WOLKITE UNIVERSITY

COLLEGE OF SOCIAL SCIENCE AND HUMANITIES

DEPARTEMENT OF GEOGRAPHY AND ENVIRONMENTAL STUDIES

Assessment of Soil Conservation Practices and Challenges The Case of Bokoji Nageso Kebele,in Limu Bilbilo Woreda of Arsi Zone,Oromia Region ,Ethiopia

Senior Essay Submitted to The Department of Geography and Environmental Studies in Partial Fulfilment of The Requirement for The Bacholar of Art Degree(Ba) in Geography and Environmental Studies

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Declaration

Lalisa Chala and Juhar Mokonen do here by declare to Wolkite University Department of Geography and Environmental Studies that this thesis is a product of our original research work, and it has not been submitted to any other university for any academic degree. Any materials and information in a report other than our own are duly acknowledged.

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List Of Acronyms

A.S.L Above sea level

FAO Food Agricultural Organization

WFP World Food Program

BNKA and RDO Bokoji Nageso kebele Agriculture and Rural Development Office

WCO Woreda communication office,

PHCE Population and Housing Census of Ethiopia

SWP Soil and Water Conservation Programme.

UNDF United Nation Development Program

ABSTRACT

This study was conducted in Bokoji Nageso kebele in Limu Bilbilo woreda,Arsi Zone,Oromia,Ethiophia with the objective of identifying challenges that influence soil conservation practices and management on it. For in the study ninenty-one(91) respondents were selected from a total of 802 households sampled using simple random sampling. The information was obtained from both primary and secondary data sources. The primary data source was obtained through a questionnaire,an interview, and observation. While secondary data sources were obtained from reading materials,different books, and municipal offices. Both quantitative and qualitative methodologies were used to obtain realiable information.the result show that soil conservation practices and challenges influences the level of investment in soil conservation and the number of years of the household has spent farming as living the household labor. The elements that challenges soil conservation practices,ownership of land, and farmers on soil erosion are significantly related to improveing conservation practices to protect their soil from loss by using traditional and improved soil conservation practices.The researchers findings provide valuable insights for policymakers, extension workers, and other stakeholders to develop targeted strategies and interventions to promote soil conservation practices and management in the study area. Finally researchers tried to assess some problems with the soil conservation practices and challenges in the study area based on the respondents and some recommendations for the problem.

Keywords: Bokoji Nageso Kebele, The Study Area, Source

CHAPTER ONE

1. INTRODUCTION

1.1. Background of the study

Soil is a vital resource for the production of food, fibber and other necessities of life. A fresh crop can be grown to replace what is consumed the soil that produces are essential strong reactions occur when there are shortages of food products or other consumer items. The more gradual changes resulting from persistent processes such as soil erosion may escape attention despite their fundamental importance the long term loss of productivity caused by soil erosion should be of greater concern than temporary shortages (JAY and got, 2006).

Continued loss of soil in productivity of land due to lack less felling of trees, improper land uses and plugging of natural drains are causing increasing run off, reduced ground water recharge and sever erosion; this result not only valuable loss of top soil along with nutrients but also flood, sedimentation of reservoirs and wastage of precious water to the ocean (Tripathi, 2007)

The decreasing of soil nutrients in the ground has impact on agricultural productivity. Soil conservation practices are very important methods to maintain fertility of soil and produce sufficient agricultural output. It also lays great role in increasing soil nutrients, increasing painting activity and reduces expansion of poverty (Shiferaw and Holden, 2009).

In general soil conservation practices are used to increases living standard of peasantry and to transfer the resource to the next generation. Soil conservation initiatives must be basis of agricultural development in Ethiopia. They need to be re-oriented in terms of their nature, approach and scope (MORGAN, 2004).

According to Ackerman and Patten (1992:53), soil conservation is defined as "the practice of arresting or minimizing artificially accelerated soil deterioration". Its importance has grown because excessive cultivation of soil for agricultural production resulted in degradation. In addition to the pressure expected by the growing world population on the soil resource exacerbated the need for soil conservation since the 19^{th} century (Encyclopaedia of Science and Technology, 2000).

