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Addis Ababa University

College of Social Sciences

Department of Geography and Environmental Studies

Indigenous Land Management Practices in Konso: South Ethiopia

**In Partial Fulfillment Of The Requirement For The Degree Of Master Of Art In
Geography And Environmental Studies: Natural Resource Management**

By

Tamiru Karse

September 2014

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Declaration

I, the undersigned, declare that this thesis is my original work and has not been presented for a degree in any other university or any other purposes, and that all sources of material used for the thesis have been dually acknowledged.

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List of Acronyms

D Drought

F Flat

Fer Fertility

For Forest

G Gentle

K Kolla

Mdm Medium

Mt Mountain

P Poor

Rv River

S Steep

VI Village

Sch. School

Stdm Stadium

SWC Soil and Water Conservation

IK Indigenous knowledge

IKSWC Indigenous knowledge of soil and water conservation

Glossary of some local words

Terms

Allumala	People grouped to work for payment
Dufana	Closed / fallowed
Kaffa	The clan
Kanta	The Gote or administration units in the Kebele
Pallet	The keble administration
Parka / Oldwa	Group of members that work for members by turn
Poqolla	The clan leader
Uganta	Relatives and neighbours that called to work for help on one's agricultural field.
Makana	House at the mora
Mora	Open space with makana where people recreate, meet for a meeting, make decisions
Bayra	Double edged land plough tool
Kuchuma	Single edged land plough tool

Abstract

The overall aim of the study was to document indigenous practices at the grassroots level to analyze the function of the practices and to evaluate influencing factors for different land management techniques as a method Konso selected due to its deep-rooted practice of indigenous land management. Accordingly the selection of the study Kebele is based on accessibility, average elevation, and different indigenous land management technique. Moreover different wealthrank groups were considered using random sampling and their fragmented plots have also been considered. Generally, the major finding of the study shows Konsocommunity use wide range of indigenous land management technologies including agronomic, biological and physical attributing to food security and sustainable resource management. Moreover, the different indigenous SWC technologies have a function of adapting to climate change. Moreover, the influencing factors for the practice are both environmental and socio-economic factors. It is concluded that the deep rooted indigenous conservation need to be integrated with modern technologies to assure the winwin in food security and sustain resource use.

CHAPTER ONE

1. Introduction

1.1 Statement of the Problem

Land is a very essential element of nature on which all living things directly or indirectly depend. Human beings greatly depend on land to produce food, clothing and shelter. For the production of these basic necessities the natural potential of the land is very important and the production level of land in other way depends up on the care we are giving to it. In other words land productivity varies from one area to the other based on the management practices we apply to it besides climate, relief and fertility of the soil.

Local people at different parts of the world have adapted their livings with the circumstances of the physical world around them and by influencing these natural circumstances of their environment. However, in most cases this local knowledge is not fully acknowledged.

In Konso land is more managed by practices based on the grass root knowledge of the society. However the background concentrations of indigenous practices are not fully given acknowledgement even to address the society to utilize them more.

This study has assessed the indigenous land management practices in Konso and their contribution towards the land productivity at an area. In Konso there are also government proposed land management techniques beside the grass root land management practice.

But currently the society at the grass root level in one way or the other is refusing the government proposed land management techniques, and also not fully engaged in the traditional methods, so these may lead to land degradation. .

1.2. Significance of the Study

This study provided basic information about the indigenous land management practices of Konso people, whose life and living is attached with agriculture and some off farm

activities. The understanding of the deep rooted experience of the local community helps to practice appropriate land management with modern technology.

However, the indigenous practices are the point of departure to develop new innovations and sustainable resource management.

The study provided concrete information on the utilization of traditionally tested land management practices of the area in line with land management. And set some points for the government policy practitioner to make use of those indigenous land management practices to back up the countries development plan.

Generally the goal of this study is to document appropriate land management practices of the grass root level which is quite important for the land to maximize productivity and to back up the development plan of the government.

1.3 Objectives of the Study

The overall objectives of the study was to assess the indigenous land management practices of Konso community in environmental protection and food security based on the general objectives , the specific objectives include to;

- Understand the indigenous land management practices of the study area
- Analyze the function of land management practices
- Evaluate influencing factors for different indigenous land management practices

1.4. Research Design and Methodology

1.4.1 Research Design

Based on the objective and nature of the problem qualitative method has been used for the study. The study employed qualitative research method to identify and understand indigenous land management practices and to describe influencing factors to these land management practices.

1.4.2 Sampling Techniques

Konso wereda was selected purposely for the deep rooted practice of indigenous soil and water conservation. Still the study area is serving as administration site for its indigenous soil and water conservation techniques across the country. Many farmers, development agents and NGO's are frequently visiting this area for its good land husbandry and adaption of climate change.

Accordingly from the district of Konso woreda, one Kebele has been selected due to combination of factors including wide spread of indigenous soil conservation, accessibility form the Konso capital Karat, highly differentiated community on wealth rank, and accessibility of some secondary data. Due to the above reasons the Kebele of Dokotu has been selected. And for detailed study in the field the following samples has been taken form the study area in accordance with their wealth rank in the community

Table 1: Wealth rank and sample sizes

Wealth rank	Sample size	Average plots
Better off	5	4
Medium	10	2
Poor	15	1

Moreover, plot level detail investigation has been conducted, where plots of different wealth rank have been considered. Accordingly a total of 53 plots were considered. The plot level investigation format was adopted from Yohannes (2014) work on Konso community where location, cropping pattern, soil type, soil and water conservation practices and major problems are documented.

1.4.3 Data Sources and Data Collection Techniques

In order to achieve the intended objectives the data for this study was collected from both primary and secondary data resources.

Primary data sources: The primary data was collected from the sample respondents, development agents, observation, and checklist and group discussion. Checklist was developed in order to document the land resource management practices of the study area.

Secondary data source: The research also accessed secondary data from different published and unpublished sources such as books, journals, and research reports, magazines electronics media, official statics and reports. The secondary data consisted of data on the population, characteristics and geography of the study area as well as general concepts on the land management practices on the different places across the globe.

1.4.4 Methods of Data Analysis

The study used qualitative data analysis technique. Besides the analysis of the primary data which was gathered, coded, edited and entered in to tables to clearly detect the difference in percentage. Tables therefore prepared to show the list of the types of indigenous land management practices; in what percent the people are using or applying them including the constraints and challenges to those indigenous land management techniques plus the output and gain due to the application of these grass-root land management practices.

1.4.5 Measurement of Variables

Indigenous land management practices in this study are the cumulative effect of a number of practices. Terraces are measured by feet and checked to kilometers and area of plots was measured by hectares, numbers of plants in agro forested plots are given in number. The distances of fragmented plots away from home are checked to kilometers. Regarding terrace measurement, after measuring a single terrace, it is converted to the lines of terraces in the plot.

CHAPTER TWO

2. Literature Review

Land is vital for human existence. In some parts of the world people even seek for a land to make use of it (Eliot 1969 PP.89). Europeans came to the region (United States and Canada) in search of land to farm, for valuable mineral land, political and regional freedom.

People have affected the earth where ever it has lived. Whatever we do, or have done in the past, to satisfy our basic needs has had an impact on the landscape. To provide food, clothing, shelter, transportation, and defense, we have cleared the land and replanted it, rechanneled water ways, and built roads, fortresses, and cities. We have mined the earth's resources, logged entire forests terraced mountainsides, even reclaimed land from the sea. The nature of the changes made in any single area depends on what was there and how people have used the land (Getis Arthur, 2000.PP 168).

Degradation of environment threats to ecological systems due to destruction of habitats, introduction and loss of species are the most serious environmental problems in Ethiopia. In a country endowed with such biological diversity, diverse ecosystem and over 80 ethnic groups.

