ADDIS ABABA UNIVERSITY

SCHOOL OF GRADUATE STUDIES

COLLEGE OF SOCIAL SCIENCES

FACTORS AFFECTING SUSTAINABLE LAND USE MANAGEMENT: THE CASE OF WARRA JARSO WOREDA, OROMIYA, ETHIOPIA

BY

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A THESIS PRESENTED TO ADDIS ABABA UNIVERSITY
SCHOOL OF GRADUATE STUDIES
IN PARTIAL FULFILLMENTS OF THE REQUIREMENTS FOR THE DEGREE OF
MASTER OF ARTS IN GEOGRAPHY AND ENVIRONMENTAL STUDIES
(POPULATION, RESOURCE AND DEVELOPMENT)

ADVISOR
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MAY, 2015
ADDIS ABABA

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COLLEGE OF SOCIAL SCIENCE

This is to certify that the thesis prepared by Mamuye Tola, entitled: Factors Affecting Sustainable Land Use Management: The Case of Warra Jarso Woreda, Oromiya, Ethiopia and submitted in partial fulfillment of the requirements for the Degree of Master of Arts in Geography and Environmental Studies (Population, Resource and Development) with the regulation of University and Meets the accepted standards with respect to originality and quality.

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Chair Person (Name)		

Declaration

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

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Mamuye Tola

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ACRONYMS

CSA	Central Statistics Authority
CIESIN	Center for International Earth Science Information Network
DA	Development Agent
EMA	Ethiopian Mapping Authority
EFAP	Ethiopian Forestry Action Program
EWNHS	Ethiopian Wildlife and Natural History Society
FAO	Food and Agriculture Organization of the United Nations
GEF	Global Environmental Fund
GIS	Geographic Information System
IEM	Integrated Environmental Management
SLM	Sustainable Land Management
WFP	World Food Programme
UNCED	UN Conference on Environment and Development

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Acknowledgment

I am greatly indebted to my advisor Dr. Mulune W/Tsadik for his advice and sharing his valuable time and ideas. My special thanks also goes to Wara Jarso Woreda Agriculture and Rural Development Office, Woreda Administration office, Kebele leaders and all of my respondents for their unreserved information. I have everlasting thanks for all of my friends who contributed their ideas and time directly and/or indirectly to make this thesis a reality. Finally, the unfailing encouragement and support rendered from my families deserves particular thanks.

Mamuye Tola

ABSTRACT

Human being depends on land to produce basic necessities which include food, clothing and shelter. Moreover, land is the principal resource of human beings in general and agrarian society in particular. Land use is the end product and manifestation of the degree of interaction between the two and a kind of permanent and cyclic intervention of man in his environment. The main objective of this study is to assess factors affecting sustainable land use management in Wara Jarso Woreda. The data for the study were collected using survey questionnaire including formal interviews, key informant interview, observation and focus group discussions. Three kebeles were selected purposely where land degradation is high and forest products are supplied. One hundred forty eight households were considered for analysis of data. Respondents' size from each kebeles was selected through systematic random sampling based on their proportion household number. Both quantitative and qualitative research methods were employed to achieve the objectives set. The results showed that land use management is poor. Population growth, infrastructure development, household income, educational status of household heads, sex of respondents, media, families, national policies were assessed as factors affecting sustainable land use management. To conserve degraded land and bring sustainable land use management farmers agricultural input application, farming system and national policies were also assessed. Strategy that support the provision of infrastructure, information on land use management, government policies practice at household level are necessary to better adapt to minimize the impacts.

Key words: *Ethiopia, Wara Jarso, Sustainable land use management, forest*

CHAPTER ONE

1. INTRODUCTION

1.1 Background of the study

Land is a very essential element of nature on which all living things directly or indirectly depend on. Human being depends on land to produce basic necessities which include food, clothing and shelter. Moreover, land is the principal resource of human beings in general and agrarian society in particular. Land use is the end product and manifestation of the degree of interaction between the two and a kind of permanent and cyclic intervention of man in his environment (Enemark, 2007; World Bank, 2006).

Many writers argued that the nature and intensity of land use of a given area is evolved and conditioned by the economic and social environment which has been in existence since historic past. Given the potentials of land resources, i.e. the permutation and combinations of physical characteristics of the natural environment, the kind and extent of uses are primarily determined by the basic needs of individual inhabitants from time to time. It is conditioned by the social norms accepted by the prevailing social and economic institutions and physical infrastructures. There are six physical factors on one hand, and economic and social factors on the other, which together ultimately shape the land use system of an area (Muluneh, 1994 cited in Sinknesh, 1999).

As it was discussed by Muluneh (1994 cited in Sinknesh, 1999), the land use system in an area may be characterized by the kind of uses and non-uses. The most distinguishing kinds of uses of productive land are grazing, cropping and woody vegetation may include eucalyptus wood land and shrubs/bushes land. Moreover, currently non-utilizable lands such as marshy and swampy areas, like water surface, deserts degraded or unusable land, built up and areas may be added to the land use/cover/components. The agenda of increased investment to promote agricultural growth and poverty reduction has an impact of land resources. Land resource is one of the components of ecosystem services. An ecosystem is a dynamic complex of plants, animals and micro-organism communities and the non living environment interacting as functional units. Furthermore, ecosystem

include natural forests, landscapes with mixed patterns of human use and ecosystem intensively managed and modified by humans, such as agricultural land and urban areas. Ecosystem services are the benefits that people obtain from ecosystems. They include the following: provision services such as food, water, timber and fiber, regulated services that affect the climate, floods, disease, waste and water quality, cultural services that provide recreational, aesthetic and spiritual benefits, support services such as soil formation, photosynthesis and nutrient cycling (Barbier, 1993).

1.2 Statement of the Problem

Land is the chief resource and source of wealth of a given country. The productivity of land varies from one place to another depending on variation in such natural factors as climate, relief and soil fertility and manmade factor such as land tenure system, level of technology and unwise use of land resources. When human being in position to use an improved technology with favorable physical conditions of the area, can produce enough and even, excess food and industrial raw material. But lack of sustainable land use such as over cultivation, over grazing, deficient and poor irrigation practices lead to land degradation. Moreover, land use planning; cultivation practices and soil management have considerable impact on productivity and utilization of land.

In Ethiopia, the current status shows that natural resource (land resources) management is becoming poorer. For instance, the most important element which helps to maintain land resources status is forest. But forests have been cleared for the expansion of cultivated land and meeting the demand for fuel. The rate of deforestation is higher than afforestation. This has led to loss of soil through accelerated erosion. On the other hand the performances of agricultural activities have been very poor crop lands, production and yields have declined and stagnated from year to year (Akililu, 2006).

The importance of land is not limited only to agriculture production but it can be used for various kinds of activities. The use of land in the study area appears largely used for crop production and animal rearing. Although, inappropriate use of farmland and lack of modern or scientific agricultural practices to increase productivity and to decrease the

rate of soil erosion and land degradation. As mentioned before, land is very important resource where human and others life lives on. It is the sources of everything which is important for life existence. This very important resource can be affected by various factors which are broadly categorized in to two. These are natural and manmade factors.

Hence, the researcher found the gap that, on the one hand different studies boldly showed that manmade is a main cause for lack of sustainable land use management, and on the other hand natural factors explained as an immediate cause of unsustainable land use management. And, therefore, the researcher aimed to practically show factors affecting sustainable land use management. Thus, this study going to assess, the factors that affect sustainable land use management in Wara Jarso Woreda.

1.3 Objective of the Study

1.3.1 General objective of the Study

The general objective of the study is to assess land use situation and explore factors affecting sustainable land use management in the area.

1.3.2 Specific Objectives

Specific objectives of the study are the following

- Examine the current practice of sustainable land use management of the study area.
- Identify the natural and manmade factors that affect sustainable land use management practice in study area.

1.4 Research Questions

The research will answer the following research questions.

- What is the status of current practice of sustainable land use management in the study area?
- What are the natural and manmade factors that affect sustainable land use management?

1.5 Significance of the study

The main purpose of this study is to produce academic research. Moreover, it serves as a base for other study which is related to this issue. It May indicate some possible direction for the problems and factors that affect sustainable land use management. This study may use as a source of information regarding the factors affecting sustainable land use management. The study may add new ideas to already existed practice and it also used as a base for further research on similar issues. Furthermore, it may create awareness for the concerned body (governance and others) the practice of sustainable land use management.

1.6 Delimitations of the Study

This study was delimited both geographical and conceptually. Concerning geographical delimitation; it was restricted in Wara Jarso Woreda. Conceptually the study was limited to investigate the factors affecting sustainable land use management in Wara Jarso Woreda.

1.7 Limitation of the Study

The study will not completely free from constraints. Because of shortage of time, the study did not investigate all factors that affect sustainable land use management

CHAPTER TWO

2. REVIEW OF RELATED LITERATURE

2.1 Theories and Concepts of Sustainable Land Use Management

The foundation of sustainable theory lies, first, in recognizing the biological limits to growth, the ecological carrying capacity and the maximum sustainable yield – the ecological sustainability view (Rees, 1990; Adams, 1990; Shiva, 1992 cited in Pelesikoti, 2003). Sustainability in this view means environmental sustainability. The environmental and ecological base of sustainable development is very strong (an eco centric view). Tilton (1996 cited in Pelesikoti, 2003) referred to this view as the 'Fixed Stock Paradigm'. Ecologists and other scientists are concerned about the irreversible exhaustion of finite resources.

The second foundation is sustainable economic growth. This refers to a situation where the economy is growing over a period of time (measured by continual rise in GNP per capita) and surviving periods of relative recession. Sustainable economic growth implies that if the economy is growing on its own momentum then there is sustainable development (O'Riordan, 1981, Pelesikoti, 2003). O'Riordan also refers to this view as 'techno centric' (believing in the technological capability of humans to control nature and to achieve the best use of the environment). The concern for project sustainability is also related to this view. Sustainable funding and participation, after the life of a project is the main concern here, regardless of the project being ecologically sustainable or not. Ecological economists, however, favor the merging together of environmental and economic concerns into one theoretical framework (Barbier, 1993; Pearce, 1993; Tisdell, 1993; Common, 1995 cited in Pelesikoti, 2003). The economic system dealing with production and the question of distribution of goods and services is brought together with the ecological system. Economic growth is necessary and possible, though such growth should not irrevocably harm the environment.

The third foundation is sustainable societies. The social approach considers the poor people and their basic needs first (Chambers, 1986 cited in Pelesikoti, 2003). Another key element of the social approach is an emphasis on social equity, justice and liberation.

This is the elimination of injustices and major inequalities within a society, which includes, for example, division of society by race, class or gender; the abrogation of basic human rights by rulers; or the existence of extreme inequalities in wealth (Mies& Shiva, 1993; Merchant, 1995; Salleh, 1997 cited in Pelesikoti, 2003). Another key consideration in this view is the inter-generational equity and the fair distribution and access to life-support systems between generations and within the current generation (WCED 1987; Dover &Handmer, 1992; Elliot, 1994; Reid, 1995 cited in Pelesikoti, 2003). Sustainable development then, is the merging of all three foundations: ecological carrying capacity, sustainable economic growth and a sustainable society.

The word sustainability is relatively presently introduced term but it has long been a fundamental concept in land resource and other resource management. Farmers have always tried to pass on land to their children in at least as good conditions as they inherited it. The agenda 21 report of the UN Rio meeting is subtitled, a program of action for sustainable development and there are now few development projects which do not include reference to sustainability. If it is properly employed, however, sustainability is a valid concept of the highest significance, fundamental to questions of the land resources (World Bank, 2006).