Although farmers are taking part in soil conservation practices. Thus the main focus of this study is to identify challenges that influence soil conservation practices and to assess the farmers' perception to these practices. Soil conservation activities must be motivated by innovative conservations not only to meet environmental requirements, but they are also economically attractive and fit in to the existing farming systems.

1.2. Statement of the problem

Soil erosion is one of the most serious environmental problems in the highlands of Ethiopia. The prevalence of traditional agricultural land use and the absence of appropriate resource (management often result in the degradation of natural soil fertility. This has important implications for soil productivity, household food security, and poverty in different parts of the country Teklewold and Kohlin, 2011).

Soil degradation in Ethiopia can be seen as direct result of past agricultural practices in its highlands and the processes of over cultivation, deforestation, and overgrazing lead to accelerated soil erosion (Hurni, 1993).

Human related activities such as deforestation ,overgrazing ,intensive cultivation ,cultivation of steep slope, soil mismanagement, socio-economic and political condition factor influences and accelerate soil erosion hazards (Lal,2013).

In the woreda, there was no study conducted regarding soil conservation and management practices,which are not equally successful or effective in Bokoji Nageso Kebele. Level of farmer's participation in soil conservation and management activities are influenced by inadequate expert follow-up , assistance and technical skills.There is a gap on the issue of traditional and modern soil conservation and management practices and what factors affect of soil conservation and contribution of soil management practices in the study area. Even though soil conservation and management technologies were promoted by Ministry of Agriculture and concerned non-governmental organizations, the extent of introduced soil conservation and management practices has been innot looked in to so far in the study area.

In an attempt to contribute in bridging the above-stated gap, the study would focus on soil conservation and management practices in the study area to assess existing soil conservation practices and management,identify the mechanisms of increasing soil fertility,and crop yields, and reduce soil erosion,and increase soil conservation awarenes in the study area.

1.3. Objective of the study

1.3.1. General objectives

The general objective of the research study is assessment of soil conservation practices and challenges in limu bilbilo worada

1.3.2 Specific objectives

- To explore the existing soil conservation and management practices of the communities in the study area.
- To identify the types of soil conservation practices in the context of their locality.
- To identify the major challenges of soil conservation practices in the study area.

1.4. Research questions

- ✓ What are the existing soil conservation and management practices in the study area?
- ✓ What is the types of soil conservation practices implemented in the study area?
- ✓ What are the major challenges of soil conservation practices on farm land?

1.5. Significance of the study

One of the major concerns of the developing countries like Ethiopia is the inability to provide its extending population with adequate food and subsistence. This population pressure has impacts on soil conservation. The study may be help to know challenges which soil conservation practices and challenges that soil conservation practices such as the attitude towards soil erosion, over grazing, high population pressure, slope and high rainfall etc. The government and non government agencies and researchers,policy makers to understand the major problems existing soil conservation practices and challenges in the study area.

1.6. Scope of the study

The study was delimited in terms of areal coverage to Limu bilbilo woreda specifically focused on Bokoji Nageso kebele. Because it was difficult to examine the assessment of soil conservation practices and challenges at the entire Woreda level for a student researchers.In addition to this it was expensive and time consuming to cover the whole kebeles of Limu bilbilo woreda. For this reason it would be limited to one kebele of the woreda from 32 kebeles. This kebele was Bokoji Nageso kebele.

1.7. Limitations of the study

When conducting research projects, there were some limitations is faced.In the course of study, the researchers faced by different problems,like being constrained by financial factors,Lack of time to accomplish the research,Unwillingness of respondents to give reliable information,lack of internet access,and lack of reference materials may be major problems.Therefore;the researchers have tolerated to getting required information from households,leaders,and offices,to reduce these influences of these limitations on the research.

1.8. Organization of the paper

This study was organised into five chapters. The first chapter covers the introduction part which includes background of the study, statement of the problem, objective of the study, research question,significance of the study, scope of the study,limitations of the study,and organization of the research report. Chapter two covers the review literature that includes different relevant and use topic. The third chapter is the research methodology and description of the study area. The chapter four is contains results, discussion, analysis,and interpretation of data. Finally, the fifth chapter contained summary, conclusion and recommendation of the overall process of research

CHAPTER TWO

REVIEW LITERATURE

2.1. Definition and concept of soil erosion

Soil is a natural resource which generates every year through the natural process. Soil erosion is the interred changeably used with land degradation; Soil erosion is the removal of soil by the action of wind of water. It is natural process that occurs without human intervention; but it has greatly exacerbated by cultivation of the land. Indeed, there was be serious erosion as farmers continue farming.(wild (1993).

