strategies (major livelihood activities of men and women)
- Infrastructure (access to roads, markets and services; irrigation; local organizations)
- Agricultural production and markets (crop production and yields, livestock ownership, use of purchased inputs, crop production practices, land investments, technology adoption)

In general, probability sampling procedure was used for data collection. In all, a detailed questionnaire was administered to 270 household heads. Data collection covered indicators of SLM as contained in the FESLM.

3.6 Model specification

(What are the dependent and independent Variables)

A binary logistic regression model is used for the analysis because the dependent variable is treated as a binary variable. In this study, a model that describes the relationship between the dichotomous characteristic of interest (dependent variable) and a set of independent variables were used.

$$P=p(a+bx)$$

P= probability

x= explanatory variable

a and b = model parameters to be affected

Or

$$\text{logit}(p)= b_0+b_1X_1 + b_2X_2 + b_3X_3 + \dots b_kX_k$$

p = probability of the dependent variable to be affected by independent variable

$b_0, b_1, b_2, \dots, b_k$ = coefficients

$X_0, X_1, X_2, \dots, X_k$ = independent variables

Therefore the model is a best fit for calculating the impacts of a set of independent variables on dependent variable which is in case of this research different types of land management practices.

3.7 Description of variables

Table 2 Description of variables

Variable name			Description
Sustainable land management strategy(Dependent variable)	SRCP	Soil bunds, stone bunds, grass bunds	"1"= used, "0"= otherwise
	SFEI	Fertilizer, crop-rotation, manure, mulching, crop residues, herbicides, pesticides, hybrid seeds	"1"= used, "0"= otherwise
Age			A continuous variable measured in year
Sex			"1"= male, "0"= otherwise
Marital status			"1"= married, "0"= unmarried
Years of education			A continuous variable measured in a number of classes
Land size			A continuous variable measured by hectare
Household size			A continuous variable measured family member
Farming experience			A continuous variable measured in a years of farming
Income per capita			A continuous variable measured in birr
Manual method of cultivation			"1"= yes, "0"= otherwise
Access to credit			"1" for "yes" and "0" for those who do not have credit access
Extension contact			"1" for "yes" and "0" for those who do not have access of extension contact

Tenure security	"1" for "secured" and "0" otherwise.
Access to market	"1" for "yes" and "0" for those who do not have access to market
Non-farming activity	"1" for "yes" and "0" otherwise.
Raring livestock	"1" for "yes" and "0" otherwise.
Usage of irrigation	"1" for "yes" and "0" otherwise.
Land ownership	
Support by officials	"1" for "yes" and "0" otherwise.
Support by agricultural experts	"1" for "yes" and "0" otherwise.

Chapter Four

Results and Discussions

4.1 Socio-economic characteristics and land management activities of the respondents

4.1.1 Description of Farmers' Socioeconomic Characteristics

Table 3 shows that, average age of the respondent is 53.6 years, and average farming experience is 33.17 years. These results show that the farming population is already ageing. 93 percent of the total respondents are male farmers, and female farmers are about 7 percent, while 92 percent of the total farmers are married. Average year of education is 3.99, showing that an average farmer did not complete primary education, which should have taken eight years. Household size is relatively large with an average of 6.47. Average total land area owned by the farmers is 3.80 hectares, while average income per capita is Birr 15,441.75. Extension services are received by 71% of the total respondents, while 41 percent have access to some form of formal or informal credit. About 60 percent relied on the crude manual methods of land preparation. The results show that 87% of the total respondents land tenure is secured, while the rests land tenure is unsecured.

Table 3: Descriptive statistics of some farmers' socio-economic characteristics

No	Socio-Economic Characteristics	Mean
1.	Age	53.6
2.	Sex	0.93
3.	Marital status	0.92
4.	Years of education	3.99
5.	Land area	3.8
6.	Household size	6.46
7.	Farming experience	33.17
8.	Income per capita	15441.75 birr
9.	Manual method of cultivation	0.60
10.	Access to credit	0.41

11.	Extension contact	0.71
12.	Tenure security	0.87

Source: Field Survey & personal communication, from February 26, 2006 E.C. – April 30, 2014

4.1.2. Description of Land Management Practices

Farmers use different land management practices in the study area including grass strips, soil bunds, stone bunds, fertilizers, crop-rotation, manure/compost, and crop residues with varying extent in the woreda. The most commonly used soil fertility-enhancing mechanism is crop rotation followed by manure, crop residue and fertilizer application. Crop rotation is applied by 86.3 % of the total respondents, whereas manure, crop residue and fertilizer are used by 86 %, 85 %, and 50 % of the farmers respectively. Herbicides, hybrid seeds and pesticides are also some of the soil fertility-enhancing mechanisms used by the farmers (41%, 39%, and 39% respectively). Use of mulching is very negligible in the study area; only a small number of households apply it. Even at worse, observations witness that farmers commonly graze their livestock on their farmland after harvest, a situation which exposes farmlands to wind and water erosion, and moisture loss due to evaporation. On the other hand, the most used soil resource conserving practice is grass bunds followed by stone bunds and soil bunds. Grass bund is applied by 48 % of the respondents, whereas stone bund is used by 26 % farmers. Usage of soil bunds takes the least share (25 %).

Table 4: Types of land management practices used by respondents

Land Management Practices	Variables (%)	Mean
Soil conserving practices	Soil Bunds	25
	Stone Bunds	26
	Grass Strips	48
Soil fertility enhancing inputs	Fertilizer	50
	Crop Rotation	86.3
	Manure	86
	Mulching	26
	Crop residues	86
	Herbicides	41
	Pesticides	39
	Hybrid seeds	39
Other determinants of land management Practices	Land tenure security	87
	Access to market	75
	Non-farming activity	40
	Rearing livestock	80
	Use of irrigation	41
	Support by officials	70
	Support by agricultural experts	71

Source: Field survey & personal communication, from February 26, 2006 E.C. – April 30, 2014

Other land management practices which are tasted in the study area as determinants of land management systems are land tenure security, access to market, availability of additional income by performing non-farming activity and raring livestock, use of irrigation, support by woreda officials and agricultural experts. Table 4 shows that 41% of the total farmers use irrigation for their farming activity and 87% of the respondents

reported land tenure is secured whereas 75%, 71%, and 70% of the respondents have access to market and extension service and officials support respectively. In order to get additional income 40% and 80% of the respondents are also engaged in non-farming activities and rare livestock respectively.

4.2 Woreda's Land management Institutions and Their Land Management Activity

According to Smyth and Dumanski (1993), Framework for Evaluation of Sustainable Land Management (FESLM) which is provided for substantiation of the evaluation process consist; evaluation of the performance of the given districts institutional framework, land-use planning, preparation works, land use, and a system of indicators. Based upon these evaluation points the current land management of the woreda is assessed as follows.