Land management is the process of managing the use and develop (in both urban and rural settings) of land resources .Land resource are used for a variety of purposes which may include organic agriculture reforestation water resource management and eco-tourism project (<http://www.Aau.edu.et/> land management)

To sustain their lively hoods, the rural poor are having dependent up on natural resources particularly on land. Hence, attaining poverty in rural area is believed to be matter of improving poor people's ability to drive sustenance and income from more productivity and sustainably managed land resource (Preety, etw.2000; Debebe, 2000)

The inhospitable Konso terrain was transformed by people into a remarkable landscape of terraces and channels, conserving every drop of rain and protecting the soil against erosion. The Konso practice an integrated crop, livestock system. The limiting factors of production are the poor soils, land scarcity and most importantly the lack and un-reliability of rain fall. Besides terracing, the most striking features of the agricultural system are irrigation, mulching, multiple cropping and utilization of free species sustainably (Wibeke 2003).

This land management is a solution for the problem of households and community in general.

Land management is the cumulative effect of different activities and systems, social set ups, economic activities, vulnerability of profile gender, and contribute to water shade development, although all community members are expected to be benefited from water shade development, specific attention is required to address problems at the land in general and soil and water conservation techniques.

According to UNEP (2009) human impacts on the environment have entitled growing concerns. Atmosphere, land and water resources are spoilt. Persistent organic pollutants and toxic substances have accumulated in living organisms. Species have been lost and ecosystems are being degraded. Social and ecological systems are being subjected to natural and anthropogenic hazards and catastrophes. Over all human begins activities have reached a scale where they are entailing sever impact on the entire planet.

Ethiopian farmers have long been aware of the problems of soil degradation and have traditionally been conservation minded at the level of the farm. However, an extensive work on indigenous knowledge in land) management shows there is poor record and lack of appreciation of indigenous practices by soil conservation experts and policy makers, which shows the less attention given to indigenous soil and water conservation by researchers and development agents in Ethiopia.

2.1. The land Degradation Problem

Land needs management because of degradation. Soil erosion is one of the most important components of land degradation. Soil erosion and degradation is a reduction in soil depth and fertility. It is caused by erosion (soil removal, loss of nutrients), reduced soil water holding capacity and excessive exploitative use of the land (cultivation of steep slopes, shallow soils, tillage, overgrazing, encroachment of forests closed areas, and others. Land resources degradation occurs in various forms of degradation water sheds, forms of degradations can be physical, biological and chemical (Lakew D.2005).

Reduction of the vegetative cover and biomass caused by climatic factors, over utilization of vegetation such as cutting trees, over use of crop residues for forage and fuel wood, over grazing and burning, erosion and reduced soil fertility .If a water shades are not managed properly then the natural resources (soil, water, fauna, and flora) are degraded rapidly and in due course cannot be used for betterment of humane existence.

The problem is not only unsustainable consumption or over development. There is equally a large problem associated with dilemma of the poor. Whether affluent or poor, each human being requires housing schooling, employment, health care and other facilities in course of life. Therefore, land always is in need of management.

2.2. Sustainable Land Management

People have affected the earth where ever they have lived. Whatever we do, or have done in the past, to satisfy our basic needs has had an impact on the land scape. To provide food, closing, shelter, transportation, and defense, we have cleared the land and replanted it, rechanneled water ways, and bullet roads, fortresses and cities. We have mined the earth's resources, logged entire forests terraced mountain sides, even reclaimed from the sea. The nature of the changes made in any single area depends on what was there to begin with and how people have used the land (Getis, Arthur,2000, pp 168).

The word sustainable according to Cambridge international dictionary is a way of using natural products so that no damage is caused to the environment.

According to CBD, 2007 Sustainable development is the decision of individuals, the private sector, and local community and governments on how to use or transform environmental resources into assets. The decisions are influenced by the amount, diversity or quality of resources and decisions on which resources matter for whom and why. This will bring about competition among resource users and thus may lead to misuse unless handled properly. This situation is disclosed due to the fact that 15 out of 25 examined ecosystems are in decline mainly due to misuse (CBD, 2007).

Among others the use of indigenous land management practices contribute to improve land in the long run contributes to improving soil ecological functions (productive, supportive, regulations and recreation). In spite of variation from farmer to farmer, different indigenous practices of land management's contribute to different degree of accumulation of organic matter over time contributing to carbon sequestration and adaptation to climate change. On the basis of the features of indigenous land management and significance of the practices from points of view of carbon sequestration, improving soil ecologies function and climate adaptation, expert rating was undertaken (Abebe Shiferaw, 2011).

2.3. Indigenous Knowledge of Land Management

Indigenous knowledge is the local knowledge that is unique to a given culture or society. Indigenous knowledge contrasts with the international knowledge system generated by universities, research institutions and private firms. It's basis for local level decision making in agriculture, health care food preparation, education, natural resources management and a host of other activities in rural communities (Warren 1991).

Indigenous knowledge is developed and adapted to gradually changing environments and passed down from generation to generation and closely interwoven with people's cultural values. Indigenous knowledge is the social capital of the poor, their main asset to invest in the struggle of survival, to produce food, shelter or to achieve control of their own lives.

Indigenous knowledge (IK) is gaining increasing attention and its importance in sustainable development is well-recognized (Warren and Rajasekaran 1993, Kolawole 2001, 4, Small et al, 2010, 140). Policy makers and agricultural development planners are

beginning to recognize the need to understand indigenous knowledge systems and have shown renewed interest in this type of knowledge. The importance of integrating indigenous knowledge into contemporary conservation and sustainable management of natural resources have been well reviewed. Recognizing indigenous knowledge means acknowledging locally developed solutions based on existing culture, values and beliefs and practices which otherwise could be a barrier in development efforts. Moreover, farmers' ideas which were in the past regarded as primitive or misguided are now being seen as appropriate and sophisticated (Chambers 1983,5-8). Farmers have quite sophisticated knowledge of agriculture based on insights from several generations (Kolawole, 2001, 4).

Indigenous knowledge is a valuable national resource to enhance sustainability of development. Indigenous communities develop and designate land use systems closely intertwined within their culture and well adapted to their ecosystem. There is a need to consider indigenous knowledge as a means to develop situation specific and sustainable soil and water conservation measures (Mitiku et al 2006;19). Studying indigenous knowledge systems contribute to gain lessons on ecological management, climate change adaptation and lead to incorporated indigenous practices with natural resources development to ensure sustainability. Although a vast heritage of indigenous knowledge about ecosystems and their use exists, it does not appear in the world literature (Warren, 1992, 8). There is a need to document and personal digging of the knowledge in situ and ex situ (Klawale, 20014).

Early study on indigenous soil and water conservation practices was carried out in 1983 and detailed study continued by Alemayehu in 1992, focuses on the role of traditional terracing in controlling soil erosion increasing production in Northern Ethiopia.

Herway (2002, 681-682) described role of indigenous knowledge in soil management to overcome labor shortage and optimize farm operations. The practices described include working arrangements sharecropping and gradual terrace building for degraded farm plots. Use of manure, compost, crop residue, soil burning, temporary structure (trash line) and indigenous grass and vegetation strip as reviewed also by Herweys are some of the role of indigenous knowledge practice in improving physical soil properties nutrient recycling and

fertility improvement. Best practices in sustainable land managements insub-Saharan Africa and described a case study on traditional water harvesting system focusing on run off and food water farming in Ethiopia.

In Ethiopia, there are numerous indigenous land management practices contributing to sustainability of ecosystem management. Ethiopia is a tropical country with varied macro and micro climatic conditions in diverse ecosystems in habited with a great bio diversity and has over 80 ethnic groups with such diverse agro ecology,, richness of bio diversity and existence groups, each ethnic group has unquie way of managing its ecosystem. Since past development effort in Ethiopia, less attention was given to indigenous practice and farmers competence to solve their problems (Mitiku at el 2006; 26). In Ethiopia, in spite of government and partner's conservation effort, the past decades have witnessed the severe ecological degradation in Ethiopian (EPAE, 1989). The role of indigenous knowledge system in land management practices and its contribution to eco system management has been undermined.