2.2 Evolution of Resource Management Paradigms

The dominant theoretical paradigms that explain the evolution of resource management and development paths include the classic, the neo-liberal and neo-populist paradigms, the community-based development and the integrated management approaches.

2.3 Classic, Neo-Liberal and Neo-Populist Paradigms

2.3.1 Classical Paradigm

The ‘classic’ paradigm, which was predominant between 1950 and 1975, drew its sources from notions relating to rural development and environmental management. The model is top-down, state instigated, informed by state-sponsored scientific institutions, and promoted via extension agents. The following steps characterize the classic paradigm’s approaches: Perceived problems are identified by external agents (government officers,

donors, Researchers etc.); technical measures are formulated by these external agents but require community cooperation; and plans are implemented using a combination of encouragement, persuasion and subtle threats.

With the classic model, local knowledge is seen as defective, traditional, irrational, nonscientific and even superstition, which should be replaced by expert-led knowledge and officially sponsored innovations (Blaikie, 1996). Failure with this approach, however, is blamed on the community or the environment.

2.3.2 Neo-Liberal Paradigm

The neo-liberal and neo-populist paradigms were formulated at about the same time because of the rejection of the classic model. The neo liberal paradigm is closely associated with the World Bank (WB, 1992). The paradigm relies on incentives and regulations and is related to the economics of externalities and property rights. An issue with the neo-liberal paradigm is the absence of any universal or explicit criteria to judge the best technology.

2.3.3 Neo-Populist Paradigm

The neo-populist approach is a result of the rejection of the top-down, techno centric and state-led model of technology transfer. It is a reaction against the incapability of central or external authorities and the market to stop resource degradation and of the self-sufficient society against capitalist penetration of small-scale capitalism and urban interests of rural movement seeking to realize traditional values in a changing society. This approach, which promotes a more participatory style, became central to the development agencies by the 1980s. Many researchers advocate the neo populist approach (Gary, 1991), among others, have argued for the need for ‘community based’ or ‘co-management’ approach to ensure sustainability of local communities. Other features include flexible ‘process oriented’ planning in which local people use their own knowledge and skills to figure out solutions to their problems. In recent years, the neo-populist approach has led to a shift away from ‘supply-driven’ approaches to ‘demand-driven’ ones and from centralized command and control to local management or co-

management of resources and services. The shift has been aimed at increasing efficiency, equity, empowerment and cost effectiveness (Narayan, 1995).

In order for development to serve the needs of a community, development should be based on appropriate strategies for encouraging participation, the existence of viable community groups, the appropriate fit of technology to the project and community needs, effective agency outreach strategies, client responsive agencies, and enabling policies (Narayan, 1995). In other words, successful community development relies on an integrated management approach. However, the decline and disappearance of certain natural resources (i.e. diminishing fisheries, deforestation, grazing land degradation, water shortages etc.) in many parts of the world has led to crises in natural resources management. Recently, largely as a response to failure of development paradigms mentioned above, to attain sustainable development objectives, researchers and governments are looking at alternative resource arrangement as an attempt to reverse resource degradation and to achieve sustainable livelihoods for the community concerned (Chamarik, 1994). For example, Agenda 21 promotes the study of traditional resource management systems because of the lessons they offer to contemporary societies. However, Jackson (1990) cautions jumping to conclusions that traditional knowledge and skills would still produce the desired results, as was the case in the past. Questions that come to mind include: What aspects of the traditional resource management methods would still be applicable in contemporary local societies? What characteristics of the traditional skills that can be strengthened or learned to provide for the needs and aspirations of communities now and into the future.

Sustainable land use has been variously defined, although the FAO definition has gained common acceptance. The essential feature is that sustainable land use achieves production combined with conservation of natural resources on which production depends. This is expressed in the specified definition. It can be compressed still further in to a pseudo- equation that is sustainability = Production + Conservation. For a land use system to be sustainable requires ,first, that it should meet the needs of farmer and other land users; and secondly, that it should achieve conservation of the whole range of

natural resources including climate, water, soils, landforms, forests and pastures. Simplified definitions: sustainable land use is that which meets the needs for production of present land users, whilst conserving for the future generations the basic resources on which that production depends.

The objectives of SLM is to harmonize the complementary goals of providing environmental, economic and social opportunities for the benefit of present and future generations, while maintaining and enhancing the quality of the land (soil, water and air) resources (Dumanski et al.1998). In addition to this, sustainable land management means managing land without damaging ecological processes or reducing biological diversity. It is a knowledge-based procedure that helps integrate land, water, biodiversity, and environmental management (including input and output externalities)to meet life demands while sustaining ecosystem services and livelihoods. It is the use of land to meet changing human needs (agriculture, forestry and conservation) while ensuring the long term socio economics and ecological functions of the land. Sustainable land management combines technologies, policies and activities aimed at integrating socio economic principles with environmental concerns, so as to simultaneously; maintain and enhance production (productivity),reduce the level of production risk and enhance soil capacity to buffer against degradation processes (stability/resilience),protect the potential of natural resources and prevent degradation of soil and water quality(protection), be economically viable (viability),be socially acceptable and assure access to the benefits improved land management(acceptability/equity). The definition and these criteria called pillars of SLM are the basic principles and the foundation on which sustainable land management is being developed. Thus, any evaluation of sustainability has to be based on the following objectives: Productivity, stability/resilience and production. SLM is necessary to meet the requirements of a growing population. Improper land management can lead to land degradation and a significant reduction in the productive and service functions (World Bank 2006).

In lay terms, SLM involves these activities: Preserving and enhancing the productive capabilities of cropland, forestland, and grazing land (such as up land areas, down-slope

areas, flatlands, and bottomlands), Sustaining productive forest areas and potentially commercial and noncommercial forest reserves, maintaining the integrity of watersheds for water supply and hydropower-generation needs and water conservation zones, maintaining the ability of aquifers to serve the needs of farm and other productive activities. In addition, SLM includes actions to stop and reverse degradation—or at least to mitigate the adverse effects of earlier misuse. Such actions are increasingly important in uplands and watersheds—especially those where pressures from the resident populations are severe and where the destructive consequences of upland degradation are being felt in far more densely populated areas downstream (Chambers, 1988; Dumanski, 1998; Hans, 199).

2.4 Integrated Environmental Management

McManus, (in UNESCO, 1993 cited in Pelesikoti, 2003) stressed that integrated environmental management (IEM) must have the following elements: holistic and interactive, address complex resource management issues, coordination and multi sectoral, IEM's main objective is to break down the barriers between the various sectors of the environmental administration and to view the environment in its totality (Barrett, 1994). It goes beyond scientific and technological concerns and addresses the activities of society as a whole. It is the next step in the evolution of environmental policy making. Similarly, Cairns et al. (1991)define IEM as the "coordinated control, direction or influence of all human activities in defined environmental systems to achieve and balance the broad estrange of short-and long-term objectives".

Barrett (1994) listed the following characteristics of IEM Plans as: longer time scale (i.e. 10 to 15 years); goal of integrating the various measures (e.g. for pollution prevention, nature conservation and the creation of environmental amenities); establishment of environmental policy objectives agreed-on by all members of the community (local authorities, the prefectural population and developers); encouragement of voluntary activities, public participation and the promotion of greater environmental awareness; quality information; monitoring is an essential part; flexibility to allow adjustment; and good leadership. Ecosystem-base management (ecosystem management) is another

evolving approach to natural resource management. This integrated systems-based approach has been used to manage a growing number of environmental problems such as fisheries, large marine ecosystems, management of terrestrial habitats land use and water quality problems in various estuaries, river basins, and the Great Lakes. The general common elements that were emphasized by the studies above are institutional challenges associated with the implementing of an ecosystem-based program. Previous research suggests that ecosystem-based management has a strong administration and institutional orientation that emphasizes redefining management units and building on the best ecosystem science to improve resource management (Engelk, 2010; Rees, 1990).

2.5 Participatory Management Approaches

Participatory approaches allow greater community (direct or indirect) involvement in the policy formulation and decision-making processes or the technical aspects of the functions of the central authority. This approach provides for consultation of the stakeholders or for the community to have some form of representation in the decision making process. It promotes a more transparent and accountable management authority on the one hand and creates a more responsive community in terms of implementation of the management programs and objectives, and greater compliance on the other (Barrett, 1994).

Some scholars describe a ladder of participation with eight steps. The first step (at the bottom of the step) is 'manipulation', the second is 'therapy' both aiming at educating the participants. The third step is 'informing', followed by 'consultation', 'placation',' partnership', 'delegated power' and finally 'citizen control' at the top of the ladder. Still scholars describe the steps for participatory management implies an increasing degree of control if the participants were empowered enough. 'Community based' management is a form of participatory management, where the community has the total responsibility of managing the resources. Another form of participatory management is 'cooperative management'. The community willingness to voluntarily co-operate goes beyond the requirement of a formal legal provision or a community rule. 'Co-management' regime is a form of participatory management where the local community shares resource

management responsibilities with an external agency or organization (Pomeroy & Williams, 1994 cited in Pelesikoti, 2003).

2.6 Community Based Management

Management of common resources, or resources held in common by many individuals is where property rights are assigned to the community or a social group rather to private individuals or to the state (Berkes, et al., 1989; Gary, 1991; Rowse, 1993; Fisher, 1995 cited in Pelesikoti, 2003). Communities develop the rules about using the natural resources, and they also develop the social values and norms, many of which are informal and non-contractual, that stress moderation and prudence rather than excessiveness and recklessness (Berkes, et al., 1989 cited in Pelesikoti, 2003). Management of common resources may take place through completely self-regulated systems (community-based) or through 'co-management' arrangements. Self-regulated (self-organizing or self-governing) systems are those where the rules have been devised and modified by the participants themselves, and also are monitored and enforced by them.

A review carried out by Edwards & Rivera (1998 cited in Pelesikoti, 2003) for IUCN of a community-based management of wildlife(two species of lizards) in Cosiguina, Nicaragua, noted the following important institutional structures: the co-operative leadership to the Omar Baca Cooperative was stable; co-management agreements formalize working relationships among the people who are engages in the program (local managers), the government and other partners (i.e. conservation organizations);Government authorizes management and government officers are 'supportive' of the program; and External partners (IUCN, National university) continued their commitment. Self-governance systems, however, have limits and drawbacks. They may be impractical where resources are migratory or overlap jurisdictions. Self-governance may be unacceptable where it excludes people with claims to common use-rights based on historical use or other notions of right (competing claims), for example, the special rights of the local people who depend on the resource, versus the rights of citizens or the public to the use of the resource. Edwards and Rivera (Pelesikoti, 2003)

also identify constraints to sustainable management of the lizards and specifically the problems met with the community-based management in the case study. They concluded that the program was not sustainable but if certain management needs are addressed, the sustainability could be enhanced substantially in the future. Lack of a monitoring program is a main constraint in order to assess the impact of the use[9] on the wild populations and there is a need to adjust their activities based on the monitoring information. Sustainability and maintaining community commitment would been handed if the government formalizes the villagers' rights to manage and harvest the animals from the wild under the authority of the co-operative as: "…only when such access rights are clearly defined will the government have the ability to hold the managers accountable for their actions" (Edwards and Rivera, 1998 cited in Pelesikoti, 2003).

The success of the programand long term sustainability depend on the profit villagers receive from their management of the resources therefore, there is a need for education and awareness programs for marketing both local and external. The regulatory aspects of community-based management regimes, however, have also not been given much attention in the literature. This could be partly due to a belief that communities will regulate themselves. However, threats to conservation do not disappear, either from within or from outside the community, just because land rights, or other community-based measures are introduced (Milner-Gulland& Mace, 1998 cited in Pelesikoti, 2003).