4.2.1 Institutional Framework

Other than developing policies and laws, each woreda level offices, in Oromia, have been established with similar designations and responsibilities as the regional bureaus and federal ministries line departments. The most relevant woreda level offices and institutions in relation to land resource management include office of Agriculture, Irrigation Development Authority, Land Administration and Environmental Conservation, Urban Development Office, Finfinne Forest Resource Conservation Agency, and Civil Societies. I briefly describe the roles and responsibilities of the woreda offices and institutions.

A. Office of Land Administration and Environmental Conservation(OLAEC)

OLAEC is the woreda's equivalent of the regional Bureau Land Administration and Environmental Protection and federal Environmental Protection Authority. The major roles and responsibilities of OLAEC include: ensuring as interventions are carried out in a manner that will protect the welfare of human beings as well as sustainably protect, develop and utilize the resources, create conducive atmosphere by which the management, administration, and use of rural land of the woreda could be appropriately decided pursuant to regions and federal policies (OLAEC, 2006). To this end, OLAEC of Nono

woreda is applying environmental regulations and strategies developed by the region, which is based on federal environmental policy; environmental impact assessment (EIA) procedures to support development projects; issued directives to implement the rural land administration and land use; and issues of environmental clearance to development projects. Furthermore, OLAEC coordinates environmental protection efforts of NGOs and community organizations besides applying strategies, polices to protect and conserve natural resources (OLAEC, 2006).

Under OLAEC there are three work divisions involved with land resource related activities. They are:

- i. Land use policy application division
- ii. Land property registration division
- iii. Environmental protection division

i. Land use policy application division(LUPAD)

This Division of the Office of Land Administration and Environmental Protection has the responsibility for applying systematic land use planning throughout the woreda, based on federal and regional plan. Its objective is to ensure the utilization of natural resources to the maximum benefit of society, by the application of land use policies and the preparation of land use plans. These should allocate land resources among competing users on a rational basis, so that optimal and sustainable land uses are maintained.

Strategies adopted by the LUPAD in achieving these objectives include:

- application of a national and regional land use policy;
- preparation of land use plans at woreda level
- preparation of land use information;
- conduct training and awareness programmes on land use

ii. Land property registration division(LPRD)

Registering and certification of land holding right and documenting land rights are some of the activities of this division. In addition to this registration and custody of notarial deeds

and other documents affecting property and the preservation of records and issue of copies from such records are responsibilities of this Division.

iii. Environmental Protection Division

This division coordinates environmental protection efforts of the GOs NGOs and community based organizations besides applying strategies, polices to protect and conserve natural resources (OLAEC, 2006).

B. Office of Agriculture (OA)

In relation to land and water management, the roles and responsibilities of Agriculture office of the woreda has been derived from regional bureau. These include implementing laws on the conservation and utilization of forest and wildlife resources; coordinate food security programs; provide agricultural extension services; provide support for the expansion of water harvesting and irrigation development activities; promote market-led agriculture development and create efficient agricultural input and product marketing systems, etc. (including through organization of cooperatives). The Office also optimizes land and water resources use on a scientific basis for excellence in agriculture.

To achieve these, the Office is engaged in:

- dissemination of land conservation and water management techniques for sustainable agriculture;
- development and maintenance of a database on land and water resources
- technical assistance for watershed management, land use planning and farm development;

C. Office of Irrigation Development Authority (OIDA)

It is the woreda's equivalent of the regional Irrigation Development Authority and it applies laws and policies developed by regional authorities. The major roles and responsibilities of the OIDA includes: expanding of irrigated agriculture to the maximum possible extent, developing strategies for the development of small and medium scale irrigation schemes, supporting traditional irrigation schemes, protecting irrigation water from pollution, integrating appropriate water drainage service with irrigation development works, and devoting adequate resource for irrigation development.

D. Urban Development Office (UDO)

The Office is expected to promote integrated planning and implementation of economic and physical development of areas selected by Zone Urban Development Office. In any area declared as an Urban, the UDO is expected to:

- carry out integrated planning and physical development;
- prepare a development plan;
- implement programmes of development consistent with integrated planning;
- implement an urban land use policy;

E. Finfinne Forest Development Enterprise (FFDE)

FFDE is one of the eight forest enterprise branches of Oromia Forest and Wildlife Enterprise and is an autonomous fully government-owned organization established with regulation number 122/2009, issued in July 2009 by the Oromia State Council (OFWE, 2009). FFDE works to ensure conservation, sustainable development and the use of forest resource in its concessions through community participation. In the study area this Agency performs the protection and management of the Langano and Jibat natural forest areas. The strategy adopted by FFDE is to provide government institutions, non-governmental organizations (NGOs), private sector agencies, groups and individuals that operate in the area with information, technical expertise and inputs so that they can successfully implement forest resource conservation measures. The Agency operates in two teams:

- Conservation - soil, water, forest conservation activities and techniques.
- Participation - human resources development - awareness, training and mobilization.

F. Civil Society

Civil society is also increasingly involved in land-related activities through NGOs, special interest and advocacy groups and community-based organizations. At the local level these groupings are involved in a wide range of activities supporting stakeholders in sustainable management of the land resources on which they depend.

4.2.2 Land-Use Planning

According to the response of key informant interview from the woreda's administrative office, as a framework for land management of the woreda, four(4) points has been identified as a pillar of the activity to be relied up on; First, existing policies, opportunities, constraints and preferences lead individual households and communities to adopt specific livelihoods and associated land use patterns. Second, there are broader social objectives to safeguard land uses that provide valued (often public) goods and environmental services, such as drinking water, flood regulation and water for irrigation. Third, by overlaying individually and socially preferred land use visions, it is possible to identify areas in which the two visions differ, as well as to establish the nature of those differences. Fourth, known options (inventories of technologies, land management options, institutional arrangements, etc) are examined to assess the extent to which individual and social preferences might both be satisfied at the local level, or to establish the nature and scale of potential tradeoffs involved.

At this moment the application of the framework is in its last stages. On the application of the framework interesting results has emerged from spatial analyses relating to especially the first three concepts or steps. They identified, for example, areas with a comparative advantage for different agricultural intensification or expansion strategies; areas with high levels of biodiversity or fragile soils; and based upon this information, areas of potential conflict or complementarities between agricultural development and environmental conservation. The analyses show that the areas where local communities most profitably can intensify agriculture are located in south, south eastern and peripheral area of the western part of the woreda.