Soil degradation, on the other hand is one of a complex process involving one or more of severe agents, erosion and actual removal by water and wind, chemical, physical and biological changes. Although soil erosion is a natural process, its intensity has been greatly increased by human activities that includes deforestation, poor farming, over grazing and mining etc (Eyualemental, 2006).

According to Hindson (2015) soil degradation is the cause of land degradation. The term land degradation can be defined in various ways in relation to soil erosion to describes, its negative impact on land productivity.

2.2. Soil Erosion in Ethiopia

Soil erosion is one of the most serious environmental problems in Ethiopia. The Ethiopian Highlands have been experiencing declining soil fertility and severe soil erosion due to intensive farming on steep and fragile lands and other factors attributed to population pressure (Hurni, 1993).Soil erosion by water is a phenomenon, which mainly occurs in the highlands of Ethiopia (areas>1500 MASL) which constitute about 46% of the total area of the country, 8 support more than 80% of the population, and account for over 95% of the regularly cultivatedland and about 75% of the livestock population (Bekele and Holden, 2008). Water erosion not only removes nutrients but also reduces thickness and the volume of water storage and root expansion zone (Abiy, 2007). Under extreme gully erosion, farm activities are extremely affected. The magnitude and rate of soil erosion continued to increase despite the considerable efforts made during the past three decades. Hence, many studies attribute water erosion, particularly on cropland, as a major cause for such a high level of soil erosion in Ethiopia (Bekele and Holden, 2010).

Ethiopia is one of the developing countries affected by soil erosion severity and is one of the most environmentally troubled countries in sub-Saharan Africa (Fitsum et al , 2002).

In Ethiopia, the largest proportion of the eroded land is situated in the *Woina-dega* agro-climatic zone where about 72% of cultivated land of the country is concentrated (Zewdie, 2011). Moreover, in the Ethiopian highlands, soil erosion and desertification are major issues since agriculture and deforestation have been practiced here for over 2500 years (Hurni,2005).

2.3. Cause of soil erosion

One could argue that soil management represent the underlying problem of land degradation, with soil erosion and nutrients deletion being twin of the most critical manifestation of unsustainable management and deforestation and livestock managements as key challenges of these problems. These includes production on steep slopes and fragile soil with in adequate investments in soil conservation of vegetation cover erratic and erosive rain fall parents declining use of follow limited recycling of dung and crop restore. Many factor underline these proximate of direct causes including population presser, poverty and limited access to agricultural inputs and credit, low profitability of agricultural production and many conservation practices are high risks facing farmers, fragmented land holdings and insecure land tenure, short time horizons of farmers and lack of information about appropriate alternative technologies (Lakew Desta 2000).

According to Hurni (1994), water erosion, wind erosion and physical and chemical deterioration are processes responsible for soil erosion and further he indicated that soil erosion by water and wind account for about 84% of all the damage. He has also indicated that 28% of all types soil erosion at the global level is caused by cultivation and 35% by over grazing and 29% are related to deforestation. Thus, soil erosion is caused in more than 92% of all causes by a variety of agricultural uses

2.3.1. Slope affecting erosion

Erosion increases dramatically because the increased angle facilitates water flow and soil movement. Data for assessment of the effect of slope gradient and length on soil erosion is limited. However, it is generally accepted that an increase in slope and slope length will increase erosion because they lead to an increase in overland flow volume and velocity. Runoff on low slopes flows slowly and quickly forms a water layer deep enough to act as surface mulch. Increasing slope length enhances soil loss as more runoff can accumulate on long slopes., identified that slope shape together with ground/field attributes exercise a strong influence on the nature and extent of visible erosion damage. Thomas (2006)

2.3.2. Rainfall and wind affecting erosion

Water erosion may take several forms, which include raindrop splash erosion, sheet erosion, rill erosion, gully erosion, and stream bank erosion. A surface running water is responsible for the formation of sheet, rill, and gully erosion. The initiating mechanism for surface erosion is heavy rainfall, during which the impact energy of raindrops break up soil aggregates and causes detached particles to move laterally by splash action (UN,20015). The extent of erosion is greatly affected by the size and impact energy of the rain drops, the soil structure, the steepness of the slope and particularly, on plant cover.