2.7 Cooperative Management

Its main properties are: reliance on the social discourse and on a framework to guide this discourse through the integration of diverse and conflicting individual interests into 'co-operative' collective decisions-ones that can: (1) draw maximum support; and, (2) enhance the stakeholders' willingness to voluntarily cooperate in their implementation by inviting respect for the whole process of their selection and implementation. However, there are circumstances where there are limits to the voluntary proactive response to achieve the 'best practice environmental management'. This is when there is an emphasis of corporations on short-term profitability. Markets, investors and others principally

judged corporations on short-term performance, thus it is difficult to justify investment in environmentally benign technologies (Fisher, 1995).

This is where the role for governmental regulations remains – to nudge firms at the margin towards cleaner production, heightening their awareness of environmental issues, providing them with financial incentives, etc. In cases where corporations simply have little or no self-interest in environmental performance – a very different regulatory emphasis is needed. There are differences in attitudes and preferences towards co-operative management between different countries (ibid).

Cooperative management agreements are a potential solution for management of forest fragmentation. Stevens and Dennis (1999) studied the attitudes and preferences towards co-operative agreements for management of private forestlands in the Northeastern United States. Most landowners believed that their actions affect land elsewhere and were favorably disposed to the idea of working with others in conserving the forest. In New Zealand, however, Hawes and Memon (1998) found out that although owners of indigenous forests agree that co-operative management is a potential solution to the problem of commercial logging and clearance of forest area for other uses, owners were looking for financial incentives from the government in order for farmers to conserve the forest.

2.8 Co-Management

No single property-rights regime is sufficient to guarantee the sustainable use of resources (Fenny et al., 1990 cited in Pelesikoti, 2003). More recently, resource users have been seeking and obtaining formal powers to participate in the decision making process, referred to as co management. Co-management focuses on user group oriented approach as the self governed system, but without neglecting or compromising the state role in resource management. It is a way to develop a dynamic partnership using the capacities and interests of both government agencies and the resource users .In other words, co-management, where power is actually shared, provides an institutional response to the ‘commons’ problem, which essentially is the question of how private

interests can better intermesh with collective interests. In theory co-management will improve both the effectiveness and the equitability of resource management (Pinkerton, 1989 cited in Pelesikoti, 2003).

The co-management process is influenced by both internal and external factors. Internal factors that affect resource use and management are based on beliefs and perceptions, experiences and observation of the local community and the environment. That is, resource management is regulated by socio-political institutions that are an integral part of the cultural traditional practices. These institutions in turn are influenced by such factors as colonial manipulation, science and technology, population changes, urbanization, education and elements of modern economic development argues that the strength of co-management lies in the dynamic character because of its adaptability (Pelesikoti, 2003).

2.9 Concepts of Land

Land is opening to various interpretations. It would be easy to associate it with slightly simplistic limitations, such as restricting it solely to non-water-covered areas outside the city (city *and* land). A complete definition of the land may be the following one (according to already used in the documentation for the Convention to Combat Desertification) (UN, 1994): Land is a delineable area of the earth's terrestrial surface, encompassing all attributes of the biosphere immediately above or below this surface including those of the near-surface climate the soil and terrain forms, the surface hydrology (including shallow lakes, rivers, marshes, and swamps), the near-surface sedimentary layers and associated groundwater reserve, the plant and animal populations, the human settlement pattern and physical results of past and present human activity (terracing, water storage or drainage structures, roads, buildings, etc.). Form the above definition land refers to cropland, range, pasture, forest and woodlands. Land is defined by the UN Convention to Combat Desertification as the terrestrial biologically productive system that comprises soil, vegetation, other biota and the ecological and hydrological processes that operate within the system.

2.10 Land use and land use management system

Land use can be seen as the human modification of natural environment or wilderness into built environment such as settlements, agriculture or pasture. By defining new functions to the land, also in term of changing the functionality of land, the human is transforming his environment consequently. The land structure resulting from this use of land has to be considered as the result and the mirror of his society and his culture, resulting of the action of different actors, mobile (households, companies) and immobile (communities, cities, investors) (Weith, et.al, 2013). .

As management is the human activity meaning the action of people working together in the aim to accomplish desired goals, land use management is a process of managing use and development of land, in which spatial, sector-oriented and temporary aspects of urban policy are coordinated. Resources of land are used for different purposes, which may produce conflicts and competitions, and land use management has to see those purposes in an integrated way. Therefore, land management covers the debate about norms and visions driving the policy-making, sector-based planning both in the strategic and more operative time spans, spatial integration of sectoral issues, decision-making, budgeting, implementation of plans and decisions and the monitoring of results and evaluation of impacts.

The Management System includes all processes, methods and tools used for organizing, operating and supervising the urban environment including the factors influencing it. Management systems cover all phases from the visions behind the preparation of plans and decisions to their implementation and the monitoring of impacts. Planning practices, decision making processes and procedures, implementation and monitoring mechanisms and methods and tools used in the above-mentioned phases are all elements of management systems. In general, land use management is driven by various decisions taken at different levels of administration (local, regional, national) (EU Working Group, 2004).

2.11 Land Tenure system in Ethiopia

Land is a public property in Ethiopia. It is administered by government since 1975 which is the time when radical land reform took place. Still no change has been taken place with the change of government since 1991.Moreover, the constitution of Ethiopia of 1994 provided that "land is a common property of Nations, Nationalities and peoples of Ethiopia and shall not be subject to sale or to other means of transfer". Before 1975 the land tenure system of in Ethiopia, through commonly characterized as feudal, had a combination of the following four different categories ownership relation: the communal ownership, the private ownership; the partly owned the partly rented ownership and; the tenant ownership (Samuel, 2006).

2.12 Sustainable Development in a land use management context

Sustainable development considers three dimensions that age closed later linked and between hade offs age inevitable; environmental Economical and Social. Moreover, these three can hardly be implemented if not supported by institutional and political backing.

The Environmental dimension general deals with maintaining a certain stock of natural resources above a certain quality threshold. A number of criteria to assess this dimension can be put forward. These include biodiversity preservation measured against species richness, abundance, diversity, high number of endemic species; high number of important gene pools; Rate of irreversible resource depletion; degree and reversibility of degradation of renewable resources; use rate of non-renewable resources against the potential use by future generations and/or the orderly transition to renewable energy sources; reduction of adverse global impacts (Admas, 1990).

The economic dimension can be assessed as follows. Steady, continuous stream of income at different levels; individual households, communities countries; increase food availability real income and each; maintenance of productivity in the face of stress or shocks like human health, Natural disasters, economic conjuncture conflicts; real benefits derived from land management; efficiency of investment through cost/benefit analysis; maintenance of a given level of expenditure over time (Samuel, 2006).

Social dimension has been less addressed in the sustainable development discussion; it embraces a wide range of issue that should be considered if sustainable development aims at being socially acceptable. Equitable access to resource; equitable access to information and services; protection of acquired rights; redistribution of wealth derived from land use and management; active participation of all stockholders in policy and law development; governmental and local accountable for resource use and good management; respect for and valuing indigenous knowledge local diversity and rural population livelihood strategies; room for Social and cultural evaluation without abrupt disruption; fulfilling people's cultural and spiritual needs. The institutional dimension is neglected or assumed to be in place. It includes formal and informal institution that affect the use and the transfer of assets to future generative to assure the quality of life in the long run (Tisdell, 1993; Rowse, 1993).

2.13 Factors affecting Sustainable Land Use Management

There are various drivers of change and sources of pressure on land use. These are population growth, increasing income, urbanization, infrastructure development, food price and price elasticity of demand, polices at national and international level, land tenure and property rights, bio-energy and land degradation. These factors categorized as natural and manmade factors. But, it is difficult to differentiate and put as manmade and natural factors. For instance, population growth is a natural phenomenon, but, it motives the people to practice deforestation, and another factors expected to affect land use managements directly and/or indirectly. On the other hand some researchers explained as natural factors, socio-economic and institutional factors as explained here.

2.13.1 Natural factors

Hudson (1981) and Morgan (1986) pointed out that natural factors causing land degradation, high intensity of rainfall and steep scope are the major ones. The impact of raindrops, with tremendous amounts of energy, on bare unprotected soil starts the process of erosion by water. The impact of the raindrop causes a splash, which seals off infiltration as the soil pores get plugged with fine particles. Splash erosion grows into

sheet erosion and then rill erosion. Eventually, the rills form big gullies, which accelerate the erosion process. The impact of the raindrop depends on the level of soil cover; plant cover is often lacking due to problems of deforestation, over-cultivation and over-grazing.

2.13.2 Socio-economic and institutional factors

Socio-economic and institutional factors affect land degradation through their impacts on farmers' decisions with respect to land use and land management practices, such as ploughing, fallow, use of manure and other sources of organic matter, fertiliser use, and adoption of soil and water conservation measures. A non-exhaustive list of factors influencing these decisions includes population pressure, poverty, land tenure relationships, the nature of local markets, local institutions and organisations, and farmers' perceptions and attitudes. Each of these is considered below,

2.13.2.1 Population pressure

The population of the region is increasing at an alarming rate. Population growth can have and has had a deleterious effect on agricultural growth, resource management, and poverty. Land redistribution, which in recent years has been the only means of formally acquiring access to land to accommodate new households, has led to severe fragmentation of plots, a reduction of crop fields and insecurity. Reduction of cropland per capita and insecurity have led to reduction in activities such as fallowing, planting trees and investing in conservation structures, while a reduction in cropland per capita has caused cropping and grazing activities to be shifted to hillsides and ecologically fragile areas. For example, UNECA (1996) found that shortage of farmland was cited by 90% of households interviewed in the Amhara region as the main constraint to fallowing.

Without adequate alternative sources of energy, population growth increases the demand for fuelwood, which in turn leads to the destruction of forests. It also contributes to the use of crop residues and dung for fuel rather than using them as sources of organic fertiliser to improve the already poor soils (UNECA, 1996).

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On the other hand, Population pressure has positive impacts on land improvement and soil management. By increasing the value of land relative to labour, population growth may induce farmers to make labour-intensive investments in land improvement and soil management, such as planting trees, constructing terraces, composting and mulching (Tiffen et al. 1994; Pender 1998).

2.13.2.2 Poverty

Poverty is very likely to contribute to land degradation for many reasons. When people lack access to alternative sources of livelihood, there is a tendency to exert more pressure on the few resources that are available to them. Bekele Shifereaw and Holden (1997) showed the intensified pressure on natural resources as a vicious cycle in which resource degradation and drought lead to reduced household assets, and reduced household assets in turn affect degradation in the Ethiopian highlands. Deforestation and burning of dung and crop residues are increased by people's inability to afford, or lack of alternative fuel sources. Electricity and kerosene are expensive and in most cases not available. Even households with electricity supply avoid using it, except for lighting at night.

2.14 Land Management Practices in Ethiopia

As with population pressure, however, there are also reasons to believe that poor people may be more likely to conserve their land. Although there is no evidence to support this in the region, poor farmers may have more incentive than wealthy ones to manage what they have carefully, since they may 'own' little else than the land they occupy. Furthermore, they may have few alternative investments available to them, so they may give high priority to investing in the land. Finally, the opportunity cost of poor farmers' labour time may be very low at certain times of the year, encouraging them to make labour-intensive investments in land improvement and soil management.

Land degradation is a central challenge to sustainable development. The latter has been defined as development that “meets the needs of the present without compromising the

ability of future generations to meet their own needs" (WCED, 1987). This was accepted as a common goal at the UN Conference on Environment and Development (UNCED) in 1991. At the global scale, key problems threatening natural resources and the sustainability of life support systems are: (1) soil degradation, (2) the availability of water and (3) the loss of biodiversity (WBGU. 1996). These occur in virtually all socio-cultural and economic contexts worldwide.