Pressures from agriculture on protected areas are likely to be found in Hurumu Jibat and Metu Sillassie kebeles. Agricultural intensification as it is currently occurring, without adequate replenishment of soil nutrients and limited use of soil conservation measures is in potential conflict with soil conservation objectives, especially in the eastern and in the central part of the woreda. Conversely, it appears environmentally sound to intensify

agricultural land use along the periphery of Langano and Asasa protected forests, which are respectively located at central and eastern end of the woreda.

Following the approach noted above the woreda has set different development goal related with land. Out of the general plan of the woreda the average plan of the selected kebeles plan is:-

- a) Integrated Agriculture:- establishment of integrated agricultural development project aimed at increasing existing agricultural production per hectare by improving infrastructure (communications, supply of agricultural inputs, produce marketing, credit facilities and extension service coverage).

Table 5: Average crop production plan per hectare per quintals

No	Action to be performed	Measurement	Benchmark 2002	Target				
				2003	2004	2005	2006	2007
	Average crop production per hectare	Quintals	14.4	18.75	24	30	37.5	40

Source: OANW, February 1, 2006 E.C.

- b) Irrigation development:- increasing uses of irrigation farm land and use of irrigable land for irrigation only.

Table 6: Five year irrigation use plan

No	Action to be performed	Measurement	Benchmark 2002	Target				
				2003	2004	2005	2006	2007
	Total farm land size to be developed using irrigation	Hectare	24	42.4	84	181	240	272

Source: OIDA February 5, 2006 E.C.

- c) Forest protection:- protection of existing and establishment of new forest reserves in areas with sloppy area where conservation is required.
- d) Urban development:- bounding urban areas and usage of these land according to the plan set
- e) Soil conservation and drainage development:- by participating the community performing actions of protection of erodible land by building terraces and developing drainage to create additional water resources for agricultural activity

Table 7: Five year soil conservation and drainage development plan

No	Action to be performed	Measurement	Benchmark 2002	Target				
				2003	2004	2005	2006	2007
	Building terraces structures for soil and water conservation	Kilo Meter	9	20	111	144	99	89

Source: OLAEC, February 10, 2006 E.C.

4.2.3 Preparation Works

In this stage, related to the study area, the most significant thing that the woreda had done were related to information gathering regarding interests of the landowners, aggregation and systematization thereof, on one hand, and finding out opinions of individuals living in particular territory regarding their preferable social and ecological development directions, on the other hand. By using our spatial analysis we have find out the necessary trade-off between the interests of landowners and the interests of individuals in a short-term and long-term period of time.

Then draft plan has developed and handed over for public discussion, during which inhabitants of the urban and rural kebeles had an opportunity to express their opinion on the land use type in specific land units and the establishment of infrastructure necessary for implementation of this type. After aggregation of discussions' results and their

evaluation from the point of view of sustainable development of urban and rural areas, the authorized representatives of the society (woreda officials and kebeles peoples representatives) approved the land-use plan and it became a regulatory document, on the scope of which interests of the involved parties are discussed enough and balanced – finally reached an agreement.

4.2.4 Land Use

After preparation work the woreda had put the discussed theoretical formulations of land management into practice. Preferable scenario meets the reality – land use of the study area in the best and most efficient way, taking into account the socio-economic and ecological interests of the society, which have been included in the binding regulatory enactments. But some key respondents do not agree up on this government official's response. According to some key respondents, “government officials do not concern about the socio-economic and ecological needs of the society, rather they concern about accomplishment of tasks that has given to them from upward bodies. For example, on some environmental protection activities (like construction of terraces) to be performed by community participation, woreda's administration share its plan for the kebele's as a quota. Therefore in order to accomplish the given quota, the community loses its energy on digging more gentle and flat land feature which is not as such vulnerable for erosion”.

4.2.5 A System of Indicators

After application of the plan, the woreda has selected indicators to evaluate economic, social and ecological effects obtained as a result of land use. The evaluation was based on land-use categories, both in the territories where built up and infrastructural development has performed. Based on last four years performance evaluation meetings conducted by the Woreda's Administrative offices, the efforts have shown encouraging results. Specially, increases productivity of the land, flow of rivers and streams and the return of the previously lost wild life resources are quite encouraging. This implies effectiveness of the woreda's land use plan and its application.

Based up on the evaluation, in the previous 4 years (2002-2006 E.C) in selected kebeles;

1. Integrated agricultural development project aimed at increasing existing agricultural production per hectare has been established by improving infrastructure, such as coverage of telecommunication services like mobile phone and wireless phone network coverage, in order to facilitate access to markets construction of roads that connects rural kebeles with adjacent rural kebeles and with a capital town of the woreda, delivery of agricultural inputs (like fertilizer, hybrid seeds, productive cattle and poultry species, generators for irrigation service), and delivery of credit and extension service. Due to these efforts, agricultural productivity of these kebele's (namely, Hurumu Jibat, Metu Sillasie and Gololle) land has increased by 141% per hectare (from 14.4 quintals to 34.74 quintals per hectare). However, the performance was less than the plan. Their plan was to increase average production of the woreda's land by 160% (from 14.4 quintals to 37.5 quintals per hectare) in their strategic four year plan.

Table 8: Average crop production of the study area's land per hectare

No	Types of action	Measurement	Benchmark 2002	Performance				
				2003	2004	2005	2006	2007
	Average crop production per hectare	Quintals	14.4	18.4	25.9	29.1	34.74	-

Source: Field survey, February 15, 2006 E.C.



Figure 3: Maize plant (top left), Teff plant (right top) and Sorghum plant (bottom) in Hurumu Jibat, Metu Sillasie and Gololle respectively, after improvements made. **Source:** Field survey.

2. Intensification of modern and cultural irrigation farming by developing irrigation canals and by providing generators has been the major area of concern on which the woreda had performed a lot of activities. Due to this in study area in the previous four (4) years (2002-2006) usage of irrigation land had increased by tenfold (24 hectare to 260 hectare). In general the performance exceeds the plan averagely by 8.3% per year.

Table 9: Total farm land size developed by use of irrigation

No	Types of action	Measurement	Benchmark 2002	Performance				
				2003	2004	2005	2006	2007
1.	Irrigation Applied plots	Hectare	24	44	90	200	260	-

Source: Field survey, February 15, 2006 E.C.



Figure 4: Sugarcane plantation (left), Onion,(middle) and Tomato plant (right) grown in Golole kebele of Nono Woreda.

Source: Field survey.

3. In previous four years; protection of natural forest areas, establishment of new forest reserves and planting trees on lands unsuitable for crop production was the major areas of concerns of the study area related to the conservation of natural forest. Due to this, a tangible outcome has been attained in the last four years. From 2002 up to 2006, 350 hectare of natural forest land had legally bounded and protected from agricultural land intensification around the forest. In addition to protection of the natural forest 580,346 different plant species were planted in all of the study area kebeles.