2.3.3. Population pressure affecting erosion

Population growth increases the demand for land and contributes to farming on steep and fragile soils, also leading to erosion problems. It increases demand for biomass as a source of fuel, leading to deforestation and increased burning of dung and crop residues, thus increasing the problems of erosion and nutrient depletion. Population growth increases demand for livestock products and therefore leads to increased livestock numbers, causing overgrazing and consumption of crop residues by animals (Baland and Platteau, 2001).

2.4. Consequence of soil erosion

Degradation of soil has become an alarming global environmental problem treating a sustainable development in most developing countries. But the depletion of soil resources by erosion might be the most series long term the productivity land; Soil erosion which may be called the creating death of the soil. It affects the land from which soil is washed, damages the area downstream by flood and is detrimental to the economy because it lowers the overall income of the farm. The problem of soil erosion is a serious concern with the distinction of forest. Erosion along the mountain roads causing landslide is such serious problem that the vital lines of communication are distorted. Large sum of many is spent every year on hills to keep the roads open (Anonymous, 2010).

The impact of erosion on crop yield is through changes in soil chemical characteristics and/or changes in soil physical or structural characteristics (FAO, 1999). One of the most wide spread examples of the former is the loss of soil nutrients through removal of top soil due to erosion because the highest concentration of nutrient necessary for plant growth is found in the upper layers of the soil. Thus, the loss of this layer results in the decrease in soil nutrient reserve. This situation is more serious on soils with low level of natural fertility, as is the case inmuch of the tropics (Sanchez and Logan, 2014)

The MoARD and World Bank (2007) stated that the minimum annual cost of soil erosion

ranges between 2 and 3 percent of the national agricultural GDP. This also clearly shows the extent to which soil erosion is a contributory factor to the country's structural food insecurity problem.

2.5. Current approaches of soil conservation in Ethiopia

In Ethiopia the soil conservation program is a recent phenomenon. Astra was made in early 1995s; serious attempts on large scale however, were delayed until the early 1996.

When assistance of the world food program (WFP and UNDF/FAO) became available initially conservation work was concentrated in severally degraded areas with reclamation measures and forest planting. As the major trust was on reclaiming degraded lands scant attention was paid preventive measures on productive land where the problems spread. The direction of the government on soil and water decisions which might be rejected by the farmers any way, by not having identified appropriate perception of the surrounding the advisor need to make sure they are aware of the circumstances well in advance (Chanaboakol, 2008).

Soil conservation has the potential to contribute sustainably too reserving the degradation of the productivity capacity of land. So while conservative initiative must be the basis of agricultural development in Ethiopia's they need to wards sustained agricultural out of strategies need to be based on new approaches (Sanders,2010).

2.6. Types of soil conservation practices

2.6.1. Traditional soil conservation practices

The object of traditional soil management practices give us an understanding of farmers way of thinking .The aim of farmers does not necessarily corresponding with the aim of the scientist .Some practices are simply good farming practices that happen to leaves soil erosion (World Bank,2008).

Traditional knowledge is a product of the culture and cognition of people that operate independently of Western ideas (G. Hewson, 2015). In Sub-Sahara Africa, soil management has a long tradition. Indigenous techniques from the pre-colonial era focused on erosion control in combination with water conservation by ridging, mulching, constructing earth bunds and terraces, multiple cropping, fallowing, and the planting of trees (Abaidoo et al., 2008).The types and intensity of the management practices to be implemented at a given farmland depends on the nature of the climate and topography where the farmland is located (Girmay et al., 2008). The traditional soil managements are simple structures of a short-term

nature that could be reshuffled each year to make use of the soil captured above the structure and avoid rodent production (Wagayehu, 2003).