Many indigenous people have extensive knowledge in management of natural resources in their traditional landscapes. Indigenous people have experimentation and ways of research of knowing, which allow the local knowledge to be innovated in the local practices and systems. Recognizing, empowering and incorporating indigenous knowledge in participatory rural development projects has been consider a means of ensuring socially, environmentally and economically sustainable natural resources management. There is trainable indigenous knowledge which has the potential to be applied to other site. Protection of indigenous people and their environment as potential resource management .There are transferable to be applied to other sites. Protection of indigenous people and their environment as potential resource managers in a solution towards the threatened ecosystems (Abebe Shiferaw.2011).

The Konso tribe in south western Highlands of Ethiopia- having to survive in a harsh environment in a terrain characterized by steep slopes and soil highly susceptible to erosion have developed a complex and highly sophisticated agricultural system, which has

allowed them to subsist in a mountainous area, harsh conditions and irregular rainfall. Farming is based on an elaborate system outreaching, soil and water conservation practice, irrigation, multiple cropping systems with the integration of livestock and forestry and crop biodiversity (Abebe Shiferaw,2011).

Indigenous human practices can affect the land either positively or negatively. According to Stroller 1983; the rate of erosion may be enormously speeded up by human activities or by rare natural events to result in a state of accelerated erosion, in which the soil is removed much faster than that it can be formed.

The significance of Indigenous knowledge has been recognized in eco system management and in its contribution for the advancement of knowledge in modern science, Indigenous knowledge on land management contributes to sustain the eco system services. Indigenous knowledge systems in land management have played a vital role in ecosystem management for generations in Ethiopia (AbebeShiferaw,2011).

Generally, Indigenous land management practices are the tested practices with the circumstance on the ground; thus, it is really important to assess the Indigenous knowledge that helps land to continue in production and that also insures food security.

In the study area people manage the environment particularly the land with the grass-root knowledge they accumulated from their ancestors in levels.

Environmental attention is being given to the environmental concerns of indigenous knowledge. Most of the past research has centered on Asia, Native American Indians and Australian Aborigines with little attention being paid to Africa. African indigenous soil and water conservation has been ignored by researchers and developers. Indigenous knowledge has remained an important wealth of resources in management of ecosystem in African countries like Ethiopia despite the less attention given by development practitioners and policy makers The importance of indigenous knowledge and ecological resources can be well realized in sub-Saharan African countries like Ethiopia when we look at the total dependence of rural population, 85% of the people, on natural resources (land, water, livestock, forests and trees) for economic development and food security Ethiopia has rich

biological diversity important to the world in both domesticated and wild plant and animal species that occur in inevitable and unique micro and macro-ecosystems (Abebe Shiferaw,2011).

CHAPTER THREE

3. Profile of the Study Area

3.1 Geographic Location

Konsowereda administration is found in south western part of Ethiopia in southern nations, nationalities and people’s regional government. Konso after the new administration reform of the region was made under the Segen Area People’s Zone.

Konso is one among the weredadistricts of the Segen Area People’s Zone of Southern Nations, Nationalities and Peoples Regional State (SNNPRS) in southern Ethiopia. Karat the capital of Konso, is located at about 595 and 365 KM south west of Addis Ababa and Awasa respectively. The total land area is about 202867 hectares characterized by hills, mountains intersected by gullies and valleys most of which have been under cultivation over period of hundreds of years.

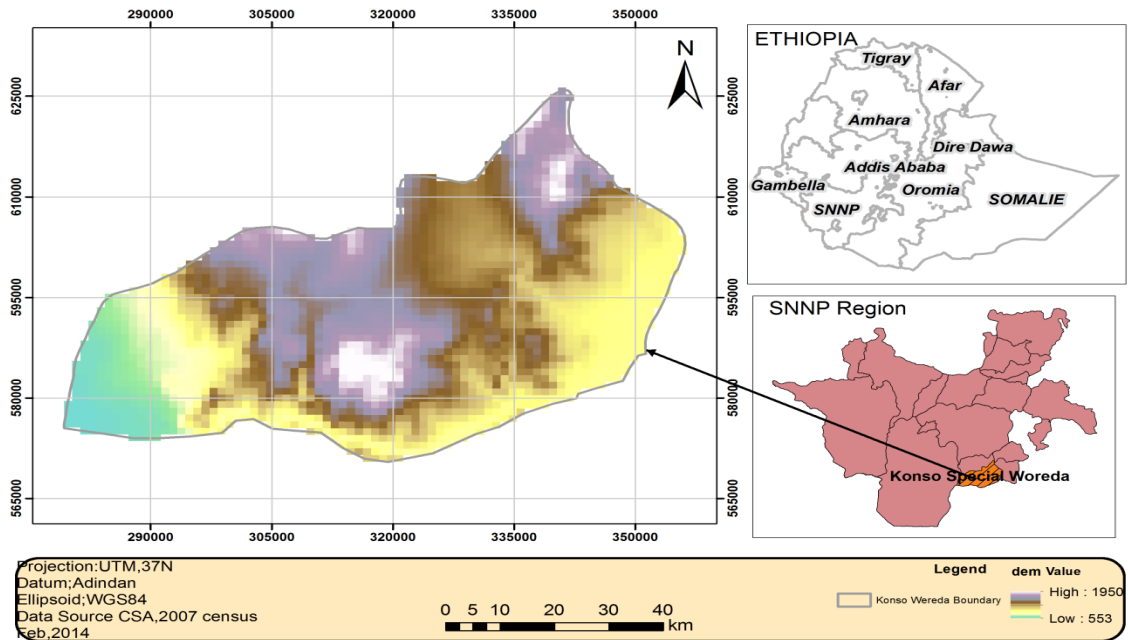


Fig 1 Location of the study area

The Konso people is located in this region of south western part of Ethiopia in Southern Nations Nationality and Peoples Regional Government (SNNPRG), speaks Konsigna language that belongs to the Eastern Cushitic language.

The Segen River in the south, Woyto River in the west and Derashe wereda in the North and Burji in the South East, bounds Konso. Absolutely Konso is located according to Konso development office at 37.1-37 longitudes and 5-5.36 latitudes.

Konso is known for its hard working people who endowed with extra ordinary skills and knowledge particularly in indigenous water and soil conservation and land management practices. They managed to survive in marginal environment using the indigenous skills and knowledge that enabled them to make optimal use of unfavorable terrain and climatic conditions in innovative manner. This creative indigenous and noble work culture has qualified Konso people in 1995 for UN prize and recognition and registration of Konso landscape as a cultural heritage site by UNESCO in 2010.

The annual total rain fall ranges from 600mm to 800 mm. Average annual temperatures is 23.95 °c where the maximum is 32.4⁰c and the minimum is 15.5⁰c.

3.2 Topography and Climate

Konso topography is characterized by rugged surface feature of hills and depressions. The Konso woreda topographic elevation ranges from 500 to 2100m.a.s.l which also has an impact on micro climate of the woreda. As the result climate at Konso in a considerable portion is Kolla (70%) and Woinadega which is 30% of the total area.

3.3 Demography and Environment

The total population of Konso currently according to Konso development office is 250,750 from which the male population is 120,693 and the rest 130,057 is female population. The annual growth rate of Konso population currently equal to 2.6%.

Having this number of population the Konso family in average has 4 family members. Due to the increment of population 1 man shares 0.53 ha in Konso where one can easily

understand how dense the population settlement of Konso is, in relation to land size (1/0.53ha).

Teferi Abate, 1992, explained Konso as, Konso ecology is mainly characterized by; rugged features, hot temperature and a remarkably high population density. This has resulted in shortages of fertile soil, grazing land, rainfall, water reserve, and other resources. In spite of all these shortages and problems, the Konso have managed to create a way of life for themselves on the rocky hill tops through their wise utilization of available resources. They engage in intensive hoe cultivation, beekeeping, trade, craft, etc and developed a remarkable culture (1992:23).