However, there are great differences in the abilities of countries to cope with the problem of land degradation (Hurni, 1996). For example, North America and the Sahel exhibit diametric differences in their socio-economic dispositions to cope effectively with desertification, although both show similar symptoms of desertification in their dry land areas (WBGU, 1996). Problems of land degradation exist in many parts of the world. The following natural resources may be affected: (1) soils: about one third of the world's agricultural land has been damaged, mostly by soil loss caused by water erosion (Oldeman, 1990) (2) water: problems of quality and quantity, as well as spatial and temporal interdependence (highland-lowland effects) (3) natural vegetation: problems of quality, quantity and biodiversity (4) wildlife: problems of protected areas, wildlife corridors, controlled hunting and poaching.

The perception of these problems, however, varies greatly—between land users and other stakeholders, among these groups, and with time. From an economic perspective, for example, an environmental problem might be assessed in terms of its short-term costs, and the economic viability of technologies at the household or societal level, which may be very different. On the other hand, the social perspective may take account of poverty issues, social differentiation of affected groups, or societal and political effects, but disregard economic considerations. Finally, the ecologic perspective may consider only the effects of land degradation on nature, *i.e.*, wildlife, vegetation and ecologic processes, disregarding both social and economic problems (Oldman, 1990; Rees, 1990).

Natural resources can potentially be used in a sustainable way if appropriate land management technology, regional planning and the policy framework complement one

another in a purposeful way, in accordance with the principles and concepts of sustainable land management (SLM). At the center of this thinking is the concept of "ecosystem balance", and especially the questions of irreversibility of ecologic (and socio-economic) processes, resilience of ecosystems, and the spatial and temporal scales to be considered at the landscape level. It is here that the relevance of geo-information to SLM can be seen (Milich, 1999).

Sustainable land management has been defined as "a system of technologies and/or planning that aims to integrate ecological with socio-economic and political principles in the management of land for agricultural and other purposes to achieve intra- and intergenerational equity" (Dumanski, 1994; Hurni, 1996). SLM is thus composed of the three development components technology, policy and land use planning. While knowledge is generally considered the key factor for achieving better land management, it will not succeed if efforts to create better knowledge are made exclusively here, *i.e,* by using only a scientific approach. It should be noted that actors' strategies are influenced by a multitude of factors, including perceptions, attitudes, and societal frame conditions such as economics, politics and power structures (ProClim, 1997). If geo-information is to assist in improving the sustainable use of natural resources, it must have four major orientations: it must be target-oriented, client-oriented, and process-oriented and transdisciplinary. The same applies to the concept of SLM, in contrast to earlier approaches such as the framework for land evaluation (FAO, 1976), which focused on expertise and used a standardized, fixed methodology.

In Ethiopia, since the 1970s, considerable efforts have been made to reverse the problem of land degradation. What were once considered to be sustainable land management practices such as soil and water conservation, soil fertility management, controlled-grazing and other land management practices were introduced. However, the impact of those efforts did not curb the impact of land degradation in a meaningful and sustainable manner. Various reasons are often given for the lack of success. Among these the most commonly cited factors include practices, high initial costs which are not affordable to poor farmers and also trying to apply uniform techniques in different agroecological

regions (Aklilu, 2006). Traditionally through time, farmers have developed different soil conservation and land management practices of their own. With these practices, farmers have been able to sustain their production for centuries. Even up to now, it has been acknowledged that these technologies, which include ploughing of narrow ditches on sloping fields to control run-off, farmland terraces, traditional ditches and furrows, contour ploughing, fallowing, crop rotation, farmyard manure and agroforestry continue to play a significant role in the production of subsistence agriculture (Betru, 2003).

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

However, efforts made up to the early 2000 were considered inadequate as they covered only 7% of the total land area that needed treatment, and at that rate, it was estimated that treating all the remaining land could take seven decades. Evaluations of efforts made concluded that the interventions were ineffective, insufficient and unsustainable (Woldeamlak, 2003; EEA/EEPRI, 2002).

Topography is another factor contributing to degradation. The region is characterised by flat to gently sloping plateaus above deeply incised and dissected valleys, connected by steep and long slopes up to 0.5 km in length. It is on these steep long slopes below the escarpments that gullies originate and extend down to the plain fields. Generally, convex slopes are more susceptible to sheet and splash erosion than concave slopes (NEC, 1997).

It is becoming increasingly clear especially in the case of Ethiopia that land management practices are a complex issue requiring further investigations as they are influenced by different factors operating at different scales. These factors include government policies, programs, and institutions at many levels. Infrastructure development, agricultural extension, conservation technical assistance programs, land tenure policies, and rural credit and savings programs affect awareness, opportunities, and constraints at the village or household level which may further influence land management (Pender, Ehui 79 & Place, 2006). There are also household-level factors such as households' endowments of physical assets, human capital, social capital, financial capital and natural capital that could determine households' land management practices (ibid).

Recent empirical studies on sustainable land management practices further highlight this complexity. A study conducted in Beressa watershed of Ethiopian Highlands by Aklilu Amsalu (2006) identified factors that could influence adoption of different sustainable conservation techniques. This study was done using quantitative and qualitative research methodology and identified farmers' age, farm size, perceptions on technology profitability, slope, livestock size and soil fertility to have an influence in the adoption of stone terraces. It further indicated the decision to continue using the practice was influenced by actual technology profitability, slope, soil fertility, family size, farm size and participation in off-farm work. Factors such as perception of erosion problem, land tenure security and extension contacts were identified to have no significant influence.

Another study by Habtamu (2006) focused on the adoption of physical soil and water conservation structures in Anna watershed of Hadiya Zone. He also used qualitative and quantitative methodology to identify factors that affect adoption of the introduced soil and water conservation measures to cultivated fields. This study identified perceptions about soil erosion problem, farmers' attitude to try new technology, participation on conservation training, plan of a farmer to continue in farming career in the following five years and farmers' perception about effectiveness of the technology in arresting soil erosion to have significant positive influence on farmers' decision to retain conservation

structures. Farmers' contact with development agents, educational attainment of the household head and land tenure security were identified to have weak and positive influence on the farmers' decision to retain the introduced structures. Age of the household head and land holding size were identified to have significant negative influence, whereas variables such as livestock holding, off-farm employment and distance from farm plots were identified to have weak negative influence.

CHAPTER THREE

3. RESEARCH METHODS AND METHODOLOGY

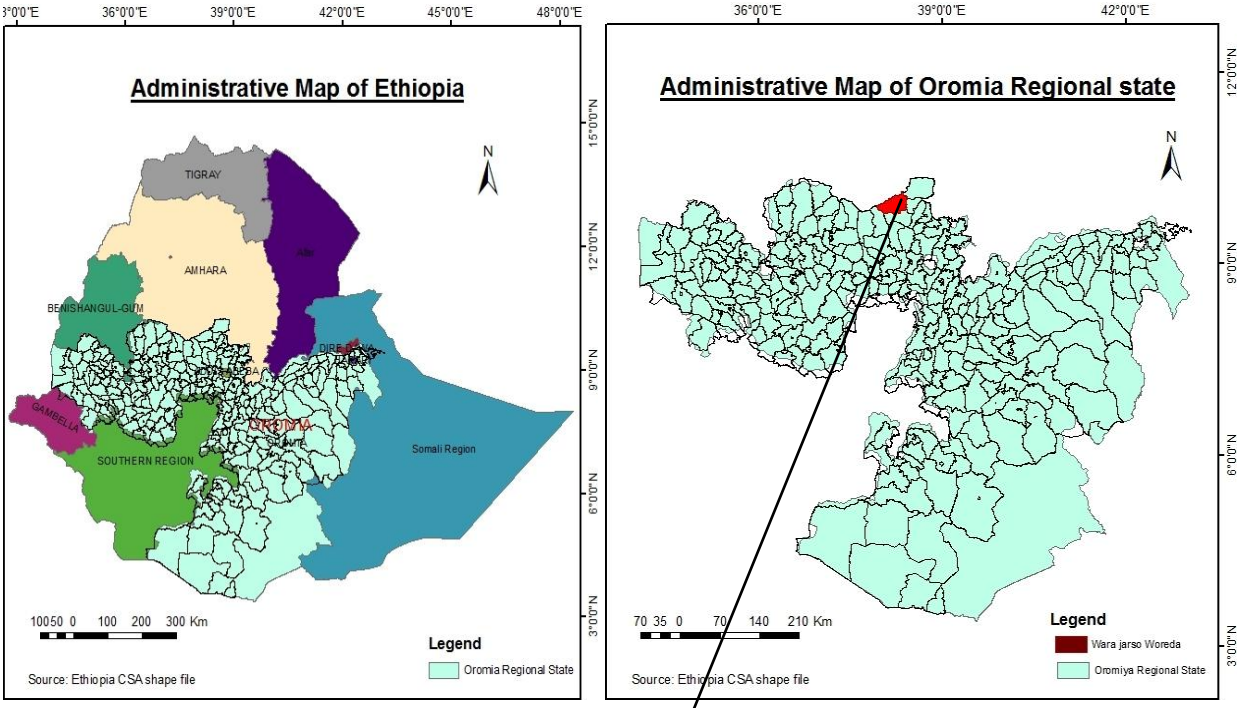
Research methodology helps to understand not only the products of scientific inquiry but the process itself. It describes and analyzes methods, throw light on their limitations and resources, and clarify their presuppositions and consequences, relating their potentialities to the twilight zone at the 'frontiers of knowledge. In addition to that, it enables to evaluate and use results of earlier research with reasonable confidence and take rational decisions. Also a right methodology process acts as the nerve center because the entire research is bounded by it (http://www.slideshare.net/mssridhar/introduction-to-research-methodology-presentation.acceesed on June, 2015)