Figure 5: Langanu conserved Natural Forest (top); Asasa conserved Natural Forest (both at bottom) in Hurumu Jibat and Metu Sillasie kebele's respectively. **Source:** Field survey.



Figure 6: Plant species in nursery cite of the woreda ready for plantation (top left), Planted gravilia plant in Gololle kebele (top right) and Reforested area in Langanano natural forest periphery (bottom). **Source:** Field survey.

Administration of three natural forest lands (Langanano, Jibat, and Asasa) has given for known forest administrator (Finfinne Forest Protection Organization). During the key informant interview and formal household survey people confirmed that, in these kebele, in addition to increases in agricultural production, increases in flow of rivers and streams and the return of the previously lost wild life resources is quite encouraging. In the previous time the vegetation cover of the area was dense and had large land coverage. These large and dense vegetation covers had been declining with time and were gradually reduced to only scattered trees on the farmland and disturbed

natural forest. After the woreda administration has applied five years plan (which is derived from growth and transformation plan of the country) on action, there is quite encouraging result on natural forest coverage, productivity of the land and availability of water by drainage development. One of the key informants had to say this about the vegetation cover change of the area as in the following context:

“I was born during the end of Hailesilase regime and I have been living here for more than 35 years. It is not only of the information that I have heard about the dense vegetation cover of the area from my parents, but during the Derg regime I myself used to collect fuel wood from the nearby Langano natural forest area. In the previous ten and fifteen years due to intensification of cut and burn type of agriculture around the forest, almost all of the forest has been cleared and changed to agricultural land. In the previous four years the government took a measure that delimits the area to become protected natural forest land. Due to this measure, damaged forest has recovered and again become home for wild animal s”. However, the respondent continues his speech, “...these forest resources are being administered by external organization. Chance has not given for the community to protect and conserve this forest. Therefore, due to low level of community participation on the activities of rehabilitation, conservation and protection of these forest resources, it has been overexploited by individuals. This is due to ineffectiveness of existing use rules and regulations and due to absence of creating awareness among the community as it is its own property. This means the community is not aware that the forests were own property”.

4. Depending upon the need of the society, rules and regulations set by the government, 1(one) new urban area had bounded and use land around the area according to set plans.
5. By using community participation, actions of protection of erodible land by building terraces and developing drainage to create additional water resources for agricultural activity has been performed in a good manner and it covers around 750 hectares. However the performance is below the plan.

Table 10: Study areas four year soil conservation and drainage development performance

No	Types of action	Measure ment	Benchm ark 2002	Performance				
				2003	2004	2005	2006	2007
	Building terraces for soil and water conservation	Kilo Meter	9	25	135	205	246	-

Source: Field survey, February 15, 2006 E.C.



Figure 7: Stone terrace development in Metu Sillasie of Nono Woreda, (three pictures from left to right). Development's of grass strip in Gololle kebele of Nono Woreda (right end). **Source:** Field survey.

According to some key informant interview, “people confirmed that building of terraces, drainage development and protection of the natural resources performed by community participation was not made by will of the community. Without discussing with the community up on its benefits, government officials have been implementing by

commanding the people to do the activities by setting some rule of punishment on who do not participate”.

According to a response of one of the officers in OA of Nono:

At the community level, land management and natural resource conservation activities were implemented by the community and closely supervised by the DA and Natural Resource Safeguard Specialists. With the support of the Woreda experts, the Das were responsible for the effective implementation of the plan. Safeguard specialist, hired at the beginning of the plan for each kebele, had been monitoring the implementation of planned land management and natural resource conservation activities.

The implementation, monitoring and supervision of the land management activities in general were a joint task of the safeguard specialist, the AO and the OLMEP. The three bodies were jointly monitoring the effective implementation of the plan in rehabilitating the environment and natural resource conservation.

4.3 Constraints of Woreda’s Land management Institutions and Their Land Management Activity

4.3.1 Institutional framework

In Nono Woreda, setup and arrangements of governmental institutions are based on regional and federal line departments. For this reason, roles and responsibilities of different governmental institutions of the woreda, that has been discussed in the above section stems from the regional and federal line departments. Therefore, since they share common roles and responsibilities, a comment on each of the woreda governmental institutions also works for the regional and federal line departments.

In terms of clarity of institutional objectives, the institutional arrangements for land were fairly well defined. There are organizations with clear mandates, duties and responsibilities. The organizational settings have been organized in such a way that organizations that have to do with land, directly or indirectly, have been identified and given by law duties and responsibilities. The roles and responsibilities in place have also

clear objectives and some have developed strategies and policy instruments to meet these objectives. That said, however, there are important problems related to organizational setting and some questions about the institutional arrangements that remain to be answered. Important policy gaps are identified as well.

As it is discussed in the earlier section, there are about four governmental institutions working in the area of land and water and environmental protection. The government tried to define the roles and responsibilities of government bodies, a careful look into the work portfolios of offices indicate the presence of overlaps in mandate between OLAEC and OA. For instance, OLAEC and OA have both responsibilities related to protect and conserve natural resources. The broad areas of integrated natural resource management also fall into the mandates of these two sectors.

It seems there is a problem of split jurisdiction here, which may create problems in implementation and enforcement. Expansion of water harvesting and irrigation development activities also falls under the jurisdiction of OA and OIDA. Separate work of these institutions lead to a clear duplication of effort and waste of resources. Some of the key respondents also assured this fact, and told “due to overlaps in mandates and lack of integration there is a clear duplication of efforts, waste of resources and conflict on mandates. This shows us, availability of poor inter-sectoral collaboration and problems related to roles and responsibility of institutions.

In summary: as we have seen in the earlier section there is an overlapping and conflicting roles and responsibilities between institutions of the woreda. NBI (2006) also reported availability of a high frequency of overlapping and conflicting roles and responsibilities between institutions of the country and identified poor inter-sectoral collaboration and control as one of problems related to roles and responsibilities of organizations. Concerns existed that roles and responsibilities between levels remained ill-defined and resulted in implementation inertia and even failure (NBI, 2006). This could lead to inability to achieve the goals of the sectors. Additionally, the stakeholders may not collectively drive some synergic benefit from being able to integrate their administrative efforts. Both protective

institutional responses and lack of effective coordinating mechanisms are featured as reasons (NBI, 2006).

4.3.2 Land-use planning

As stated in the conceptual framework of this study, land-use planning begins with the development of a uniform land policy and the implementation of the spatial planning system, taking society's dominating socio-economic and ecological interests into account.

One of key respondents and who is head of one of the office in Nono woreda describes the issue related land policys as follows; "there is a uniform land policy developed by federal and regional government related land management of the woreda. Based upon society's dominating socio-economic and ecological interests; spatial planning of the woreda land has implemented in line with regional and federal policy."