3.4 Settlement

Traditionally the Konso land is divided to four regions namely Karati, Takadi, Turo and Gumaide. Each of these regions constitutes a number of autonomous walled towns. The Konso are distinguished among many other features by their stone walled towns called pallets that are encircled by Kawata (Watson 1998).



Fig 2 Walled village of Konso

One of the benefits of Konso settlement is for labor mobilization. The Konso people settle in groups in a walled villages having open site with one big house called Mora and Makana respectively. During the day time in the morning Mora helps as a traditional court site during the rest time of the day elderly people gather together so Mora here serves as a recreation center and during night youth gather to Mora to sleep. In relation with environmental protection Mora plays a significant role where the youth remains a stand by labor for fire accidents also. Thehouse in the Konso village are crowded together and surrounded by a circular wall of stones, like fortress, surrounds the village. The village is built with one or more gates a watch can be kept on people entering in to the village compound.

CHAPTER FOUR

4. Result and Discussion

4.1. Land Degradation Status

4.1.1. Slope Types and Vulnerability to Degradation.

Land degradation is defined as a reduction in soil depth and fertility. On the earth there are a number of factors that contribute to degradation and one of these factors include slope type of the area. Vulnerability of degradation therefore is high on steeper slopes and decrease on gentle and flat.

Konso topography is very rugged with irregularity of slopes, ups and downs that contribute to degradation. The following table shows sample plots and their slopes according to the grass root society classification.

Table 2 Slope type of sample agricultural plots in the study area

Slope types	Number of plots across Wealth rank		
	Better off	Medium	Poor
Steep	14	6	10
Gentle			1
Flat	7	11	4

As shown in the table above the diversification in slope is common in Konso the main slope of agricultural plots are on steep hills of Konso that are not even suitable or capable based on USDA land capability classification and FAO land evaluation frame work.

4.1.2. Soil type and erodability of the study area

One of the factors that accelerate soil or land degradation is the type of soil, its character, structure and texture. All the mentioned profiles of soil are the result of the different processes of soil formation. Therefore the difference in the process they underwent during formation results up in difference in erodability of the soil. The following table shows soil types of the study area.

Table-3 Soil type of the sample plots at the study area

Soil types	Number of plots across Wealth rank		
	Better off	Medium	Poor
Red soil (key afer)	12	9	4
Koticha	1	2	1
Dokolota (whitish soil)	2	3	
Borbora black soil	4	2	
Kalkalyta			1
Sandy soil	1	1	7
Stony soil			2

The table above depicts different soil types of the study area. Since soil is the product of parental material, elevation, vegetation, climate and other factors, at the study area there is different types of soil in accordance with the factors that contribute to its formation. These soil types have also different arrangement and cohesiveness that in accordance been affected by soil or land degradation agents.

4.2 Land Holding and Fragmentation

Ethiopia is a country of small holder agriculture. In the 2000 cropping season 87.4% of rural households operated less than hectares; whereas 64.5% of them cultivated farms less than one hectare; while 40.6%. Operate land sizes of 0.5 hectare and less (CSA, 2002; Nigatu 2005) such small farms are fragmented on average is to 2 to 3 plots (Samuel G. 2006).

In the study area land is privately and communally owned. Some of the common land are managed by the traditional leaders (Boqola) where there are 9 (nine) traditional clans and their leaders namely; Kertita, Arkamita, Tokmaleta, Tikisaita, Sawdata, Pasanta, Elita, Mahaleta and Eshalaita. Some portions of land are managed by Kebele administration called duffanna (yegarameret). Another land remains under the decision of Kebele cultural administrators. And still some exotic and indigenous plants are with the safetynet program. However, the traditionally owned are still relatively have dense forest and well protected by the traditional system.

Table 4 Land fragmentation and ownership among wealth rank groups

No. of fragmented plots	Wealth rank		
	Better off	Medium	Poor
1		1	15
2		16	
3	1		
4	20		

As shown in the table above much share of the land fragments of the area are owned by the better off, located at different micro- climatic locations, where the medium households almost own plots of two and the poor totally a single plot per house hold.

Agricultural plot fragmentation in Konso is because of inheritable land. The eldest son of the family has given more portions and the rest sons of the family share the rest based up on the will of their father. Women have no cultural right to inherit the agricultural plots in Konso. As the result the poor group is the couple who recently married, because the husband is the only one who comes with one or maximum of two plots from his house. And this further division of farm plots amongst sons continuous as per the male children born to a family in levels through generations. So the fragmented tinny plots also can't supply the living of individuals, this is why the Konso land is intensively protected and well managed in order to maximize production.

4.3 Land use Land Cover at the study area

Many books use land use/ land cover concepts interchangeably, although they are different land cover refers to the physical characteristics of the earth's surface, captured in the distribution of vegetation water, desert, ice and other physical features of the land, including those created solely by human activities such as mine exposures and settlement (Billah , 2004). And the same author defines land use as the intended employment and management strategy placed on land cover type by human agents or land managers.

Land use/ land cover pattern of any area is an outcome of natural and socio economic factors and their utilization by man in time and space. Land use/ land cover change has become central component in current strategies for managing natural resources. The advancement in the concept of vegetation mapping has increased research on land use/ land cover change (Zubari, 2006)

As shown in the table below the biggest land holding share is under private owner ship as the expense of communal land since the Derg regime. Accordingly different soil and water conservation techniques are used according to the difference in the use of land.

Table 5 Land Use and Land Cover of the study area

Land use land cover	Ha	%
Cultivated land	49130	24.22
Forest/bushes	44014.367	21.7
Pasture	60325.349	29.8
Settlement	41068.705	20.2
Miscellaneous	8326.597	4.1

According to the figures in the above table the pasture land is so wide. And this is due to the hostile climate of Konso. The low elevated topography of the study area is hot in temperature which is agriculturally not productive. Although Konso population is in need of agricultural land, these considerable portions of pasture land remain uncultivated besides climate due to steepness of the terrain. The other major share of Konso land is the cultivated land which shares 24.2% of the total land followed by forest/bush land and settlement.

The other type of land use land cover besides agricultural land is forest and bush land there are culturally protected forests by leaders of the clan that contribute to land management. Forest or bush land in Konso includes bush land in the low land area of the site and includes the riverine or gallery forests around the banks of revivers and streams.

The agricultural land shares 24.25 besides the density of population. This in one way or the other shows that even through there is a need for agricultural land agricultural suitable land only accounts for the mentioned share including hills cultivated.

4.4 Indigenous Soil and Water Conservation Practices

4.4.1 Terrace building: Konso farmers are threatened by continuous erosion from their fields and have perfected the art of terracing, which is unrevealed anywhere in Africa. The terraces cover hill sides over hundreds of kilometers and over a height of 700m. Terraces are built with stone walls. The height depends on the terrain, but especially on steep slopes they are only a few meters wide and can reach a height of up to 6m, although a height of 0.5 to 1.5m is preferred (Engels, 1990, Weibke 2003).

Terraces are dry stone benches that are constructed by cutting soil away to make perpendicular face and a wall of stones is built against. Earth is then moved from above the terrace and used to level the plat below. On the high land Konso at an altitude of 2000 m.a.s.l, 10-20 cm high earthen ridged, sub divide terraces in to 9m² basins. The main function of all these structures is to maximize water retention and infiltration. At the same time it is very effective in preventing soil erosion.

Konso is characterized by rugged and stony high lands cut by deep valleys. The main agricultural area ranges from 1400m to 2000m above sea level. This semi-arid, dry and inhospitable place requires immense human effort to survive.

The micro climate of the study area is mainly Kola which is 70% and woinadega which is 30%. Temperature fractures are not extreme and vary from 15⁰C to 33⁰C. But the area is situated in a dry belt with very unreliable rain fall. Rainfall distribution follows bimodal patterning on flat surfaces. Terraces look like a stage after one another which are important to cover some steep slopes of the ground and to make farming easy and effective by minimizing the soil take off effect. It is part of the land management techniques mainly for soil conservation. The following picture shows terrace construction in the study area.