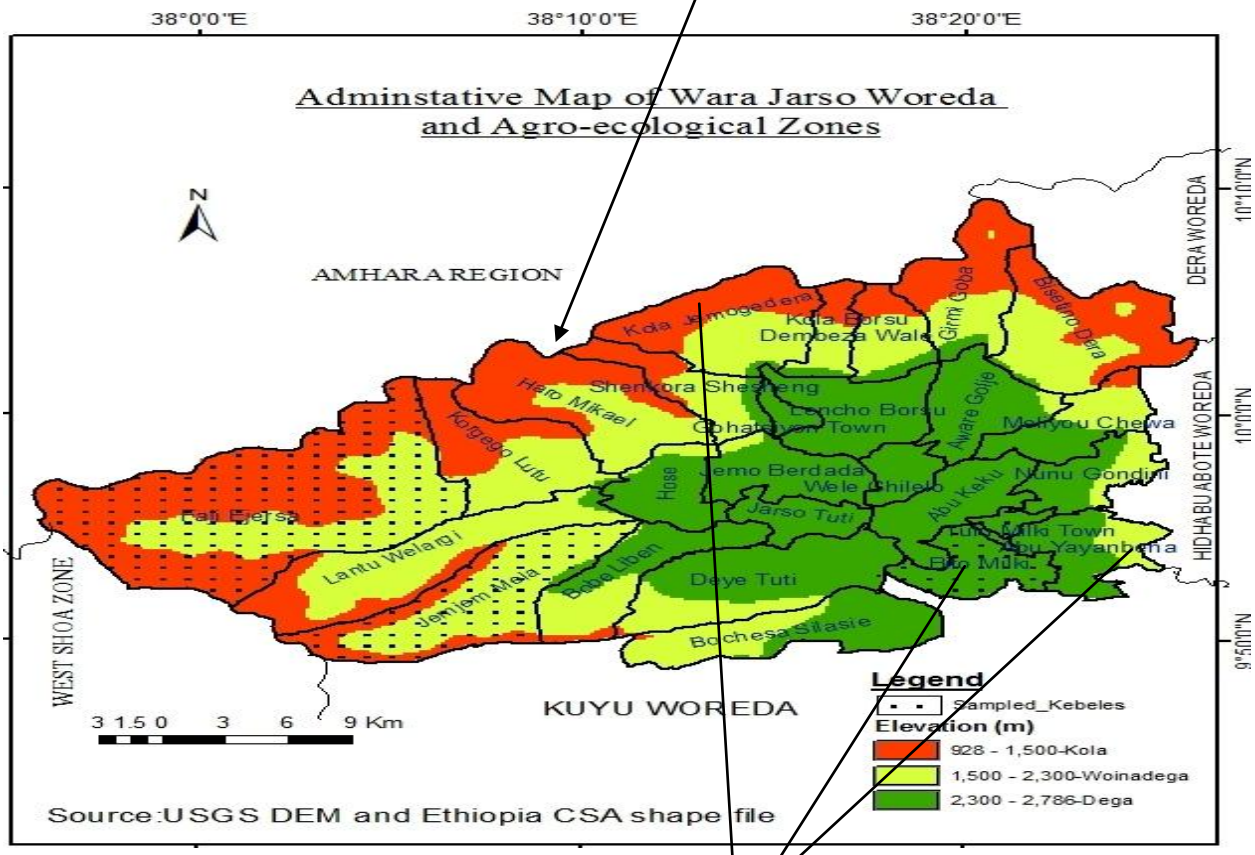
3.1 Study area: Warra Jarso Woreda

3.1.1 Location and Description

The study carried out in Warra Jarso Woreda, which is found in the North Shoa zone of Oromia Regional State. Geographically, Warra Jarso Woreda is located between $9^0 47^{'}$ to $10^0 11^{'}$ North Latitude and $38^0 27^0$ to $38^0 43^{'}$ East Longitude. It is bounded by East Gojjam Zone in the North, Kuyu and Hidebu Aboute Woredas in the south and Southeast, Dera Woreda in the East and West Shoa zone in the West. The woreda's total surface area is about 135,000km^2 with varied topographic features, rugged and undulating areas representing about 70%and flat plains 30%. Agro-Ecologically, the Woreda is subdivided in to Kola (49.5%), Woina Dega (43.4%) and Dega (7.3%) (Warra Jarso woreda Agricultural and development Office, 2014). The Wereda found at 185kms away from Addis Ababa (in the North West direction) on the main road Addis Ababa to Gondar and 73 kms away to Northwest from the zonal capital, Fitche.

Figure 3.1 Administrative Map and agro-ecological division of Wara Jarso woreda





Study Kebeles

3.1.2 Population

According to CSA, (2008) census report a total population of this woreda was 148,771, of which 74,490 (50.07%) were males and 74,281 (49.03%) were females. Urban dwellers are 13,003 or 8.7% of its population, which is less than the Zone average of 9.5%. With an area of 1,198.35 km2, Warra Jarso has an estimated population density of 126.1 people per square kilometer, which is less than the Zone average of 143/km^2 and the average household size for the Woreda was 4.9.

3.1.3 Topography and Climate

The topography is slightly undulating in the middle and low land areas. Uplands consist of extensively settled at the tops with steep sides that forms hills, georges, escarpment, steep to gentle slopes, etc which is part of vast Shoan plateau. Altitude wise, woreda lies between 928 and 2786 meters above mean sea level, representing three (3) agro climatic zones based on traditional classification as Dega (>2300m), Woinadega (1500-2300m) and Kola (below 1500). The average monthly temperature varies from 12^0 C in July and 28^0C in May, with the climatological average of 19.8^0C. Mean annual rainfall ranges from 849.7 to 1416mm, with the climatological annual average of 1148.2 mm (Warra Jarso woreda Agricultural and development Office, 2014).

3.1.4 Land use and Agriculture

Warra Jarso Woreda is known for mixed farming i.e. crop production, predominantly food crops: barley, wheat, horse bean, field peas, potatoes, flax, niger seed, and livestock rearing. The highland is moderately productive; Teff, barley and pulses are dominant crops grown in this area. Income is earned from sales of crops, livestock, fodder, and eucalyptus trees. Woinadega is moderately populated; Main crops grown in this agro-ecological zone are teff, pulses, wheat & oil seeds (Niger, sesame & flax). Households also keep livestock (cattle & shoats). Mixed farming is also practiced in Kola zone. Main crops are sorghum, teff and maize and Livestock is composed of cattle and goats. For poorer households significant part of their income is from farming, local labor and firewood collection/sales, which they use it for purchasing part of their staple food

requirements. Crop rotation, fallowing, application of dung, compost, crop residues and fertilizers are methods of maintaining soil fertility in Wara Jarso Woreda /district/.

According to agricultural and rural land development bureau report of 2013/14 on land use distribution in the woreda, out of 1198.35km^2 total land area of the woreda farm land which comprises 31% of all land use types is the largest of all land use type followed by arable land under fallow accounts for 20.5% percent of total area of the woreda. Grazing land 17.1%, forest land 10.4%, bush and shrubs 9.8%, bare land unsuitable for cultivation 6.2% and the remaining 5% belongs to other land uses like settlement, road, water body, etc. Sometimes some of land uses overlap each other. Example, grasses under forest and bushes are used as grazing land also herbs found on fallow land also used for grazing (Warra Jarso woreda Agricultural and development Office, 2014).

3.2 Research Design

According to Dawson (2002), Research design is the conceptual structure within which research would be conducted. Qualitative and quantitative research methods were employed in this study. The research design, sampling procedures, method of data collection and their source are discussed below.

3.3 Sample population and Sampling Techniques

The population for the study was all population within Warra Jarso Woreda. The woreda has 29 Kebeles the researcher took 3 kebeles (namely; Bito Milki, Abo Yayabana and Kola Jamo Gadara) purposely by considering the agro-ecological conditions. One kebele from kola (low latitude) and one kebele from dega (high altitude) and one kebele from woina Dega. For this study probability sampling techniques, which is simple random sampling techniques, was applied. Moreover, the researcher took 25 % of the total population of the three kebeles. To select the respondents used, K=N/n where K is the skip number in the alphabetically arranged of total population, N is the total population and n is the sample size. Accordingly, the total population is 592 and the sample size is 25% of total population, i.e.592*25%=148. If the first respondent is registered at roll number 1 in the list the next respondent will be roll number registered at 5 in the list

(1+4=5) then the third would be 5+4= 9 and so on. Moreover, agricultural office expert and other officer were involved in the study. Respondents were picked using random sampling form the community to save time and increase representativeness of the study. Lastly, a total of number of respondents was included as a sample population for primary data source. Accordingly, sample of respondents was explained in Table 3.1.

Table 3.1: Sample Size Distribution

Agricultural Zone	**Sample Kebele**	**Total Household**	**Sample Household (25%)**
Kolla	Kola Jamo Gadara	224	56
Woina dega	Abo Yayabanana	180	45
Dega	Bito Milki	188	47
Total		592	148

Source: Combiled from Warra Jarso Agriclture Office, 2015

3.3.1 Data Collection tools

Data for study were collected from primary and secondary sources. Primary data was obtained through questionnaire, interview, focus groups discussion and observation. Secondary data collected from various publications, document analysis from relevant zonal and woreda offices.

The research data was collected from selected Kebeles of Wara Jarso Woreda. Different methods of data collection like structured questionnaire; interviews and discussions with the communities, and personal observations were employed to produce primary data. Moreover, secondary data was collected from documents, books, journals, and, others sources from sectoral offices, and concerned bureaus.

3.3.1.1 Questionnaire

Questionnaire containing both open-ended and closed-ended questions was prepared and distributed to the rural households to collect the information on the factors affecting

sustainable land use management. The questionnaire distributed to farmers was enabled the researcher to generate both qualitative and quantitative data, which was generate inputs for analytical operations to arrive at certain results, so as to postulate on problems and their probable but applicable solutions.

3.3.1.2 Interview

Interview involves a series of open ended questions related to problems researcher wants to study. The open-ended natures of the questions define the topics under investigation and provide opportunities to both interviewer and interviewee to discuss some topics in more detail. If the interviewee has difficulty in answering a question or provides only a brief response, the interviewer can use clue or can prompt them to encourage the interviewee to consider the question further. In a semi structured interview the interviewer also has the freedom to probe the interviewee to elaborate on the original response or to follow a line of inquiry introduced by the interviewees.

To document the factors affecting sustainable behavior related to land resources, livestock in context of sustainable land management, public and government policy, knowledge practiced, farm management practiced, and etc. population growth, infrastructure development, income level, the role of government department, Non-governmental organization, friends and family members were collected.

3.3.1.3 Focus group discussions

Sometimes it is preferable to collect information from groups of people rather than from a series of individuals. To obtain in-depth information on concepts, perceptions, and ideas of the groups; the researcher organize group of 6-8 households of various experience with careful supervision to keep them on track of what is needed to be studied. It aims to be more than a question-answer interaction. Discussions were held with local development agents, kebele managers, and prominent kebele residents' general issue of current practices in managing sustainable land management, and major factors affecting sustainable land use management in the study area. Based on this, the researcher got qualitative information on factors affecting sustaianle land use managment in the study

area. People who have been residing in the study area for many years were selected for this purpose.

3.3.1.4 Observations

Observations can also serve as a technique for verifying information provided in face to face encounters. Observations of the environment can provide valuable background information about the environment where this research project is being undertaken. The researcher observed the current land management practices carried out by farmers or by woreda natural resource administrators in order to mitigate damages due to; flood, landslides, heavy storm and etc.

3.4 Method of Data Analysis

Descriptive statistics based on percentages, frequencies and graphs and others were used to analyze findings. Data collected form research participant and environmental and land expert members using structured questionnaire, interviews, observation and discussions were organized and used to examine the problem under study.

CHAPTER FOUR

4. FACTORS AFFECTING SUSTAINABLE LAND MANAGEMENT

This chapter presents the results of both quantitative and qualitative analysis of data in line with the specific objectives of the study. The chapter consists of the background information's of respondents which are related to the assess land use situation and explore factors affected sustainable land use management such as; demographic, socioeconomic characteristics of households and others analysis. The produces of this reaearch distributed for 148 respondents from three kebels of Warra Jarso woreda. The result obtained described as follows.

4.1 Background information of Respondents

The information provided here were from Warra Jarso woreda households, experts and researcher observation. The collected information is believed that the respondents are the permanent resident of the woreda and they were considered to be relevant as main sources of data for the study.

Table 4.1 Distribution of sampled households heads within agro-ecology

Agro-ecological zones	Kebeles	Frequency of respondents				Total number of respondents
		Male		Females		
		No	% of class	No	% of class	
Dega	Bito Milki	38	82.9	9	17.1	47 (31.7%)
Woinadaga	Abo Yayabanana	40	88.8	5	11.2	45 (30.5%)
Kola	Kola Jamo Gadara	47	83.9	9	16.1	56 (37.8%)
		125		23		148 (100%)

Source: Compiled from field survey, 2015

As shown in table 4.1, the numbers of male respondents were almost the same. Likewise, the numbers of female respondents are small. This is due to the fact that the numbers of female head of households were small in the area.

To understand factors affecting sustainable land use aspect the researcher conducted focus group discussion in “Bito Milki” kebele including male and female members together. According to the result of discussion, gender discrimination, challenges of opportunities of land certification, methods used to manage land use in sustainable manner, and other issues. Men have quite better information than female on every aspects rose in the discussion. Therefore men have high probability to receive important information than women.