However, in one of my interviews with an expert of government office in Nono noted that;

"there is no mechanism by which they identify material, social and ecological needs of individuals of the society, rather they develop different infrastructures based on the plan given from upward government body and by the system "they need to have" which is by judgment of government officials". Even if it's so, the respondent continues his speech, ". . . there is encouraging and remarkable achievements in different fields of the economy, natural resource conservation in general and land management in particular."

During my fieldwork of data collection, I observed the land which was washed away by erosion here and there. This shows the land management plan of the woreda was inductively developed. By its nature, the inductive land use plans are often inadequate because it does not identify critical areas to be focused (eroded, encroached, and etc).

4.3.3 Preparation works

As stated in the conceptual framework of this study and FESLM, land management is a process of co-operation and interaction of many participants, which determines the objectives and restrictions of land use, taking the development possibilities of relevant

populated area according to the various interests into account. Thus, in evaluating land management processes, the measures included therein and public status of participants, functional objectives of the state and local institutions, tasks set for the fulfillment thereof, and regulation in the field of land use and protection. This shows us, in addition to governmental institutions, tasks and regulations related to land use and protection; societies should have to actively participate in the planning of land management. Community-based land management approach will empower rural communities to take responsibility for the sustainable management of their local land resources. Engaging the different land use and management groups (farmers, foresters etc) in a variety of participatory assessment and planning activities will increase the ability of the participating communities to control their own natural resources and to promote local ownership. Predominantly top-down approach with no stakeholder participation in the land use planning exercise is unable to address the concern of over-exploitation and unsustainable land uses which affect a wide range of land resources.

However, evidence that I collected in study area clearly highlights that local administrations are only vested with the task of implementing government designed policies. Virtually all the *kebele* officials I interviewed in Nono (95% of sample) argued that they felt more responsible of their actions towards upward bodies rather than to local people. Local communities are often the last to be informed when relevant decisions are taken or new programmes are planned.

In one of my interviews a farmer in Nono noted: “from time to time the government send here its officials to communicate us that something changed or that a new program is available for our community (...) I wonder what participation really means”.

Thus, opportunities for rural dwellers to express their needs and demands are constrained by a rigid and vertical institutional framework limiting local democratic spaces.

4.3.4 Land use

In one of my interviews with a governmental official in Nono noted that: “taking into account the socio-economic and ecological interests of the society, which were included in the plan

of the woreda, the land were used in the best and most efficient way. There is encouraging and remarkable achievements in land resource management in general and soil conservation in particular”.

Another respondent from AO Noted: “the absence of an effective land management strategy is also apparent in private land. Here the government objective of protecting and preserving the environment goes unheeded, in the seeming absence of any effective controls on land use conversion of valuable agricultural land to housing. In the previous four years valuable agricultural land of the woreda has been changing to housing following infrastructure developments (mainly roads) or to get infrastructures that need close cluster (like electricity and drinking water). Mainly following road developments, villages are being created here and there. Therefore, government should have to develop a strategy in which it may control private land”.

4.3.5 System of indicators

Monitoring & evaluation at the programme level can strengthen knowledge management, benchmarking, and guide design and implementation of individual investment operations on the ground. Without monitoring and evaluation, no one can understand the level of his performance and can take corrective measures when his action for better may cause ecological degradation. In order to assess outcomes and develop strategies that reduce the negative environmental impacts of land use, we should have to set indicators of our land management activity. Developing a preliminary set of outcomes and indicators is important to build a common understanding of what the country is trying to achieve and to help focus various stakeholders and partners on a shared practical agenda. A results framework based on a causality chain of indicators (input-output-outcome-impact) is an essential tool. It sets the scope of action and identifies to what extent certain types of factors are under their control. Depend up on these facts, in the study area; there are clear indicators of SLM in their initial plan and evaluation documents. However, in the study area; there are some constraints to evaluate indicators of their land management system. These are:

- Unavailability of land information in the form of operational status maps, of practical use by land use planners and land managers. Operational status maps are

used in rapid rural appraisals to identify priority areas in which urgent action is necessary to solve land use problems confronting the district staff, such as encroachments, deforestation, soil erosion, clouded land tenure, poorly planned settlements and undesirable alienation.

- Challenges of accessibility to data, including the inability of government officials to satisfy requests for information because of lack of familiarity with modern information technology.
- Inability to finance the collection and processing of needed data in the woreda.
- There are gaps in information about the critical areas of concern in the woreda and kebeles; and what are the critical lands issues affecting those areas, in particularly on land use changes, often as a result of a lack of communication between the woreda and the land users who operate at more local levels. At the local level land users are well aware of their immediate land, its extent, ownership patterns, the portions of it affected by degradation and other critical issues hindering sustainability of use. However, governing body has no information regarding the status of each parcels of land at local level.
- Information is lacking on which to base recommendations concerning the advisability of land users land management activities.
- Limited discussion on goals, objectives, indicators, and data collection responsibilities for the monitoring and evaluation system.

4.4 Determinants of of Land Management Practices

Table 11: Determinants of land management practices (Marginal Effects)

No	Explanatory Variables	RCP	PES
1.	Age of the household head	-0.077	-1.05
2.	Sex of the respondents	0.21	0.331
3.	Education status	0.31	0.26
4.	Tenure security (1 = yes)	4.9	0.01
5.	Proximity to markets	1.26	1.17
6.	Access to credit (1 = yes)	0.44	0.581
7.	Family size	0.015	0.1116
8.	Non-farm activity(additional income)	-0.68	-0.23
9.	Per capita income	0.76	0.63
10.	Access to Extension service	0.105	0.825
11.	Livestock ownership	0.174	0.99
12.	Farming experience	-0.0467	-0.135
13.	Support official officials	0.9	1.83

Source: Field Survey, personal communication, from February 26, 2006 E.C. – April 30, 2006 E.C.

Results in Table11 indicate that land tenure security positively and significantly affects the use of sustainable land management strategies in the study area. This implies that farmers, who feel secured, follow sustainable intensification. This is in line with the results of other empirical studies in Ethiopia (Demeke & Hunde, 2004). In fact, empirical evidences offer mixed results (Mortimore, 1989). Mortimore (1989) finds evidence of small-scale farmers' willingness to forgo short-term income gains even under price and famine pressure to pursue long term sustainable management strategies. However, several studies cite land tenure insecurity as the primary reason for poor farmers' excessive cultivation of their land due to absence of vested interest in conserving an asset that they do not own (Mink, 1993). With insecure land tenure and transaction, farm households may have less incentive to

invest in land management (Feder et al. 1985) as it takes relatively longer time to reap the benefits expected from investment on sustainable land management practices. On the other hand, the household may increase investment if the investment can in turn increase security of tenure (Besley, 1995), for example, by having perennials and erosion control structures on the farm. Generally, legally secure land tenure and transaction is expected to improve land use efficiency and long term investment on land.