Fig.3 Stone terrace construction in the study area

Terrace construction requires a skill and labor. Skill is needed to have a long lasting terrace and labor is needed to dig the foundation, to carry stones and to construct. Thus during terrace construction in most cases elderly people sit and arrange the stones where adults dig the soil (foundation) and help in carrying stones to be constructed. The following table shows terracing per plot size in the study area

Table 6 Terracing of the sample plots in the study area

Wealth rank	Terraced plots	Un terraced plots
Better off	16	4
Medium	7	10
Poor	13	2

Terrace building in agricultural plots is common, in other words it is uncommon to see untraced plots of agriculture but if the slope of the plot is flat then farmers use soil

bands instead of stone terraces. This is the fact shown in the table above according to the data collected from the study area, the slope of an area results in stone trace building if steep or gentle or soil bund if the slope is flat.



Fig. 4. Stone terraced cultivated land in the study area

Table 7- Physical soil and water conservation = Terrace of sample plots in Kms

Wealth Rank	Total length of the built terrace in (m)
Better off	8.25km
Medium	0.56km
Poor`	0.4km

As shown in the table above the total length of terraces is different among the wealth rank groups. This is resulted due to many fragments or plots of the agricultural land of the Better off than the medium group and poor.

4.4.2 Manure application: Organic matter makes up only a small fraction of the total materials in the soil yet it is extremely important in all soil processes. The application of manure brings a tangible difference in land management.

Organic material in the soil is essentially derived from residual plant and animal material synthesized by microbes and decomposed under the influence of temperature, moisture and other factors that contribute to soil formation. There are many groups of factors that influence inherent organic matter content. Natural factors (climate soil parent material, land cover and or vegetation as well as topography), and human induced factors (land use, management and degradation (Scoones, 2001).

Table 8 Traditional Manure Application in the study area

Wealth rank	Total plots	Manure not applied	Manure applied plots
Better off	20	3	17
Medium	17		16
Poor	15	1	16

From the table above nearly all plots of the study are manure applied plots. Even from 3 plots of the better off to which manure is not applied, two of them applied modern fertilizer. A continuous process of traditional manure preparation is always there in the community. During field observation women early in the morning carries traditional manure to their farm plots. According to Konso development office information Konso

community is a naturally well trained society in manure preparation and where and when to apply on to the farm land.

According to the information during discussion with the elderly people, the Konso society gives much attention to manure application. In the study area manure preparation is in one's compound meaning every house hold has a manure accumulation place in the compound; where remains of cattle feed, their faces and ash are accumulated together. After these became highly decomposed every time when they go for agricultural activities to plots they carry the decomposed manure to their agricultural sites.

Some times when more manure is prepared they pay for oldawa (a group of people work for money) to carry it to the crop production site or uganta or use any available labor to transport the manure.

Manure application is so important for the crop production plots. Because; primarily they boost the production of the crop and enrich the soil to allow the growth of more plants where the roots anchor the soil even in steeper slopes across the area to and protect soil erosion. Secondly manure application maximizes production in order to increase the house hold harvest which in turn secures food insecurity of the grass root community. And this locally prepared manure has no negative impact on the agricultural plots so the indigenous community has tested these for generations and using it for multipurpose benefits.

The other type of land management that can also be classified under agronomic measures of soil and water conservation is a use of crop residue. On agricultural sites crop residues are deliberately left by farmers on crop land to increase soil fertility and organic carbon. Farmers say the residue decompose as termites use and keeps the soil moist, protect soil from direct effect of sun light, flood and wind. The protection of soil by crop residue as a trash line on the agricultural plots is widely used in the study area by different parts of the community (from better off to poor) farmers. Crop residues from sorghum, maize, crops fruity plants are often let by women on backyards while cover the crop residue by soil to enhance decomposition. The grass root community does not allow cattle to the crop

production field rather they bury any residue of crop for the fertility and to maintain soil health and productivity.

Based on the discussion with different groups meaning elders , women and leader the major indigenous agronomic soil and water conservation measures the manure, compost ,crop rotation, strip cultivation and mixed cropping. However, some of the indigenous practices can also be classified under agronomic, biological and physical such as trash line which is widely parted in the study area.

4.4.3 Agroforestry (mixed farming): The other measure of the grass root community that is used for soil and water conservation includes planting crops of different type and multi purposed plants as a component of Agro forestry. Agro forestry is widely practiced at the study area.

Table 9 cropping pattern in the study area

Wealth rank	Cropping pattern	
	Mixed agro forested	Single crop (mono cropped plots)
Better off	18	2
Medium	17	-
Poor	15	-

The table above depicts that in the study area the nature of agricultural plots seems like more or less the same covered with different types of big plants and smaller crops, thus the table is a clear indication of the mixed, agro forested plots covered with a variety species that have purposed for human living at an area.



Fig 5 Agro-forestry practice in the study area

Table 10 Types of tree species grown at the sample plots in the study area

Wealth rank	Types of plants grown	Number of main plants and trees counted
Better off	Coffee, chat, Moringa, Oybata, others	1452
Medium	Fruit trees, moringa, oybata	462
Poor	Coffee, chat, moringa, fruits, oybata& others.	130

Varied types of trees are common in Konso in a given plot. The table above is one of the good examples that indicate the agro forested land nature of the area. In relative terms the

better off leads in terms of plant species and number of plants per plots. This is a result of more fragmented land the house holds of Better off group own, where they have four plots each on average. Farmers in Konso are not only innovative in terms of farming techniques, but also in the use of local plant resources and adopting new crops. A great variety of cereals, pulses, root crops and cash crops are known and cultivated. More than so different species have been reported from one village 24 species from one village, 24 species form a single field. This figure is exceptional to other mountain areas of Ethiopia. It is also reported the use of 80 wild plant and tree species for various purposes. The species diversity decreases with altitude (Wiebke 2003).

Similarly during field observation the researcher documented the varied types of plant species form each wealth rank by plot area.

Table 11 Diversity of trees and area coverage of sample plots

Wealth rank	Plot size	No of plant species
Better off	1ha	150
Medium	0.25	124
Poor	0..0125	130

From the table above we can understand the total number of plant species per plot size area more in number.

Some of the plant species of the Konso area that constitute to agro forestry include, moringa, oybata, coffee, chat, different fruit bearing and other tree types and varied types of crops.

4.4.4 Indigenous community land management practices

The grass root community of Konso has a long history on common land of the area. These lands called common, remain untouched and protected for months which are traditionally known as dufanna. In this case the land location is announced by the traditional leaders of the Kebele to close and open. After the land is once opened everybody have equal right to be benefited from the land like to get grass and trees for house construction and other different purposes.

The Knoso dufanna is equivalent to fallowing but in this case even the land is protected from entering in to it, remain untouched, for several months. The purpose of dufanna according to the elders of Konso is to preserve grass for cattle. During rainy season cattle's can found grass every where when the dry season came then the problem of shortage grass will be there. Therefore a vast land of community made untouched preserves grass for cattle during times of drought. But in doing so the benefit of dufanna is not only for grass protection rather it includes rehabilitation of the site because of humus addition from vegetation, limited or less human influence, protected erosion and others. This indigenous land protection method is similar to fallowing which refers to leaving a land untilled, untouched for a given period of time.