2.6.2. Biological and Agro-economic Conservation practices

Organic fertilizers such as animal manures, green manure, and compost are likely to not only provide plant nutrients but also increase soil organic matter and reduce erosion (Stombaugh and Shearer, 2000). The study by Nyakataw., et al. (2000) also found that applica-tions of animal manure promoted good emergence, vigorous growth, and high yields of cotton and helped control erosion

Bio-chemical soil conservation practices can encompass the loss of nutrients and organic matter, sanitization, acidification and pollution. Global analyzes recognize that such less 18 visible change in soil properties are critical in affecting crop yields and that mentoring system need to involves to focus on key parameter such as soil organic carbon contents and integrated nutrients management approaches (Muller et al. ,2012).

Several soil function and properties are controlled by the content, characteristics and dynamics of the soil organic matter .Thus, increased in soil organic matter can be associated with the improvement of soil fertility and productivity (Johnston et al.,2009) and with the amelioration of major environmental issues such as climate change (Powlson et al .,2011)

Biological soil conservation practices such as soil microbial and enzymes activities ,are directly involved in soil organic matter dynamic and thus highly correlated with soil organic content as well as the main source of soil enzymes (Kladivko,2001)

2.6.3 Physical soil conservation practices

Structures for soil conservation on crop land are permanent features formed from earth, stones or masonry that are designed to protect the soil from run-off water and erosion and to retain water where it is needed. The most common conservation structures include: cut-off drains, water ways, tie ridges, terraces, retention ditches, graded and non-graded channels/drains (Woldeamlak, 2006). Soil conservation drains are of different types depending on the intended purpose. For example, graded channels are constructed with recommended gradient aimed at deviating excess water out of the farm with the speed which was not cause erosion. These channels are suitable in areas with high rainfall. Contour bands are another type constructed with zero gradient aimed to reduce the speed of run-off water, trap the soil particles and allow water to infiltrate in the soil (Eleni, 2008; John, 2008). Contour bands are suitable in areas with moderate rainfall. Tie ridges are constructed in such a way that the channels are tied to allow water collection and increase water infiltration in

order to improve moisture content in the field. Tie ridges are practiced in arid and semi-arid areas which experienced less amount of rainfall (Woldeamlak , 2006).

2.7. Major challenges of soil conservation practices

Among the many socio-cultural factors influencing the sue and management of land as well as resource conservation practices some of the most important are the farmers perceptions, knowledge and attitude perception refer to an individual awareness of objectives event relationships and processes in the environment knowledge on the other hand is what the individual is familiar with takes as fact or grated and also to hit long standing information and recently learned sets of skill and resource management practices (Belay,2014).

Different studies those Ethiopian farmers have over the centuries invested in soil and water conservation measures. The perception of the farmers towards resource conservation is affected by different variables. Studies in the field revealed that from a number of challenges that affect farmers perceptions insecurity of land holding is the one other studies also showed frequent land redistribution affect not only one the economy and ecology Ethiopian society, especially the rural farming community, but also the cultural perception of person hood with regard to resource conservation practices (sufctiffe,2000).

On the other hand farmers have good knowledge about soil conservation and its effects since early ages and they made efforts to reduce or to stop there hazards for several years in most parts of Ethiopia.

Conso people for instance, exerted their effort and control soil erosion by means of traditional soil conservation measures. In the northern part of the country, there are also traditional conservation measures that practised for long period of time (hurn, 2018).

Many researchers have been interested unknowing what factories farmers perception of erosion problem sued farmers are a wide perception of the problem of soil erosion in parabolic analysis. Ethiopia farmers are reported to be aware that soil erosion is a problem. Despites awareness farmers continue to use erosion land management techniques unless provides with incentive to under taken soil conservation. The reason for this could range from short time liquidity problems to administrations. Although traditional conservation have a long history in the Ethiopia high lands there is decreasing with time expect in few a years in the south.

CHAPTER THREE

METHODS AND MATERIALS

3.1. Description of the study area

Limu Bilbilo woreda is found in the Arsi zone of Oromia region. It is part of the former Bekoji Woreda in the East Arsi zone which was divided into EnkoloWabe and LemuBilbilo

Woreda,which is located about 235 km southeast of Addis Ababa, 56 kilometers south of Asella.(Arsi Zone office of Road and Transport, 2016).

The total population for this Woreda was 180,695, of whom 89,352 were men and 91,343 were women; 23,340 ,or 12.92% of its population were,urban dwellers,(PHCE, 2007)

This woreda have 32 kebele Of which,twenty seven (27) are rural kebeles,while the other five (5) are urban kebeles.