4.2 Demographic characteretics

The demographic feutures of the respondents plays its important roles in posetively and/or negatively affecting the sustainable land use management elsewhere. In line with this, the researcher focused to use demographic variables such as age, marital status, and sex. These variables are descussed below;

4.2.1 Age of the Respondents

Age of the respondent is one of the very important variables in affecting sustainable land use management under man made factors. The summery of age of respondents presented as follows;

Table 4.2: Age distribution of the respondent

Age	Number of respondent	Percent
18-25	19	12.8
25-30	22	14.9
35-40	42	28.4
40-45	37	25
45-50	28	18.9
50+	-	-
Total	148	100

Source: Compiled from field survey, 2015

Table 4.2 shows that about 37 (25%) of the respondents were in the age group of 40-45 years, 28 (19%) respondents were in the age of 45-50, 42 (28.4%) of respondents were in the age group of 35-40 years, 22 (14.9%) of respondents were in the age group of 25-30 years 19 (12.8%) of respondents were in the age group of 18-25 years. From this one can conclude that the majority of the respondents were in the age group of 35-40 years.

4.2.2 Sex of the Respondents

Being male or female has its own implication in affecting land use management of the given area. And hence, knowing the number of females and/or males for the given study is crucial. Accordingly, the sexes of respondent in Warra Jarso woreda were depicted in the following Table 4.3.

Table 4.3: Sex of the respondents

Sex	Number of respondent	Percent
Male	125	84.5
Female	23	15.5
Total	148	100

Source: Compiled from field survey, 2015

Table: 4.3 shows that about 68% were male respondents, while about 15.5% were female respondents. Thus, from the above information the majority of respondents were male respondents.

4.2.3 Household Size of Respondents

Table 4.4: Household distribution size distribution of the respondents

Household size	Frequency	%
1-3	11	7.5
4-5	133	89.8
6+	4	2.7
Total	148	100.00

Source: Compiled from field survey, 2015

Table 4.4 shows that only about 8% have household size of less than three. About 90% of the respondents have a household size of 4-5 household members. Thus, the majority of the respondents have 4-5 household family members and only 4 respondents (2.7%) have 6 and more than 6 (six) household size. On average the study area almost equal with national average of rural household size which is 4.9 as of CSA, (2008) census report. The household size indicates the level of crowding, and thus coping capacity in a community. Household size may also be related to the socio-economic status, which determines the status of rural land use and management. The larger the household size, greater are the chance of deforesting land and/or degrading farm land. On the other hand, larger households represent critical social networks and manpower, which may be valuable in emergency situations (Cutter et al., 2003). Large household size may mean availability good number of agricultural laborer.

4.3 Socio-Economic Characteristics

4.3.1 Educational Status

Table 4.5: The percentage Distribution of Literacy status *of the Family Members of respondents

Villages	Illiterate			Grades 1-4		Grades 5-8		Grades 9-12	
	M	F	T	M	F	M	F	M	F
Bito Milki	55.4	60.6	58	31.9	28.3	8.1	7.5	4.6	3.6
Abo Yayabana	57.1	68.7	62.9	33.2	28.9	7.3	3.4	2.4	0
Kola Jamo Gadara	51.9	71.7	61.8	37.2	25.6	8.2	2.7	2.7	0
Total	54.8	67	60.9	34.1	27.6				

Source: compiled from field survey, 2015

Note: *Seven year is a minimum age for education according to Ethiopian Ministry of Education

Educational level of the society affect household decision which determine the welfare of the society such as income, health, and their attitude towards using land use management. It may also enable the household to have broad vision of the surrounding environment.

Regarding to the educational status of the sample households, the survey data collected shown that more than half percentage of the population are illiterate. They cannot read and write. The minimum literacy percentage depicted in Kola Jamo Gadara kebele by 51.9% (for male) while the female's illiteracy recorded as high (71.7%). Ecologically this kebele is Kola. The share of the percentage in primary school first cycle and second cycle was relatively low (i.e., 25.6 and 2.7 %, respectively). In this kebele no high school attended respondents were reported. On contrary, in Abo Yayabana kebele, high male illiterate (57.1%) respondents were reported relatively female illiteracy also high (68.7%). Similarly, the primary school first cycle (Grade 1-4) was high in both sexes. As depicted in the table 4, Bito Milki respondents have high educational status.

The percentage of female population educated at high school level in the Bito Milki population (> 7 years old) was 3.6 percent. The comparable figure for male is with the range of 2.4 to 4.6 percent (see Table 4.5).

Education status of the respondents directly or indirectly influences the conditions of sustainable land use management in the study area. According to data gathered from house hold respondents, some of them do not know the role of land use managements towards the environment.

The education level indicates resistance to a hazardous incident as better knowledge on the origin of events and about the methods to cope with them to reduce risk. Education level also has strong relation to the socio-economic status (Cutter *et al.* 2009). Generally, the low educational backgrounds are found to hinder households from access to different services like extension service.

Belay (1995), environmental degradation is the result of several interactive factors. However, the prevailing rapid population growth rate has been exerting the most serious stress on land in Ethiopia. Along with this rapid increase in human population, the number of farm animals is also increasing. This has created a severe burden on lands in Ethiopia particularly in the highlands where 80 percent of the human population lives. As a result of the scarcity of land in the highlands, the peasants have been forced to cultivate marginal areas (areas of very steep slopes, shallow soils, etc). This situation has aggravated soil erosion and deforestation in these areas (Goyder, 1988).

4.3.2 Livestock ownership

Table 4.6: livestock ownership

No. of live stock	Frequency	%
1-10	143	96.6
10+	5	3.4
Total	148	100.00

Source: Compiled from field survey, 2015

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

Livestock plays a critical role for supporting communities involved in the mixed crop-livestock production system through a range of products and services. Respondents were asked about number of cattle, small ruminants and pack animals owned this year (currently). The above Table 4.6 illustrates that 143 (96.6%) of the respondents do have 1-10 number of livestock.

Livestock in general, is an integral part of the farming systems and they are particularly important for increasing the resilience of vulnerable poor people subjected to climatic and income shocks. This is possible through spreading risk and increasing assets. The loss of livestock, especially ox (bullock) is critical as it not only ruins the asset base, but also deprives the general productive capacity of the households.

Thus, the ownership of livestock is often used as an indicator for wealth and food security. Oxen used for plowing and threshing, cow are for milk, beef and hides. Donkeys are widely used as transport animals and for petty trade, horses used for riding. Poultry are widely kept and used for egg production and home consumption. Goats and sheep kept for sell to secure cash and for consumption. Manure is used as fuel and fertilizer.

The focus group discussion made in study area revealed that, those have no livestock's were highly depend on forest and forest products as their source of income. This in turn leads them to destruct the forest which was the causes for land degradation and soil erosion. And, this affects the sustainability of land use management.

4.3.3 Land holding size

Table 4.7: Land holding size

Land holding size	Frequency	percent
0.25-1.25 ha	1	0.7
1.5-2.5 ha	56	37.8
2.75^{+} ha	91	61.5
Total	148	100

Source: Compiled from field survey, 2015

Farmers with larger farm sizes are expected to practice better land management practices. This is because when farmers have larger farm sizes, they can plan different management practices due to the large land holding size. As summarized in Table 4.7, about 37.8 percent owned holdings ranging from 1.5 to 2.5 ha, while 61.5 percent of the households owned 2.75^{+} and above hectares land holding size.

Surprisingly enough, only one farmer reported to have owned less than 1.25 hectares of land. Under current production technology, as justified by different researchers, this holding size is too small to produce adequate grain for a household in the country as a whole. Provided that the present rapid population growth continues unabated, the scarcity of farmlands will be more severe in the future and the corresponding grain production per household will undoubtedly be affected.

4.3.4 Land ownership feeling and Certification

Table 4.8: The feeling of land ownership being public and government

What is your feeling of the land you hold and use public and government property?	Frequency	Percent
I am not comfortable	22	14.9
I am comfortable	110	74.3
I feel severed	13	8.8
I didn't feel secured	3	2.0
Total	148	100

Source: Compiled from survey, 2015

It is boring that when new things or changes came resistance is avoidable like this; the frames were resisting the process of land certification, because the framers do not show willingness to register all the land they hold. In contrary to this, land codification is legal document that allow farmers not to suspect the land owner ship.

To implement sustainable land use management first of all, there must creation of a sense of ownership. If the sense of ownership is created the land owners give proper protection and management to the land. This all may bring sustainable land use management. Because of clear cut land ownership system, this is creating a sort of suspecting not to manage the land properly. Absence of applicability of scientific solution in sedation to the land physical situation and the nature of the land scope leads to difficult.

Show that 110(74.3%) of respondents responded that as they have comfortable feeling of landholding and use as it is public and government property. The interview made with Woreda Agriculture and Rural Development office head revealed that, the land holding system being public and government is a right and proper idea. Because the land holding system being in the hand of the farmer creates severity of ownership in similar fashion, the land holding system is government creates a chance of legal protection and not allows the farmer to sell.

Only 22(14.9%) of respondents responded that as they feel discomfort towards the landholding system being government and public property. 13(8.8%) of respondents responded that as they feel secured the land holding system being government and public owned. From the above information obtained from the respondents majority of them indicated that as they are comfortable with land holding system being owned by government and is public property.

4.4 Major factors affecting sustainable land use management

Table 4.9: The major factors affecting sustainable land use management

Major factors affecting sustainable land use management	Frequency	Percent
Population growth	123	83.11
Income level	2	1.4
Urbanization	91	61.49
Infrastructure development	57	38.5
Policies at national and international level	16	10.8
Land tenure and property right	50	33.8

Source: Compiled from field survey, 2015

Sustainable land use management can be affected by natural and manmade factors. For instance, population growth is natural. The population growth in turn is a driving cause of deforestation which in turn causes land degradation, soil erosion, and loss of biodiversity. Thus, there is no single variable affects sustainable land use management. Some major factors selected as mainly cause's sustainable land use management are indicated in the above (Table 4.9).

Without adequate alternative sources of energy, population growth increases the demand for fuelwood, which in turn leads to the destruction of forests. As population increases the demand for income also increases. To increase income, peoples use different

strategies. Out of these, firewood collection, charcoal extracting are some of them. Therefore, unless alternative energy sources are exploited and become available, the rate of depletion of forest resources will continue with increase in population and consequent demand for energy increases.

During his observation, the researcher took the pictures depicted on fig 4.1 when firewood collected and charcoal extracted by the community.

Source: Picture taken by the Researcher, 2015

Fig 4.1: Firewood collection and Charcoal Making

91(61.49%) of respondents said that urbanization is the major factors which is affecting sustainable land use management. 16(10.8%) respondents showed that policies at national and international level are the major factor which affects sustainable land use management.

The ability to transfer land can also provide incentive to invest in land management, as greater transferability increases the farmer's interest to appropriate the value of his or her investments. Land sales and leasing also allow land to be used by farmers who are able to earn the highest return from it, through mobility of scarce factors of production such as draft animals, farm implements, labour and management ability (Pender and Kerr 1999). The data collected from household survey revealed that Land tenure and property right about 39% positively affects sustainable land management of the study area.

Thus, population growth, infrastructure development, urbanization and policies at national and international level are the top factors that affect sustainable land use management.

Gypsum production is very potential area in Wara Jarso Woreda. The focus group discussion participants discussed that, for Gypsum production both from the government and community no body pay an attention in its negative impacts on land use management. The observation of the researcher in all study area also revealed that due to this production land was mistreated.