According to conventional wisdom, farmers with limited human capital, such as low education level, are expected to follow unsustainable farming practices. This is expected because education has been found to facilitate adoption of sustainable land management practices among smallholder farmers (Pender *et al.*, 2006). In fact, it could be argued that when a farmer gets access to better education, then he or she may gain better opportunities outside the farm sector to pursue other income-earning ventures. Ultimately, this reduces labour availability for farm management activities in a household. However, the result in this study indicates that education status of household heads positively and significantly affects the probability of using land management strategies, which corroborates with Feder et.al. (1985).

Results also indicate that access to markets positively and significantly affects the likelihood of using productivity-enhancing strategies (PES) and the probability of adopting conservation structures (RCP). The assumption is that proximity to markets increases farmers' access to credit facilities and income-generating activities and also reduces transaction costs that enable them to buy and apply soil fertility-enhancing inputs in time. Another assumption is better access to markets increases the likelihood of using manure, household refuse and fertilizer, probably because better access to the market town raises the value of land by raising farm-gate prices, thereby encouraging investment in land management

Results also indicate that access of the farmers to credit increases the application of productivity-enhancing strategies (PES) and the probability of adopting conservation structures (RCP). This implies that those farmers that have access to credit have significantly higher sustainable land use indices. According to Pender et al.(2006), many studies have previously reported that access to credit is one of the major drivers of farmers' investment in sustainable land management technologies and it improves

problems of liquidity and enhances use of agricultural inputs in production as it is often claimed in development theory (Pender *et al*, 2006). By relaxing the financial constraints, credit helps reduce the extent to which households are unaccountable about the future and this would enable them to make more investment in land conservation (Pender & Kerr, 1998; Holden *et.al.*, 2004).

The study reveals that improvement in farm income holds some potentials for sustainable land use and is evident as it has a positive significant effect (Somda, *et al.* 2002). This shows that as farm incomes increase, sustainability of land use figures increase. Similar findings had been reported by Brasselle *et al.* (2002).

Results in Table 10 also indicate that contacts with extension officers positively and significantly affect the probability of using productivity enhancing strategies (PES) and the probability of adopting conservation structures (RCP). Kabuko-Mariara (2006) already noted that informal education through extension services will enhance sustainable land management practices among peasant farmers. This is due to the role that extension services play in providing informal education to farmers who might be illiterate on different aspects of farming activities.

Either farmers or agricultural experts, everyone has a role to play. Likewise government officials also have their own role to protect the natural resource from degradation. It may be either by raising awareness of the community, developing long term strategies and interventions, influencing the community to change their attitude by talking about the issues in different meetings and forums, or enforcing the community to abide by the relevant policies and laws to eradicate the misuse of our natural resources. And also periodic monitoring of the status of natural resources is fundamental to generate adequate information for planning and policymaking for their sustainable management. The result of this study also shows that a continuous support and periodic monitoring of the government officials positively and significantly affects the uses and applications of sustainable land management strategies by the farmers.

Results further reveal that households with large families with respect to the size of their land holding are more likely to undertake sustainable land management strategies. This is because areas with high population pressure are characterized by high scarcity of

farmlands where households use their plots more intensively as compared with areas where there is relatively lower scarcity of land. This means that high population pressure increases scarcity of land thereby increasing the incentives for efficient utilization of farmlands. With the consequential effect of population pressure on relative abundance of labor, land management may increase, as farmers will use soil fertility-increasing and yield-enhancing technologies (Boserup, 1965). This is evident in this study from the effect of the square of family size-farm size ratio on the probability of using different land management strategies (such as PES or both PES and RCP), which turns out to be positive and significant.

Livestock ownership has a positive and significant influence on the probability of using productivity-enhancing strategies (PES). Additional income from livestock production relaxes the financial constraints of the farmers so as to invest on their land. In addition to this, livestock transform poor-quality, bulky vegetation into high-value products of economic importance and nutritional use. They enhance system productivity by recycling nutrients and providing manure, by supplying draft power for the crop enterprises, and by providing livelihood options (Delgado et al. 1999). Draft animals provide about 80 percent of the power used for farming in developing countries. The byproduct of crop production (crop residue) is a principal input for livestock production, and the byproduct of livestock (manure and draft power) is a key input for the crop sector. In addition to recycling nutrients, livestock redistribute nutrients between cropland and pastureland or within the cropland between different plots (feeding livestock on agricultural residues). The complementarities between the livestock and crop subcomponents could be much higher than the potential competition between them, particularly when well-managed livestock can contribute positively to sustainable vegetation cover, improved land management, and biodiversity (WB, 2005).

Research works offer mixed results as regards increment of age in affecting land management strategies. While some indicate that age positively influences adoption (Amsalu & Graff, 2007), others indicate that age has negative impact. In this study, increase in age is found to be negative and significant in affecting adoption of both fertility-enhancing strategies (PES) and a combination of PES and RCP. While farming experience is expected to enhance soil conservation, aged farmers with a lot of experience may use the

land in an unsustainable manner due to low level of education and immobility as a result of ageing.

The results of this study reveals as non-farm activity negatively affects land management practices. It is due to the fact that non-farm employment takes labor away from farm operation leading to little time devoted to land management. As a result, the relative importance of land conservation practices diminishes since it raises the opportunity cost of labor. Consequently, farmers have less incentive to undertake the necessary conservation measures on their farmlands. The result of this study is consistent with other empirical evidences (Shiferaw & Holden, 1998) showing that non-farm activities undermine land management efforts such as conservation structures.

As a result of the study shows that, across gender, land management of female-headed households has been found to be unsustainable than that of male-headed households. This may be due to the fact that African women are responsible for 90% of the work involved in processing food and their income also affects the food consumption of the household, since women typically spend a high proportion of their income on food and health care for children. This may create financial constraints on them so as to invest on their land.

Chapter Five

Conclusion and Recommendations

5.1 Conclusion

Ethiopia, like many countries of SSA, suffers from the problems of poverty, land degradation, and low productivity, which pose serious policy challenges for sustainable development. Particularly land degradation poses an acute challenge to rural livelihoods. What makes this problem rather challenging is the overwhelming majority of the country's people reside in rural areas where land is a basic means of survival, a source of income and an object of utilization. It is to be noted that since rural people in the country derive their livelihood mainly from traditional and subsistence agriculture, they may overexploit the land resource to meet their food demand. Addressing this problem has consistently identified as a major priority for Ethiopia virtually all national strategies and policy documents. Therefore, designing appropriate policies and strategies in order to reduce land degradation and manage the land in a sustainable way, requires proper understanding of the current management activity and the current status of the resource.