Bokoji Nageso kebele is one of the thirty two (32) kebele in Limu Bilbilo woreda.

3.1.1. Geographical locations of the study area

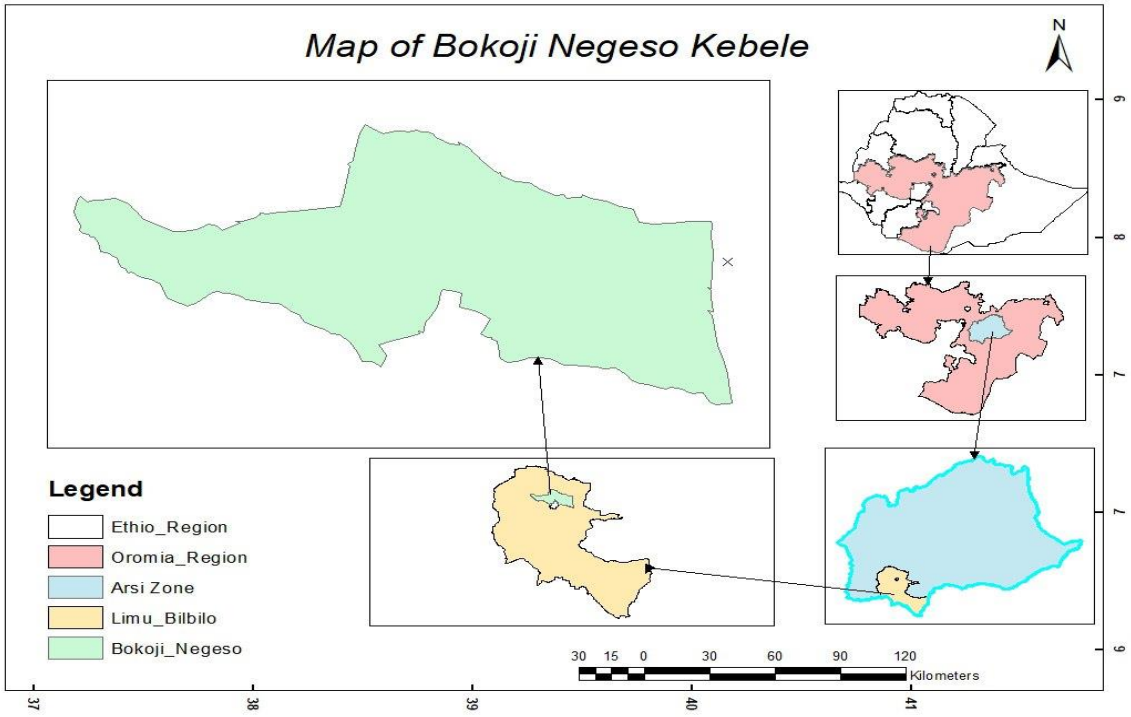
3.1.1.1. Relative location of the study area

Bokoji nageso kebele is one of the thirty two kebele in limmu bilbilo woreda that are found in arsi zone.Bokoji nageso is located, 56 kilometers south of Asella, and 50 kilometers east of Lake Langano.

3.1.1.2 The absolute location of the study area

Bokoji nageso kebele is one of the thirty two kebele of limmu bilbilo woreda that is found in Arsi zone . Its absolute or geographical coordinate system is 07° 29'35"N latitude and 39°15'21"E longitude. Bokoji Nageso kebele is located at an altitude of 2876masl((BNKA and RDO).

Figure 3.1 Map of the study area



Source: researchers 2024

3.1.2 Economic Activity

The economic activities of Bokoji Negeso kebele are dominated by agriculture. Agriculture in the kebele characterized by traditional and ox plough. Agriculture is supplemented by other activities such as trade and planting of fruits and vegetable around their home. The kebele includes both crop and livestock production. The Major crop types are barley, wheat, linseed, bean, pea, and etc. While the livestock includes cattle, sheep, caw, horse and etc. (BNKA and RDO, 2007).

3.1.3. Population

The total population of the area was increased from time to time. According to 2007 report of the total population of the area was recorded as 7090, from this 3950 was males and 3140 was females. The total number of households 802, from this 701 were males and 101 were females. (BNKA and RDO, 2007).