Source: Taken by researcher in Kola Jamo Gadara Kebele, 2015

Fig 4.2 Gypsum Production

4.5 Current practice of sustainable land use management

4.5.1 Behavioral change/Awareness creation

Currently there are different activities undertaken by the government, non government offices and other sectors on awareness creation, and practically performing land management activities. Table 4.10 shows about parts/institutions that influence change in behavior relating to land resources.

Table 4.10: Parts/institutions that influence changes in behavioral change relating to land resources

Parts/institutions	Frequency/number of respondents	Percentage *
Government department	121	87.76
Village committee	9	6.1
NGO's, environmental groups	113	76.35
The media and media personalities	14	9.5
School teachers and church leaders	28	18.9
Prominent public figures	19	22.8
Friends, neighbors	57	38.51
Family members (grandparents, parents and children	50	33.8
Others,_____	-	-

Source: Compiled from survey, 2015

Note: * Percentage does not add up to 100 because of multiple responses.

Table 4.10 shows that 50(33.8%) of respondents have said that members of household have great contribution in bringing behavioral change related to land use and management. About 28 (19%) of the respondents reported that school teachers and church leaders would have great contribution in brining behavioral change the conditions which are related to land use and management. 121(87.76%) of the respondents responded that government department would have greater contribution and influence on brining behavioral change related to land resources. 14(9.5%) of the respondents showed that the media and media personalities do have great contribution influencing or bringing behavioral change related to land resources.

About 19(13%) of respondents showed that the prominent public figures do have great contribution to influence in brining behavioral changes relating to land resource management. 9(6.1%) respondents showed that village committee would have great contribution to influence and bring change of behavior conditions related to land use

management. 113(76.35) respondents illustrated that the NGO's, environmental groups do have contribution in brining behavioral change related to the land resources.

The survey data collected indicate that, only two percent of friends and neighbors can bring behavioral changes on land use management. And thus, from the above information one can conclude that the household members (grandparents, parents and children) have great contribution to influence and bring behavioral changes related to land resource management.

4.5.2 Agricultural input used

Table 4.11: kinds of agricultural practice and input used on farm plot

Kinds of agricultural practice and input used on farm plot	Frequency	Percentage
Fertilizer (organic or chemical)	93	62.9
Improved seeds	32	21.6
Pesticides and insecticide	23	15.5
Total	148	100

Source: Compiled from field survey, 2015

The above Table (4.11) showed that, 93(62.9%) of the respondents responded that usage fertilizer (organic or chemical) agricultural practice and input used on the farm plot and use the land in sustainable manner. About 22% of the respondents responded that improved seeds usage one of the agricultural practice and input use on the farm plot to use the land resource suitably. 23(15.5%) of the respondents indicated that pesticides and insecticides are agricultural practice and input use on the farm land to sustainable land use management. Form the above malformation one may conclude that fertilizers (organic /chemical) are agricultural practice and input that are sued on the farm plot for sustainable use of land resources.

4.5.3 Farm management system practiced

Table 4.12: Types of farm management system practiced

Types of farm management systems	Frequency	Regent
Fallowing	12	8.1
Shed cropping	17	11.5
Inter cropping	8	5.4
Mixed farming	16	10.8
Crop rotation	91	61.5
Strip cultivation	4	2.7
Total	148	100.00

Source: Compiled from field survey, 2015

Farm management practices are the very important indicators in influencing in sustainable land management system of the country. Accordingly, the data collected from household respondents revealed that, of total respondents 91 (61.5%) replied as they practicing crop rotation. From the traditional experiences farmers are very knowledgeable enough in crop rotation. The key informant from Woreda Agriculture and development office explained that no farmer need advice in crop rotation practices as they doing to increase the productivity by changing farm plot. The survey indicates that shed cropping, mixed farming and fallowing systems are the other most important practices to keep the sustainability of the land resources. As depicted in the table 12, strip cultivation is the least systems employed to sustain land resources.

4.5.4 Farmers' land use and management practices

Table 4.13: Methods applied to protect soil erosion

Land Management Practices	Frequency	Percentage
Terracing	100	67.6
Small dam construction	13	8.8
Check dam	35	23.6
Total	148	100

Source: Compiled from field survey, 2015

As shown in Table (4.13), of total respondents (148), 100(67.6%) of the respondents responded that terracing was the method applied (practiced) to protect soil erosion of form plot. 35(23.6%) of respondents responded that check dam was the method applied (practiced) to protect soil erosion of type plot. 13(8.8%) of respondents are reported that small dam construction was the method applied or practiced to protect soil erosion of farm plot.

Focus group discussions further reiterated that the low level of crop residue application is not due to lack of knowledge of its importance, but that it is now a primary source of livestock feed with the increasing scarcity of grazing land. It was further revealed that manure is now gradually becoming more used as a source of fuel than for use in fields due to shortage of firewood.

Key informants and focus group discussions revealed that more than half of the farmers are cultivating erosion prone areas. It was revealed that there are some sloppy areas that shouldn't be under cultivation due to their nature, but are now coming under cultivation due to population pressure. This is a major challenge that seems to exacerbate land degradation.

The level of land degradation in the study area is high. Rills and gullies are commonly observed on farm and grazing lands. Focus group discussions further highlighted that they are aware of the problems of land degradation in their respective *kebeles*. They noted that some parts of land have gone out of use due mainly to soil erosion.

Asked what measures can be instituted to alleviate the problem of land degradation most of the key informants and focus group discussants suggested stronger commitment by concerned government bodies to deal with the issue. Such efforts should include budgetary provisions for land degradation awareness campaigns, construction of physical conservation structures such as construction of check-dams, terraces and ditches, cut-off drains and contour ridges, aspects that are currently undertaken as 'token' measures.

Form the above information, one may conclude that the majority of the respondents illustrated that terracing was the method applied (practiced) to protect soil erosion of farm plot.

The key informant interview made with Agricultural development office stated described as follows;

> *"The traditional terrace was built over generations based on the farmers' perception of the problems, as well as their knowledge, skills, energy, and survival strategies. The main purpose of the traditional terraces is to keep the soil from erosion by water and to reduce the negative effects of surface runoff"*

From the researcher observation, cultural terracing was made by the community as depicted in the Fig. (4.2).

Fig 4.3: Terracing by the Community

Source: Taken by the researcher, 2015

Fig 4.4 Modern stone bund soil conservation methods

Source: Taken by the researcher, 2015

4.5.5 Access to credit, agricultural services, and road

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

Table 4.14: Access to credit, agricultural services, and road management

Do you have access to credit, agricultural extension services market that enables you to bring sustainable land use management?	Frequency	Percent
Yes	25	16.8
No	115	77.8
I don't know	8	5.4
Total	148	100

Source: Compiled from field survey, 2015

Table 14, shows that 115(77.8%) of the respondents illustrated that as they have no access to credit, agricultural extremism services, market that enable them to bring sustainable land use management 25(16.8) respondents responded that as they have access to credit, agricultural extension services magnet that enable them to bring sustainable land use management. Therefore, the majority of respondents showed that as they have no access to credit, agricultural extension services that enable to bring sustainable land use management. From all respondents, some (5.4%) of them don't know the issue of having access to credit, agricultural extension services market that enables to bring sustainable land use management.

4.5.6 Government policies, strategies and programmes

Policies, strategies and programmes of government play a critical role in affecting farmers' decisions with respect to land management. They influence most of the factors discussed above in crucial ways, as well as having other direct effects on land management. The researcher considers now the past and current policy strategies as they have been implemented in Oromia, and their possible impacts on land management. First, we consider the broad development strategy, and then specific policies and programmes implemented within those strategies relating to agricultural research, extension, inputs, credit, irrigation, marketing, infrastructure and farmers' organisations. In addition, the researcher takes a look at non-governmental Organisation (NGO) involvement in the region.

4.5.6.1 Agricultural development policies and strategies

In an effort to bring about economic growth and development, various agricultural sector development strategies have been undertaken by the government of the day. The strategies have evolved from Comprehensive Package Programmes (CPPs) of the mid 1960s and early 1970s and Minimum Package Programmes (MPPs) of the late 1970s and early 1980s to the Peasant Agricultural Development Programmes (PADEPs) of the late 1980s and early 1990s.

The present federal government has developed the Agricultural Development Led Industrialization (ADLI) strategy to improve the productivity of the agricultural sector, with the primary objective of transforming the economy in such a way that the relative contributions of agriculture, industry and services to economic growth would change significantly in favour of the latter two over time. With more than 85% of the population employed in farming and living in rural areas, there is debate on whether agricultural development will trigger urban and industrial development or, contrarily, urbanization will trigger agricultural development.

The agricultural development policies and strategies for the Oromia Region are based on the national strategy to follow a conservation-based and agricultural development led industrialization in such a way that accounts for the region's resources and constraints. The major objectives of the five-year development plan, set up in 1996, include:

- Development of the economic and social sectors of the region in order to produce sufficient food and improve general employment opportunities for the fast growing population.
- Setting up a better economic management system to withstand droughts and other natural disasters.
- Laying the foundation for sustainable development in all areas of the region. Among others, the strategies of the plan in achieving the objectives include:
- promotion of agricultural development led industrialization along with conservation of the natural resources
- intensification of agricultural production in high rainfall areas through higher use of inputs, credit and extension service
- Increased agricultural production in drought-prone areas through: the promotion of traditional and small-scale irrigation; wider use of drought resistant seeds, fertiliser, credit and extension services; enhanced conservation practices of natural resources and reforestation efforts; and creation of income-generating activities.

Though specific strategies are outlined for different sectors, it seems that the focus is on crop production, with limited attention to the economic potential of livestock and tree products. In addition, implementation and distribution of benefits have been constrained by a host of problems that were not adequately addressed. These include (i) untimely supply of inputs and insufficient quantities; (ii) shortage of farm credit; (iii) the present land tenure system that provides inadequate incentives for farmers to invest in their land; and (iv) inadequate capacity of research and extension systems to effectively generate and disseminate new and improved technologies (CEDEP 1999).

Proposed to start in 1998, several activities were planned in all, or a subset of the areas involved, among others these include:

- Livestock production and health (forage development, breeding, apiculture development)
- Land use (formulation of land use guidelines, training etc.)
- Soil and water conservation (construction of structures, training etc.)
- Agro forestry (nurseries, training, promoting indigenous species etc.)
- Forestry (nurseries, extension, monitoring and evaluation, promoting indigenous species).

4.5.6.2 Capacity-Building In Natural Resources Management (Nrm)

Capacity-building is one of the pillars of the Government's Rural Development Policy which is applicable at all levels. Here, the researcher discussed on issues that arise in translating some of the policies and plans into actions at local and community level and strengthening the local capacity to address the degradation of the natural resources base.

In a major effort to arrest natural resources degradation, the Government (Natural Resources Management and Regulatory Department, MoA) which has the overall mandate for soil and water conservation, has developed for various types of on-farm soil and water conservation measures, rainwater harvesting and afforestation activities, for both high rainfall and rain deficit areas.

The key informant interview and focus group discussion results explicitly showed that the government current practices in natural resource management that for the future sustainable land uses management for farmers. They also explained that experts, some official leaders of the kebele and elders were trained on the resource managements. According to the key informant (head Agriculture and rural development of Warra Jarso Warada), the translation of the policies to practices was good but not quite enough.

4.5.6.3 Incentives, Property Rights and Land-Use Policy

Lack of proper incentives and clearly defined property rights to land, forest and trees have often led to inefficient utilization of natural resources and degradation. The current Government is adamant in its belief that all land will remain in the public (Government) hand as in the previous regime. There is intense and ongoing debate on issue of land tenure and whether the public or freehold systems will be the best options to unleash the potential of smallholders and bring rural transformation. The challenge to the Government land policy comes not so much from outside, but within the country (opposition parties, intellectuals, civil society organizations, etc.) and cannot be dismissed for long without finding some acceptable solutions.