With the above-mentioned issue in mind, this study deeply examines the way in which land is being managed in the woreda, level of interaction between land and land users, potentials and constraints of the woreda's current land management system, and assesses the policy, institutional and technical issues that need to be addressed in the current land management system of the woreda. In general, this study assesses sustainability of land use of Nono woreda based on principles of Framework for Evaluation of Sustainable Land Management (FESLM). This is a worth-while effort because FESLM considers different production objectives in farmer's usage of land. This allows integration of different properties of a particular land into a composite index that captures the extent of degradation the land might have suffered. It is a richer way of defining sustainability of land use system because it enables different indicators of land use to be considered at once. Based on this, however, because of the richness of policy issues that can be derived from this type of study, future studies can explore indicators of sustainable land management in the woreda with some introduction of laboratory testing of soil and water for essential parameters and application of the growing technology of Geographical Information Systems (GIS) for vegetation mapping.

5.2. Recommendations

The findings of the study are to guide policy statements for ensuring sustainability of the agricultural production systems in Nono Woreda. First, results of this study indicate that there is a high frequency of overlapping and conflicting roles and responsibilities between institutions besides poor inter-sectoral collaboration and control as one of the problems related to roles and responsibilities of organizations. Particular concerns exist that roles and responsibilities between levels remained ill-defined and resulted in implementation inertia and even failure. This could lead to inability to achieve the goals of the sectors. Additionally, the stakeholders may not collectively drive some synergic benefit from being able to integrate their administrative efforts. Both protective institutional responses and lack of effective coordinating mechanisms are featured as reasons (NBI, 2006). Therefore, government should have to readjust institution's roles and responsibilities to assure the changes and development needs of the country.

Second, the policy documents related to land management applied in the woreda uses command-and-control type policy instruments. International and local experiences indicate that the government has a key role to play in providing incentives to actors to adopt improved environmental management strategies. Because policy instruments built on command and control have limited or negative effects. There is a need for increased use of positive incentives, like payment for environmental services, to address land degradation problems in developing countries (Ekborn, 2007). Therefore, while designing policy and strategies, government should have to focus on positive incentive and voluntary approach.

Third, the study reveals that local administrations are only vested with the task of implementing government designed policies. Rather than improving opportunities for rural dwellers to control how relevant decisions on important resources such as land are taken, local officials are likely to be more accountable to upper level of government. However, studies and experiences assure that, engaging the different land use and management groups (farmers, foresters etc) in a variety of participatory assessment and planning activities will increase the ability of the participating communities to control their own natural resources and to promote local ownership. Predominantly top-down approach with no stakeholder

participation in the land use planning exercise is unable to address the concern of over-exploitation and unsustainable land uses which affect a wide range of land resources. Therefore, government should have to design a policy that correlate the difference.

Fourth, there is lack of systematic monitoring and evaluation of policy implementation which is linked with the absence of an integrated system of information management at the woreda that arise from lack of knowledge and familiarity with modern information technologies. Therefore, government should have to design better strategy that fill familiarity and knowledge gap with modern information technology; by giving either short or long term training.

Fifth, the study reveals that the farming population in Nono Woreda is ageing and that is adversely affecting sustainable land use. The woreda administration needs to intensify efforts at integrating more young school leavers into agricultural production within the currently institutionalized poverty alleviation programmes. Such programmes, if designed for each of the local government areas will not only go a long way in ensuring that vibrant youths gradually replace the old farmers, it will ensure conservation of natural resources because of the higher level of education already attained by these youths. Educational attainments become an important issue here because the study shows that it enhances farmers' ability to use their land in a much more sustainable manner.

Sixth, the study reveals that improvement in farm income held's some potential for sustainable land use. Conventionally, farm incomes can increase by getting better price for the produce or getting higher yields. Efforts by the woreda administration to enhance productivity of the farmers will go a long way in ensuring environmental conservation. This can be channeled through intensification of research efforts into development of sustainable land use technologies and promotion of usage of existing environment friendly cultural practices and hybrid varieties among the farmers. Therefore, woreda administration should have to intensify activities of enhancing productivity of the farmers.

Seventh, agricultural extension activities in the woreda should focus more on sustainable land management. The study already reveals that contacts with extension agents facilitate

sustainability of land use by the farmers. Agricultural extension programmes in the woreda should be strengthened for more impact on sustainability of existing farming systems.

Eighth, the study finds that access to credit is an important factor for ensuring sustainability of the agricultural production system in the woreda. There is need to ensure that agricultural credit schemes in the woreda are well targeted and adequately managed.

Finally, the study also finds that collective action for forest management generally functions well in the Woreda. The administration of the forest has given to one external organization. However, community natural resource management may be more effective and more beneficial if conducted at the most local level, and if involvement of external organizations is demand driven and complementary to local initiatives. Because this action creates a sense of concern on the community since they themselves manage and administer the resource. Therefore the woreda administration should have to give due attention for actions of involving the community on natural resource protection and administration.

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APPENDIX

Data Collection Tools

Part I. Checklist for key informant interview

A. Over time changes, in vegetation cover

How do you describe the changes in vegetation cover of your area during the last 4 years?

Duration	Guide/checklist questions
2002-2006	How do you evaluate the status of the forest cover at this time? What has been the major change during this time? What were the internal and external factors that contributed to the cover change?

B. Agricultural expansion practices around and within the natural forest.

- ❖ Do you have farm land around the natural forest?
- ❖ How do you express the relation between your agricultural practice and forest land?
- ❖ How do you express the relation between society and natural forest, in the context of agricultural expansion practices?
- ❖ How can you describe the tree-plant interface and tree- animal interface?
- ❖ Is there any protected natural forest in your area? If yes, how do you describe the issues related to rehabilitation, conservation, protection and administration of this forest resource?
- ❖ If there was an activity of rehabilitation through reforestation and afforestation, how tree species have been growing? Is that by plantation through community participation? If yes, how was the community participating? 1. Command and control method _____ 2. Will of the society _____

C. The interaction between local community and natural forest

- ❖ For what purpose do you utilize the natural forest?
- ❖ Is there any negative interaction between the community and natural forest?
- ❖ How these problems can be solved?

D. Community perception on the potential benefits and uses of natural forest conservation.

- ❖ Due to existence of natural forest around your area, do you believe as you are a beneficiary?
- ❖ Can rehabilitation practices provide benefits expected from the natural forest? Explain how?
- ❖ What will be the major constraints in the forest rehabilitation and conservation practices? Put according to their rank?
- ❖ How these constraints can be solved?