Table 12 Summary of some selected indigenous land management practices in Konso

No	Konso local name	Amharic name	English Name	Languages
1	Kawata	Yedigayerken (kaap)	Terrace	Crop
2	Kuffa	Madaberia	Manure	Crop land
3	Olinayliza	Abrromezrat	Agro forestry, intercropping	Crop land
4	Duffna	Mekelkel (mekelel)	Fallowing	Grass land
5	Monna	Yeafereken	Soil bund	Crop land

4.4.5 Grass Root Institutions that Mobilize Labor to land Management: The

community based institutions play a significant role in mobilizing labor on farming activities for help or money that also contributes the land productivity in practicing indigenous soil and water conservation

Table 13 Grass root institutions that mobilize labor

Grass root institutions	Their role in labor mobilization	Consists of members
Palleta	The kebele members help if one is unable to work on his farm for the sake of community affair/sickness	Whole kebele
Kanta	The kanta help to households during death or extended sickness	Whole Kanta (Got)
Kaffa	The Kaffa (clan) help to work on farm during death or extended sickness.	The members of the clan
Ukanta	Voluntary relatives call each other for work help	As per the number of voluntary relatives (friends)
Parka/Oldawa	Members of Parka work together on one's farm by turn for other members free of charges.	Members From 5 – 10
Allumala	Works for money and sometimes for payment in kind	Members From 5 – 10

As shown in the table above the Palleta and Kanta as well as Kaffa help to work on one's farm land is during the times of extended sickness of the family to be helped or if a member of a family has passed away and when the time of these incidents is during the needed time for labor call, the traditional leaders decide and mobilize the people to work

on the farms of the victim. Ukanta is free help mainly among the relatives and neighbors. Parka is working turnby turn for members of the Parka. Allumala is different from the rest where a group of 10 or more members organized together works for money to celebrate feasts and national holidays together.



Fig 6 Kanta working on the Kebeleland

4.4.6 Land tillage technique of the grass root community: There is no micro climate difference at the study area even for a single plot. This clearly indicates that the difference in land productivity is the result of other factor besides the climatic influence. In Konso we can find difference in micro climate along with the difference in elevation but specifically in area of study this is not a factor Konso community contributes to land management using indigenous tools to plough or till the crop production plots. The following table shows the land tillage technique of the grass root community.

Table 14 Indigenous land tillage tools

Wealth rank	Land tillage technique	
	Hoe (single/double)	Plough (oxen)
Better off	17	3
Medium	17	
Poor	15	

As it is shown on the table above almost all the tillage technique of Konso people is based on traditional tools known as hoe which is a single edged and a double aged called bayra that does not aggravate running water erosion.

The following figure depicts Konsohoe and bayra that the grass root community uses for land tillage practice and also for terrace construction.



Fig 7. Double edged plough tool (Bayra)

Bayra is prepared in most cases from three different woods where some times can also be constructed from a single wood that has three branches to form a bayra. Among these three, two helps for ploughing which entered in to a sharp metal edge and the separate branch helps for holding and has a shape of number 5. Bayra is used mainly during seed time and when extensive ploughing is needed. But kuchuma is a single stick of wood with a metal ploughing edge.



Fig 8 Single edged plough tool (Kuchuma)

4.5 Ecological Importance of Indigenous land management practices

The main aim of the grass root society is to produce more in order to secure their existence; which they practice as a part of their living. These grass root level indigenous land management practices are ecologically practiced, tested in the local environment, and proved for generations on the local ground and been accepted by the grass root community having the following functions

4.5.1 Terracing: Terraces are important for protecting rain water run off which in turn avoids soil take off. The protected soil refers to the soil relatively free of mineral loss which in turn helps vegetation grow that in a cyclical way protects soil erosion. Among the environmental functions of terracing is moisture retention, the protection of run off results in rain water accumulation and sink and make available for plants extraction.

According to the discussion made at the study area with elders concerning the function of terracing the major function of terracing is to minimize soil erosion, to support plant growth by providing sufficient flatter space and to recycle soil. Recycling soil according to the discussion is; during terrace construction deliberate soil transfer is also conducted. This happens in such a way that during terrace construction the removed deep soil that is highly decomposed is scattered to the surface. So they said that these change of the existing surface soil by highly decomposed and remained fertile inner soil definitely bring change in the production of the terraced plot.

4.5.2 Manure application: Manure preparation as discussed earlier is on house hold bases and which is from cow dung and remains of plants in other words it is purely organic that has no negative impact on the land but contributes to boost production. The elders during group discussion stress on the availability of manure for plant use saying the applied manure on the agricultural land is not fully used by crops grown but it also serves for the coming crop season due to further decomposition.

4.5.3 Agroforestry: Agroforestry and mixed cropping is practiced un questionably in the study area as per the informants response the use of having different trees and crops at a time on a given plot of land helps their living in such a way that they can get what they need for food from the varied type of plants on the agricultural fields. Not only food but some plants are there on the plots purposely for the use of feed for animals that are kept in the house compound.

In addition to the above use the environmental importance of vegetation at the study area include; construction, food, income, energy, medication. But one thing that not be forgotten is plants un replaceable use of carbon cycle or the fact that plants use carbon dioxide during photosynthesis and releases oxygen to the environment to support the core thing of our existence which is breathing.

Diversity of plant species can also bring about the diversification of benefits that the grass root society gain from the trees directly and indirectly.

Table 15 Multiple function of some indigenous Trees

Indigenous Trees	Function of the indigenous tress				
	Food	Construction	Income	Medication	Fire wood
Coffee and Chat	✓		✓		
Moringa	✓		✓	✓	
Oybata		✓	✓	✓	✓
Fruit bearing trees	✓	✓	✓	✓	✓
Others	✓	✓	✓	✓	✓

►The overall function of these indigenous practices is for more production and to have a protected environment. Therefore different agronomic, biological and physical indigenous practices are well known in the study area that were practiced during the former times, practicing currently and will also be used in the future that are tested modified through generations and proved in local environment under the well-known micro climate. These practices are going through different adaptation to the changing climate from time to time.

4.6 Factors that influence land management

4.6.1 Topography of the area: Konso area is characterized by rugged topography which is one of the challenges to land management practices. Because internationally according to (Wiebke, Forch2003), the main agricultural land ranges from 1400m.a.s.l to 2000m.a.s.lbut in Konso it is cultivated beyond this international limit. As the terrain gets more rugged or irregular land management activities mainly agricultural activity also gets more complicated. These problem complications of land management are facilitated by different factors including slides, falls, and erosions that are accelerated by the steep slopes of the area.

4.6.2 Plot distance from settlement sites: One of the factors that affect land management in the study area is the plot distance from residential sites.

Table 16 plot distances from farmers residence

Plot distances (Km)	Wealth rank		
	Better off	Medium	Poor
≤ 1km	17	8	11
2-3 kms		3	2
4-5 Kms		2	2
≥5kms	3	3	

Much percentage of farm plots in Konso is below and up to 1km distance from the settlement site. The distantness of farm plots in one way or the other will influence land management.

But according to the group discussion with the farmers which was conducted they didn't consider distance from the settlement area as a challenge. And the reason for their suggestion is that if the plot is far then we prepare and construct temporary staying site to conduct every needed assistance to the lands and these temporary settlement site is known as kanta where the process of going and living at kanta is called kaasuma.

4.6.3 Attitude of the young generation: According to the group discussion conducted with elders in the study area, they pointed out their uncertainty on the continuation of local land management practices mainly on terracing due to the attitude of younger generation where they consider it as backward practice. They said the current generation prefers to learn or trade than farming and take farming as the last option of their lives.

4.6.4 Other challenges: Other factors that influence land production besides land management practices are physical that include drought, fertility, erosion, pest or disease of plants, slopes, fragmentation of plots. Some of these problems are controlled by the indigenous land management techniques mainly erosion. But others still influences human living in the study area mainly land size and pests of different type.

The following table shows major problems and indigenous solutions at the study area.

Table 17 Major problems and indigenous measures taken at plots level

Major problems	Indigenous measures taken
Drought	Planting trees and well adapted crops
Fertility	Traditional manure application
Erosion	Terrace, mixed cropping(agro forestry)

Agricultural plots as shown in the table above experiences drought across the wealth ranks. Rain fall in Konso as mention on the climate section is small and undependable as the result many a times agricultural plots experience drought that influence their production even though are managed using different land management’s techniques. And indigenous measures taken to overcome these challenges are common again across the wealth rank.