3.1.4. Topography

The topography of Bokoji Nageso kebele is varies including flat and gentle undulation and plateaus, hills, valley and mountain chains, (BNKA and RDO, 2007).

3.1.5. Climate

The climate condition of Bokoji Nageso kebele was dega and woynadega. Although the kebele has annual rainfall of 1100mm-1800mm and temperatures ranges minimum of 6°c in October to maximum of 26°c in March means that approximately 80% of dega and the remaining 20% of woynadega. Its elevation is tangling from 2200 and 4100 A.S.L (BNKA and RDO, 2007).

3.1.6. Soil types

The main soil types in Bokoji Nageso kebele are red soil, black soil and silt soil, which accounts 85%, 10%, and 5% respectively (BNKA and RDO,2007).

3.1.7 Land Use

In this area most of the farmers fixed farming system based on rained agricultural. The major seasonal crops are barley, wheat, linseed, bean, pea, and etc. There is medium livestock rearing in the study area which are cattle, sheep, horse and caw. There are different types of wild life which are including monkey, hep, fox, and hyena are available in the area. The different land use system in the kebele. Some of them are described as follows.

Table 3.1 Types of land use system in Bokoji Nageso kebele

No	Type of land use	Area coverage(heck)	Area cover(%)
1	Farm land	1921	78.24
2	Forest land	354	14.4
3	Grazing land	175	7.13
4	Other land	5	0.2
Total		2455	100

3.2. Methodology

3.2.1. Research design

The study was employed using a descriptive research design. Because a descriptive research design provides a detailed and accurate picture of the characteristics and behaviors of a particular population or subject in the study area.

3.2.2. Research Approach

In this study was use both qualitative and quantitative (mixed research method). In the researchers was employed at the same time in mixed the researchers would be used interview, questionnaire, and field observation. On other hand, quantitative method was used to analyzed data that have numerical values like percentsge and table.

3.2.3 Sampling techniques and sampling size

3.2.3.1. Sampling techniques

The researchers were used simple random sampling techniques from the whole population.the use of this simple random sampling technique it provides to give equal chance of for all population. In general, this technique was preferred from other sampling system in order to avoid bias, to make sample more representative and to save time and money. For the purpose of this study in bokoji Negeso kebele was be selected simple random sampling from Limuu Bilbilo woreda

The reason for selection this study area, the area faces conservation of soil practices and challenges for soil from the area in time to time. Also the study area has enough information about the soil related conservation activities of the soil.

3.2.3.2 Sampling size

The data were conducted by selected from the total number of 32 kebele exist in Limu Bilbilo woreda. The researchers was study in special case of Bokoji Nageso kebele.The sample were collected simple random techniques which is the type of probability sampling that researchers must ensure all the number of the household as have equal chance of being select.

The study area total population is 7090 and the total households of this kebele 802 and there are 802 those households heads the researchers selected 91 household respondents by using lottery method .

Which Provides randomly selected in the first unit of sample in simple random sampling techniques because to reduce to time and money of the researchers. The researchers determined the Sample size by using Katherine's sample size determination formula.

The sample size was be draw

$n = N/1+N(e)^2$

$n =802/1+802(0.099)^2$ Where N= total household

$n= 802 /1+802(0.009801)$ n =Sample size

$n= 802/8.860402$ e= margin error

$n==90.51508046700364\approx91$

3.2.4. Data source

This study employed both primary & secondary data sources. The study would be collected the primary data by using questionnaires, interview & field observation.secondary data sources like the secondary data sources like documents of woreda administrative office and publication (Like book ,Journals ,research reports) and papers, magazines books, internet, published and unpublished materials

3.3. Method of data collection techniques

To collect necessary information, the researchers were used the following data collection methods and tools.

3.3.1. Questionnaires

Research designs were the most important research designs in quantitative research.information can be obtain through household surveys when a researchers need quantitative data.using this method information was collected through the administration of questionnaires having both open ended and close ended.The questionnaires were the method of data collection which requires clearing and define questions distributed to respondents to the questionnaire by using simple random sampling.