E. Community participation on planning of land management

- ❖ Does local community participate in the planning of land management?
- ❖ Related to land and land management issue, is there a smooth and an effective type of communication between woreda and kebele/local community or land users who operate at more local levels?
- ❖ How do you describe the roles and responsibilities of land and environment related institutions and the relation between them?

F. Production plan and performance

What is your average five year per hectare per year plan and performance of crop production?

- | | |
|---------------------|---------------------|
| 1. 2002; plan _____ | 4. 2005; plan _____ |
| Performance _____ | Performance _____ |
| 2. 2003; plan _____ | 5. 2006; plan _____ |
| Performance _____ | Performance _____ |
| 3. 2004; plan _____ | 6. 2002; plan _____ |
| Performance _____ | Performance _____ |

What is your five year plan and performance of irrigation usage?

1. 2002; plan _____
Performance _____

2. 2003; plan _____
Performance _____

3. 2004; plan _____
Performance _____

4. 2005; plan _____
Performance _____

5. 2006; plan _____
Performance _____

6. 2002; plan _____
Performance _____

What is your five year soil conservation and drainage development plan and performance?

1. 2002; plan _____
Performance _____

2. 2003; plan _____
Performance _____

3. 2004; plan _____
Performance _____

4. 2005; plan _____
Performance _____

5. 2006; plan _____
Performance _____

6. 2002; plan _____
Performance _____

Component management

- ❖ What management operations do you perform?
- ❖ How do you see management of individuals' land of the woreda?
- ❖ Describe the inter-relation and communication between governmental institutions works on land management of the woreda.
- ❖ Is there any means in which community participate in land use planning of the woreda or kebele? Clarify issues related to land use planning and management of the woreda's land.
- ❖ What are the methods of monitoring and evaluation of the woreda's land?
- ❖ What are the potentials and constraints of the woreda's land management monitoring and evaluation activities?

Part II. Questionnaires

1) General Description

Name of the respondent _____ kebele _____ sex _____ age _____
Land holding Size (ha) _____ marital status _____ Family Size _____ Education status _____
Your income per year in birr _____ farming experience in years _____ size of family member _____

2) How do you describe availability of the following services?

Type of services	Yes	No
Extension service		
Credit		
Market in nearby area		
Support from administrative body on land management		
Support from experts on land management		

Note: - use sign under answer

3) **What practice/s do you use to conserve soil resource?**

- a) Stone bunds _____
- b) Soil bunds _____
- c) Grass bunds _____

4) **What types of soil fertility enhancing inputs do you use/s?**

- a) Fertilizer _____
- b) Hybrid seeds _____
- c) Herbicides _____
- d) Pesticides _____
- e) Crop rotation _____
- f) Crop residue _____
- g) Manure _____
- h) Mulching _____

5) **Is your land tenure is secured?**

- a) Yes _____
- b) No _____

6) **In addition to farming the land, do you herd animals to generate additional income?**

- a) Yes _____
- b) No _____

7) **Do you engaged in income generating activities other than farming?**

- a) Yes _____
- b) No _____

8) **Do you use irrigation in your farming activities?**

- a) Yes _____
- b) No _____

9) **What type of farming practice do you use?**

- a) Modern _____
- b) Cultural _____

Part III. Checklist for the woreda offices

Description of the study area

1. Location

- ❖ Woreda _____ zone _____ region _____
- ❖ Distance from Addis Ababa _____ km
- ❖ Distance from zone capital(Robe) _____ km
- ❖ Number of kebele`s in the woreda _____
- ❖ The name of the neighboring woredas and the direction they bordered _____
- ❖ Latitude _____ north and longitude _____ east

2. Biophysical data

2.1. Climate

- ❖ Annual rain fall(average in mm) _____ mm
- ❖ Duration /belg / from ____ to ____ months, meher from ____ to ____ months, and dry spells from ____ to ____ months
- ❖ Average temperature, maximum ____ minimum ____

2.2. Agro ecology

2.3. Altitude ____ m. a.s.l.

2.4. Dega ____%, weyina dega ____%, kola ____%

2.5. Topography_____

2.6. Soil types_____

2.7. Vegetation

G. Status of forest coverage

- a) Forest coverage of the woreda before four years _____hectares
- b) Current forest coverage in the woreda _____hectares
- c) How the current forest coverage as compared to the previous? Increasing or decreasing? If decreasing explain the causes if increasing, explain the factors contributing to increasing _____

3. Socio- economic environment

3.1. Population

- ❖ Total population _____ male, _____ female _____
- ❖ Head house hold, male _____, female _____ total _____
- ❖ Average family size _____

- ❖ Religion:- Orthodox ____ %, Muslim ____%, Protestant ____% and others (specify) _____
- ❖ Ethnic composition ____% Oromo, ____% Amahara, ____% gurage, ____% others/ specify/

3.2. Land

- ❖ Total land coverage of the woreda _____hectare
- ❖ Average land size per HH _____ hectare
- ❖ Population density per km2 _____
- ❖ Write the Land use of the woreda according to the table provided

Land use types	Area coverage in hectare	Proportion/%/	Remark
Natural forest			
Plantation forest			
Cultivated land			
Grazing land			

3.3. Livelihood (income source) of the population in the woreda

Source of income Share in %	Source of income Share in %

- ❖ What are the major types of food crop grown in the woreda_____?
- ❖ What are the major types of cash crop in the woreda _____?
- ❖ What are the major types of livestock in the woreda _____

3.4. Institutional and infrastructural aspects

- ❖ Are there any credit facilities for the rural community? 1=yes, 2= no. If yes, mention the name of credit facilities _____
- ❖ Are there any extension services in agricultural practices? 1= yes, 2= no. if yes, mention the types of extension services _____ I f not, why?
- ❖ Are there any nursery sites in the woreda? 1= yes, 2= no. If yes, how many?
- ❖ How does the Woreda manage land related information?
- ❖ Which institutions do play key role and what are the tasks of such offices in the environmental and land management process? Describe roles and responsibility of each institute?

BIOGRAPHIC SKETCH

Tegegn Samuel was born in Silk Amba town, which is located in Nono woreda, West Shewa Zone of Oromia National Regional State – Ethiopia. He attended his primary and junior secondary education at Silk Amba School. He attended his high school education at Dejazmach Geresu Duki senior secondary school. He joined University of Gondar in 2004. After obtained his BA degree in Geography and Environmental Studies in July 2007, he has been working in Governmental and Non-Governmental Organizations from May 2008 till now. He has been working in various Organizations as: a planning and budgeting expert, organizations capacity building programs medium and higher expert, and land management expert and coordinator, during his stay in the organizations. In July 2011, he joined summer study program of school of graduate studies of Addis Ababa University.