The other problem is hostility of the area which needs immense human labor. If not intensive labor is used to manage the terrain the area would have been remain dry because of excess sunshine and temperature. In relation with the above reliability of the rain fall also be a challenge for different indigenous and management practices.

According to the data collected the main problems are clearly stated in the table below

Table 18 Potential problems across the wealth rank

Major problems that in one way or the other affect land	Wealth rank		
	Better off	medium	poor
Soil erosion	○	○	○
Fertility problem	●	●	●
Drought problem	■	■	■

Key = (○, Medium), (● Serious), (■ Very serious)

As one can understand from the table above the land problems of the area are uniform throughout the wealth ranks. If we take soil erosion potentially it is the problem of all Konso land since soil erosion is the product of slope of the ground, rain fall duration and intensity but the real thing on the ground is that soil erosion seems no more an actual soil problem in the study area. Like soil erosion soil fertility problem is a challenge for soil management in the study area. Long history of tillage has exhausted the soil nutrients of the area. Thus the difference of soil fertility is definitely the product of soil management in the study area.

According to the group discussion with elders at the study area the main challenge to environmental management is the attitude of the young generation to wards land protection.

The young generation considers and takes building terraces as a backward activity. So elders stressed on the attitude of young generation. They said in the long run terraces will be history in the Konso because, yes many are talking about terraces but none are contributing to wards the situation on the ground. During observation the researchers has seen some terraces that are scattered (destroyed) and remain unrepaired.

Therefore this is among the challenges of indigenous land resource management techniques. Terrain appearances and nature of slopes are one of the challenges of Konso indigenous land management, if we take for instance terracing on highly steep escarpments it is difficult to build terraces or to apply any land management practices but even through it is applied it lasts short due to erosion, slides and falls. So the topography also influences indigenous application of land resource management.

The Konso Woreda uniquely described above is known for rugged topography which needs intensive land management practices and care to wards land degradation to ensure food security this irregularity of the terrain feature and the concentration of population over small area also is another danger to land degradation. The Konso people from early generations have been fighting to overcome the problem of land degradation by grass root land management practices they developed and acquire through generations.

CHAPTER FIVE

5. Conclusion and Recommendation

5.1. Conclusion

From the study the following major conclusions were made possible:

- **Ingenious SWC practices:** In the study area indigenous soil and water conservation practices are many in number that harmoniously contribute to have a protected land and environment. Some of these practices include; stone terrace building, inter cropping, mixed cultivation, agroforestry, manure application.
- **Functions of the indigenous SWC practices;** Indigenous knowledge is very important to protect the land for the current generation and to keep it protected for generations yet to come by insuring natural balance. The main functions of these indigenous land management practices are; protecting the soil from forces of degradation that in turn support plant life existence, boost production, run-off protection, splash effect protection, improving soil fertility, moisture retention, plot fencing other associated results.
- **Grass root institutions role in mobilizing the labor:** In farming activities and SWC works human labor is very essential. The grass root community based organizations play a significant role in labor mobilization. These organizations are either helping a relative or a friend for free or for money and in some cases for the payment which is in kind, but in any case they mobilize labor to work on the land which contributes to land management and to boost production.
- **Influencing factors for indigenous SWC:** There are factors that influence indigenous land management practices. Terrain appearances and nature of slopes are one of the challenges of Konso indigenous land management practices. The other challenging factor for indigenous land management practice is climate of the area influences the healthy growth of crops. The main problem according to the

discussion made with elders, farmers and leaders is the attitude of young generation where they consider terrace building as a back ward activity which can also be considered as a danger to wards the existence of the beautiful landscape of the Konso area.

- Surprisingly during field observation the research has found two plots at the same topographic elevation under the same micro climate that had different soil color bears different vegetation and the owners also give their testimony in difference on the productivity of plots however one is well traced and is under the ownership of the better off while the second one is not well terraced, the terraces were destroyed here and there and it is the plot of the poor, so as it is clearly shown it is the application of different land management practices that bring change on to the agricultural plots.

5.2. Recommendation

The result of the study indicate that grass root society had a well-tested, evaluated for generations, environment friendly different types of indigenous land management practices. In light of these the following points are recommended:

- ❖ These environmental friendly indigenous land management practices are of multiple advantageous for the land, animals and human being. It is good to spread these great knowledge to other parts besides the area. Therefore it is good for the stake holders; government, NGOs to spread the knowledge.
- ❖ In order to maximize environmental importance of indigenous land management practices further studies are needed besides the assistance of government extension. So it is good to integrate indigenous land management practices with modern land management approaches.
- ❖ Empowering the decision making of the grass root society and institutions to exercise the indigenous knowledge of soil and water conservation than top down approach.

Reference

- AbebeS, H. Hurni, Getez and Berhanu D.(2011).Indigenous Knowlage in Land Management for Sequestration and Soil Based Ecological Services in DamotSore(Wolayta),Southern Ethiopia, A Report Submitted to international start secretariat. (Report No 3).
- Alemayhu,M(1992). The effect of traditional ditches on Soil Conservation.research report 22.33 pp. University of Bern, Switzerlandand Ministry of agriculture,Bern and AddisAbaba.
- Arthur,Getis,J.D(2000).Introduction to Geography.McGraw-Hill company Library of Congress.USA.
- Billah.M.andAnisur.R. (2004).Land cover mapping of Khula city applying remote sensing technique.In proceeding of the 12th International conference on Geo informatics Geospatial information research, University of Gavle, 7-9 June 2014, Sweden.
- CBD,(2007). An exploration of Tools and methodologies for evaluations of Bio diversity Resources and Functions, CBD technical services No. 20: 23-29, Secretariat of the convention on Biological Diversity.
- Chambers,R(1983).Rural Development:Putting the Last Firist.246pp,John Wiley and Sons,Inc.,New York.
- DebebeHabtewold(2000).Food aid and its impact on peasant livelihood strategies. Forum for social sciences research, Addis Ababa, Ethiopia.
- Eliot P.(1969).World Geography.Glencoe Publishing Company California USA.
- EPAE, (1998).Environmental Management as part of the plan for Accelerated and Sustainable Development to End Poverty.(PASDEP) Report.
- Herewey.K. (2002).Indigenous soil management. In Encyclopedia of soil science (Ed.Lap R), pp679, 682, marcel Dekker, Inc, NewYork.

- Kolawole, O.D(2001).Local knowledge utilization and sustainable development in 21st century. Indigenous knowledge and development monitor9-3(4),Nov 2001.
- LakewD.(2005).Community based participatory water shed development. A Guide outline, first edition,Addis Ababa Ethiopia. Of Competence in Research(NCCR)North-South.269pp.
- Mitiku, H,Herweg,K,Stilhardt,B(2006). Sustainable Land Manegement:Anew Approach to soil and water conservation in Ethiopia Mekelle,Ethiopia:Land Resources Management and Environmental Protection Department (CDE),University of Bern,andSwissNational Center.
- Pretry, M.(2000).Third World Development. 2nd edition, New York
- Scoones, Ian. (2001), Dynamics and diversity of soil fertility and farming livelihoods in Africa.Case study from Ethiopia, Mali and Zimbabwe, London..
- Teferi A. (1992). “Resource use in Konso”. Sociology Ethnology Bulletin 1.22 to 25.
- UNEP(2009).Indigenous knowledge in Disaster management in Africa, Nairobi:, Kenya,
- Warren,D.M(1991).Using indigenous knowlage in AgriculturalDevelopment.World Bank Discussion Paper No.127.Washington D.C.The World Bank.
- Watson, E.E. (2009). Living Terraces in Konso Landscape, culture and Development. Oxford: James current.
- WiebkeF. (2003). Case study: The Agricultural System of the Konso in South Western Ethiopia. University of Singer Germany.
- Yohannes G/Michael (2014). Dynamics of localknowledge and innovations in adaptation to climate change and other pressures, Konso community, Ethiopia (on publication).