Appropriate policies and incentive mechanisms that would dramatically increase wood supply at farm and community level is central to addressing the fuelwood crisis. Agroforestery can help the need for fuelwood while at the same time serve as livestock feed, source of cash, and enhancing soil organic matter.

The role food-for-work (grain and edible oils) has played and will continue to play in soil conservation, land rehabilitation and afforestation cannot be underestimated among most vulnerable households who live in highly degraded areas. However, in the past there have been many instances when food aid has been a disincentive in undertaking individual and community action in natural resource management. Caution has to be taken so that food aid will not be a disincentive from taking away other voluntary and selfhelp activities in the community. Here again the role of local and community organizations will be

essential in creating awareness of the targeted role of food-for-work and distributing benefits from such programmes. The key informants and focus group discussion results on the incentives, property rights and land use policy confirmed this practice was in practical. Agricultural development policies and strategies, Capacity-building, Incentives, Property Rights and Land-Use Policy.

CHAPTER FIVE

5. SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.1 Summary

Sustainable land use management can be affected either by manmade or/and natural factors. In the study area, Warra Jarso Woreda, these two explanatory variables were assessed. The major findings explored as manmade factors were infrastructure development, policies at national and international level, land tenure system and property right. The data obtained from the field survey depicted that infrastructure development and policies system were the major manmade factors in affecting sustainable land use management. Beside manmade factors natural factors also played its best role in affecting the sustainable land use management of the study area. Population growth, urbanization and income level of the household were replied as major causes of land use management in Warra Jarso Woreda.

The FGD results and key informant interview made also confirmed that population growth was one of the main challenges in affecting sustainable land use management in the study area.

Regarding the current practices undertaken by the government, behavioral change and awareness creation were observed. The role of government department, Non-governmental organization, friends and family members were identified as key role players in awareness creation of sustainable land use management. Out of these, the role of government department was big. This was done through Development agents. Relatively, the role of friends and family members were not sufficient in land use management. This was due to the fact that low knowledge of families on factors affecting sustainable land use management including both manmade and natural factors.

Among current practices, Fertilizer (organic or chemical), improved seeds, pesticides and insecticides are agricultural practice and input used on the farm. The Focus Group Discussion participants replied that scientific fertilizers (inorganic or chemical) are very danger for land. It kills some important naturally decomposers insects and makes it dry.

Crop rotation shed cropping, mixed farming and fallowing systems were the most important systems in managing land use.

Finally, the researcher discussed government policies in order to conserve natural resources for sustainable land use managements. The agricultural development policies and strategies for the Oromia Region are based on the national strategy to follow a conservation-based and agricultural development led industrialization in such a way that accounts for the region's resources and constraints. So that, the local community based policy that facilitates and encourages the rural farmers are better to develop. Intergraded indigenous knowledge is also better to develop for sustaining land use management practices.

Among the proposed agricultural development policies and strategies developed Livestock production and health (forage development, breeding, apiculture development), Land use (formulation of land use guidelines, training etc.), Soil and water conservation (construction of structures, training etc.), Agro forestry (nurseries, training, promoting indigenous species etc.) and Forestry (nurseries, extension, monitoring and evaluation, promoting indigenous species) were the majors. Hence, the government is better to encourage and translate into practices these agricultural development polices and strategies.

5.2 Conclusion

The general objective of this research is to identify factors that affect sustainable land use management in the case of Warra Jarso- Woreda, Oromiya Regional State. Off the findings, Population growth, increasing income, urbanization, infrastructure development, policies at national and international level, land tenure and property right are shown as a major factors which affecting sustainable land use management. Out of these, population growth was found as the main factors. Regarding infrastructure development, for schools, health posts and farmers training center construction forest depletion was common. Age of farmers, sex and livestock holding are also identified to have positive impact on modern agricultural input.

Educational level of the society affect household decision which determine the welfare of the society such as income, health, and their attitude towards using land use management. It enabled the household to have broad vision of the surrounding environment. According to data gathered from house hold respondents, some of households do not know the role of land use managements towards the environment. Livestock plays a critical role for supporting communities involved in the mixed crop-livestock production system through a range of products and services. In sustainable land management, the role of livestock was seen as both positive and negative effects of sustainable land use management. On the one hand, having many livestock minimized households from using forests and forest products their source of income, which force them to destruct natural resources. On the other hand, many livestock leads overgrazing that has negative effects.

Regarding current government practices and policies the gap was observed both in the sides of households and government. On the household side, there is law behavioral change that helps them to refrain from destructing natural resources. On the government side, there was only providing information for the households rather than mainstreaming and developing the knowledge of the household towards sustainable land use management. From the findings one may conclude that, in making interventions in land management practices, there should be active participation of local stakeholders, primarily the farmers. This helps to integrate indigenous land management practices with the new techniques and enhance easy adoption and sustainable use of introduced practices.

5.3 Recommendations

Based on major findings of the study, the following recommendation set by the researcher.

- Population growth: It is clear that increased population growth is causing Land use management in the Wara Jarso woreda in particular and in the country in general. The shifting of forest into crop cultivation is increasing in recent years in the study area. This is because other economic activities are not sufficient to provide the economic demand of increasing population. Therefore, adult education for inhabitants about the impacts of population increase and misuse of natural resource is paramount advantage. Strong family planning and population control education is therefore a timely activity.
- Infrastructure development: for the construction of schools, farmers training centers, health posts the government department better to use alternative construction material instead of using indigenous forest products. Although, in the study area, depleting forests for rural road construction (by the Universal Rural Road Program) is common. Therefore, it is better, if the concerned government departments assigned and follow regularly when they design rural road construction to minimize and set options.

- Creating off farm job opportunity: Rather than agricultural activities, especially the youths, should be involved in other jobs like service provision for tourism and related activities. This may need intensive study to identify the potential economic activities for that particular area that accommodates as much as possible youths to reduce unemployment. For these purpose, the government can play important role through facilitating infrastructure and encouraging private sectors to invest on service provision for tourists, since the area is rich in natural biodiversity.

- Government practices and policies; the government policies and practices are good but not quite enough in sustaining land use management. The enacted policies better if translated basing the knowledge of the community. Although, rather than simply teaching the community on land use management it is better mainstream at household level. This helps the household to internalize the knowledge of sustainable land management.

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APPENDIXES

ADDIS ABABA UNIVERSITY

COLLEGE OF SOCIAL SCIENCES

DEPARTMENT OF GEOGRAPHY AND ENVIRONMENTAL STUDIES

Appendix I: Survey Questionnaire

Dear respondents:

This questionnaire is prepared for acquiring information to conduct research for partial fulfillment of Master of Arts in Geography and Environmental studies (Population, Resource and development). It has objectives, for factors affecting sustainable land use management to explore natural and manmade factors and current practices to be filled by sampled households reside in Wara-Jarso woreda. Significantly, it provoke local administrators, and the farmers of Wara-jarso woreda to look for appropriate measures to meet and grasping all important area of concern in which peoples minimize the impact even eliminate the adverse effect of sustainable land use management. The selection of participants is depending on random sampling not of any other personal reasons.

General Directions

- No need of mentioning / writing name on questionnaire
- Information you provide regarding vulnerability assessment, by any means not harm your personal life and it is solely used for this research and confidential.
- This study is conducted for the benefits of all peoples in the Wara-jarso woreda, so that no money offers for information sources.
- Giving accurate information is most helpful to identify problem hotspots and enables to propose strong adaptation options to reduce or eliminate impacts of climate change.
- Data collection procedures all in all depend on your volunteer. Therefore, you are entitled either to participate or not to participate in survey.
- Put tick mark in space provided (_) for closed-ended questions and write your response on space provided for open-ended questions.
- If there is any unclear idea please ask data collector for detail. Do you have questions?

I. Background information

1. Age A. 18-25 years B. 25-30 years C. 35-40 years D. 40-50 years E. 50-60 years F. 50+ years
2. Sex A. Male B. Female
3. Household size=_____

II. General Information

4. How many livestock do you have?_____
5. Landholding size of household is_____hect or _____timad
6. Compared to the land needs of your household now do you rate your present land holding as; A. More than enough B. Just enough C. Small D Too small E. have no land
7. Do you have access to grazing land others that the plot farmland you maintain?

A. Yes B. No

8. What problems are there related to grazing land? What solutions do suggest solving this problem?

A. _____
B. _____
C. _____
D. what solutions you can suggest_____

9. Can you mention the ways youapplied to manage your land sustainably?_____
_____
_____

10. How can you manage your livestock in cntext of sustainable land management?_____
_____
_____

11. What is your feeling of the hold and use public and government property?

A. I am not confortable
B. I am comfortable
C. I feel secured
D. I do not feel secured

E. I do not have any feeling

12. If your response for Q10 is B or C or both, mention your response?_____
_____
_____

13. Which one of the following have influenced changes in behavior relating to the land resources

A. Government departments
B. Village committee
C. NGO's environmental groups
D. The media and media personalities
E. School teachers and church leaders
F. Prominent public figures
G. Friends, neighbours
H. A consultant/visitor
I. Family members (grandparents, parents, and children)
J. Others:_____

14. Do you have any indigenous knowledge you practiced to manage land sustainably?_____
_____
_____
_____

15. Which kinds of agricultural practice and input you use on your farm plot to sustainable use the land resources

A. Fertilizer (organic or chemical)
B. Improved seeds
C. Pesticides and insecticides
D. Irrigation, water

16. What type of farm management do you practice most of the time which enables to manage land sustainably?

A. Fallowing

B. Shared cropping
C. Inter cropping
D. Mixed farming
E. Crop rotation
F. Counter plowing
G. Strip cultivation
H. Mulching
I. Others (Specify)_____

17. Which of the following methods did you apply (practice) to protect soil erosion of your farm plot?

A. Terracing D. if others, specify_____
B. Dam construction
C. Check dam

18. Do you have access to credit, agricultural extension service, roads, market that enable you to bring sustainable land use management?

A. Yes B. No C. I don't know

19. What do you suggest about the land tenure system and its impact on farmers agricultural performance?_____
_____
_____
_____

20. Which one of the following are the major factors which are affecting sustainable land use management? (you can choose more than one)

A. Population growth
B. Increasing income
C. Urbanization
D. Infrastructure development
E. Policies at national and international level
F. Law tenure and property right
G. Land degradation
H. If any, specify_____

What facilities and supports that you need from government and other body to manage your

farmland?_____

_____

_____

Appendix II: Key Informant Interview Guide for Experts

Date: _____

Name: _____

Current position: _____

Educational status:_____

1. Average land holding in the area:-_____

2. Major economic activities in the rural areas and supplementary (off farm and non-farm income sources involvement of small holders?

3. Peasant households access to forest resource?

4. To what extent the local people plant trees for household need and conservation?

5. To what extent different training are provided to the rural people in related to better sustainable land use management in the area?

6. What are manmade and natural factors in affecting sustainable land use management?

7. What is national and international policies support land use management?

8. Have there been any successful efforts in terms of land use management in and around the area?

Appendix III: Focus Group Discussion and Observation Checklist

1. What do you feel that the land is owned government and public
2. What are the challenges and opportunities of land certification process
3. What need to be done to manage land use in sustainable manner?
4. Law mention the factor that affect sustainable land use management
5. What is your recommendation that you forward for sustainable land management.
6. What you recommend to mitigate the causes and consequence of deforestation to fill the gap in the area?