Zubair A.O. (2006). Change detection in land use and land cover using remote sensing data and GIS: A case study of Illorin and its environs in Kwara state unpublished MSC Thesis, university of Ibadan, Ibadan, 54PP.

<http://www.Aau.edu.et/land> management.

<http://www.unesco.org/en/list/1333>Konso cultural land scape – UNESCO.

[http://en Wikipedia. Org /wiki/konso-](http://en.wikipedia.org/wiki/konso) special woreda; Konso people

[http://Konsoda. Weebly. Com](http://Konsoda.Weebly.Com)

Appendixes

Wealth Ranke A

	Formers code	1				2				3			4				5					
	plot code	I	II	III	IV	I	II	III	IV	I	II	III	I	II	III	IV	I	II				
1	Location (village, river, road mountain)	VI	VI	R	Mt	VI	VI	R	R	VI	R	VI	R	Sch	Stdm	R	Mt	R	Stdm	R	VI	V
2	Areas size (ha)	1	0.25	0.25	0.5	0.25	0.25	1ha	0.5	0.5	0.5	1	0.25	0.5	0.25	1	1	1	1	0.5	0.5	0.25
3	Slope (flat, gentler or steep)	S	S	Fl	S	S	F	S	F	S	S	S	F	F	S	S	S	F	F	S	S	S
4	Type of soil poor, medium or fertile	F	Mdm	Fer	Fer	Mdm	Fer	Fer	Fer	Fer	Md m	Md m	Fer	Fer	Fer	Fer	Fer	Fer	P	Md m	Md m	Mdm
5	Micro climate Dega, Wainadega or Kolla	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K
6	Distance away from home in kms	0.25	0.1	0.1	6.125	0.3	0.2	0.5	1	0.5	0.5	6	1	1.3	0.5	0.5	No dista nce	6km	1	0.9	0.3	6
II	Crop types																					
7	Creasl	90	90	90	70	90	90	98	97	90	95	95	100	100	90	70	85	100	90	90	90	90
8	Oil seeds																					
9	Leguminous	10	10	10	30	10	10	2	3	10	5	5			5	20	14.5		10	10	10	10
10	Others														5	10	0.5					

Appendix

Wealth Ranke A

	Formers code	1				2				3			4				5					
	Plot code	I	II	III	IV	I	II	III	IV	I	II	III	I	II	III	IV	I	II				
III	Trees grown in no																					
11	coffee	5	4			35		2			4				4	35	4			2	12	
12	Chaft	3	2			10		5		1									2		10	
13	Fruits	1	1			10				2	3			70	297	20	349		4	2		
14	Moringa	3	5	3		5		6			5	12			3				8	1	1	1
15	Oybata	38	48	33	3				8	20				7	10	50		1	80	12	65	
16	Others				4	7						2		40		19		49		1	2	
IV	Terrace length																					
17	Length in meters	0.25	0.078	0.093	0.125	0.2	0.1	0.8		0.4	0.5	1.2			2	2	0.5					
V	Problems																					
18	Problems (Drought, fertility, pest and size)	D Fer P	D Fer	D Fer	D Fer	D Fer	D Fer	Fer	P	D Fer	D Fer	D Fer	D Fer	D Fre	D Fer	D Fer	Fer	D Fer p	D Fer	D Fer	D Fre	D Fer D

	Farmers code	1		2	3		4		5		6		7		8	9		10	
	Plot code	I	II	I	I	I	II	I	II	I	II	I	II	I	I	II	I	II	
1	Locations (village, river, round size)	Mt	Rv	Rv	V	Rv	M	Rv	Fore	Rv	Riv	M	R	Mt	Mt	V	V	V	
2	Areal size (ha)	0.25	0.375	0.6	0.4	0.125	0.125	0.25	0.25	0.25	0.25	0.125	0.5	0.5	0.25	0.375	0.25	0.375	
3	Slope flat, gentler or steep	S	F	F	F	S	F	F	S	F	S	F	S	F	S	F	F	F	
4	Type of soil	Mdm	Mdm	er	P	Mdm	P	M dm	P	Fer	P	M dm	Fer	M dm	P	M dm	M dm	M dm	
5	Micro climate Degawoinadega or Kolla	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	
6	Distance away from home in kms	1	3	1	1	1	1.5	5	3.5	0.5	4	3	1.2	6	6	0.5	0.5	0.5	
II	Crop types (%) of																		
7	Cereals	60	80	80	80	85	80	80	90	85	80	80	90	80	85	85	85	90	
8	Oil seeds											2							
9	Leguminous	20	15	10	15	13	15	15	10	15	5	15	10	15	11	15	13	10	
10	Others	20	5	10	5	2	5	5			15	3		5	4		2		

Appendix

Wealth Ranke B

	Farmer code	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
	Plot code	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I
1	Locations (village, river, round size)	Mt	Rv	For	Mt	For	Riv	Riv	Vi	Mt	Fore	Riv	V	Riv	Mt	Riv
2	Areal size (ha)	0.0125	0.125	0.125	0.0625	0.0625	0.125	0.125	0.125	0.125	0.125	0.125	0.06	0.3	0.125	0.125
3	Slope flat, gentler or steep	G	S	F	S	F	S	S	S	F	F	S	S	S	S	S
4	Type of soil	Mdm	Mdm	Mdm	P	P	P	P	Fer	P	P	Mdm	P	P	P	Mdm
5	Micro climate Degawoinadega or Kolla	K														
6	Distance away from home in kms	4.	1.3	1.25	1	1	2	4	1	1	3.5	1	1	1	1	1
II	Crop types (%) of			1.25	1	1	2	4	1	1	3.5	1	1	1	1	1
7	Creals	80	80	80	85	85	85	85	80	80	85	85	90	85	80	70
8	Oil seeds															
9	Leguminous	15	15	15	13	13	15	13	15	10	10	10	8	13		25
10	Others	5	5	5	2	2		2	5	10	5	5	2	2	15 27	5

Appendix

Wealth Ranke B

	Farmers code	1		2	3	4		5		6		7		8	9		10	
	Plot code	I	II	I	I	I	II	I	II	I	II	I	II	I	I	II	I	II
III	Trees grown in no	8															6	
11	coffee																	
12	Chaft																	
13	Fruits	5	2			3		15	4	8			12		7	18	4	11
14	Moringa	4	8	35		3	2	5	4	5	4	5	4	3	3	6	2	2
15	Oybata	15	36	10		11	14	26	11	12	28	21	17	16	22	13	11	8
16	Others					1			2		1	1		1				1
IV	Terrace length																	
17	Length in meters	0.125				0.045			0.125		0.012		0.125		0.125			
V	Problems																	
18	Problems (Drought, fertility, pest and size)	D Fer Si	D Fer Si P	D Fer Si	D Fer	D Fer Si	D Fer Si	D Fer Si	D Fer Si	D Fer Si	D Fer Si		D Fer Si	D Fer Si	D Fer Si	D Fer Si	D F Si	D F Si

Appendix

Wealth Ranke C

	Farmers code	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
	Plot code	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I
III	Trees grown in no															
11	coffee	1	3					4			3					
12	Chaft							3								
13	Fruits				2			1			1	2		3	2	
14	Moringa	2	2	2	2	1	1	1	2	2	2	2	1	2	2	
15	Oybata	7	7	4	8	11	3	7	8	3	3	5	3	1	3	
16	Others		1	1		1		1		1						
IV	Terrace length															
17	Length in meters		0.012	0.0125	0.0125	0.001	0.01	0.03	0.03	0.05		0.05	0.05	0.060	0.075	0.01
V	Problems															
18	Problems (Drought, fertility, pest and size)	D Fer Si	D Fer Si P	D Fer Si	D Fer Si	D Fer Si	D Fer Si	D Fer Si	D Fer Si	D Fer Si	D Fer Si	D Fer Si	D Fer Si	D Fer Si	D Fer Si	D Fer Si