3.3.2. Interview

The researchers believe that information obtained from the questionnaires is not enough finalizes the study,as it necessary to collected data with important people to take more information that may not be obtain otherwise.this interviews were also conducted with key informants such as from Woreda agriculture, rural development office and community elders of the respective sample woreda were collected.These interviews provided in-depth information on the history, context, and challenges of soil conservation practices in the study area.it is asking verbally situation to collected data and to obtain any relevant information.

3.3.3. Observation.

Field observation is the important technique to collect original data.This is because sometimes the information of the research gathered from the informants may contradict with what the real situation. Therefore, observation was supplemented to get better information from original sources.

3.4. Methods of data analysis and presentation.

After the necessary data is collected from the respondent the researchers is analysis' and summarized the Qualitative and Quantitative methods, the data collected is processed and analyzed through in manually by using simple statistical tools like frequency ,table, graphs, percentage& also descriptive way personal Judgment is made on the collection of data.

CHAPTER FOUR

DATA ANALYSIS AND INTERPRETATION

Introduction

This chapter describes the result and interpretation of the study. The data obtained from the respondent was analyzed in the form of a table and percentage. This chapter also contains three objectives: existing soil conservation practices and management,challenges of soil conservation practices,and types of soil conservation practices in a study area.

4.1.Existing soil conservation practice and management in the study area

In the study area of Bokoji Nageso kebele, soil conservation practices and management play a crucial role in addressing soil erosion, enhancing soil fertility, and promoting sustainable agricultural practices. Farmers in the area have adopted various soil conservation measures to protect their land resources and improve crop productivity. These practices are essential for maintaining the health of the soil, mitigating the effects of erosion, and ensuring the long-term sustainability of agricultural activities in the kebele.

4.1.1. Soil conservation practices

Table 4.1.Respondent distribution based on soil erosion problems in the Bokoji Nageso kebele

Dou you think soil erosion is a problem in bokoji nageso kebele	No of respondents	Frequency	Percentage
	Yes	60	80
	No	31	50
	Total	91	100

Source: Field survey (2024)

Table 4.1 shows that 60 (80%) sampled respondents confirmed that soil erosion is a problem in Bokoji Nageso kebele. The sampled respondents of 31 (50%) do not believe soil erosion exists. As we can see from this table, the majority of the sampled respondents, 80%, acknowledged that soil erosion is a problem in Bokoji Nageso kebele. This high percentage indicates that soil erosion is a widespread concern among the farmers in the area. The result of this interview is that farmers have a sufficient understanding of soil conservation.

4.1.2.Respondent participation

Table 4. 2.R**espondents distribution based on involve in soil conservation practices.**

Did you participate in soil conservation practice	Response	Frequency	Percentage
	yes	36	45
	no	55	70
	total	91	100

Source: Field survey (2024)

Table 4.2 shows that 36 (45%) sample respondents are involved in soil conservation practice, and 55 (70%) sample respondents are not involved in soil conservation practice. It indicates that a majority of the sampled respondents, 70%, are not involved in soil conservation practices. This high percentage suggests that there is no significant level of awareness and adoption of soil conservation measures among the farmers in the study area.

4.1.3. Age distribution of the households

Table 4.3..**Distribution of the household sampled**

Age distributiobn of farmers	No of respondents	Percentage
24-36	40	70
37-46	25	45.3
47-56	15	25
56-65	11	20
Total	91	100

Source: - Field survey (2024)

The table shows that out of the total 91 sampled respondents, 70% were found within the age groups of 24-36 years. 45.3% found age between 37 and 46 years. 25% found between 47 and 56 and 20% found the age of 56 and 65. Given that a large proportion of the population falls within the working-age group, So, as the interview concluded,the people of the study area need good soil conservation practices because of the high number of working-age groups.

4.1.4. Age of farming experience of sample farmers

Table 4.4 Age of farming experience of sample farmers

Age of farmer experience	No of respodents	Percentage
23-36	50	75
37-40	25	40
41-54	5	12
55	11	25
total	91	100

Source: - Field survey (2024)

According to table 4.4, 75% of the total sampled farmers are between the ages of 23 and 36, with approximately 40% falling between the ages of 37 and 40. The remaining 12% and 25% are found in the age range of 41–54 and >55, respectively. In Bokoji Nageso Kebele, the majority of people live in a very steep, sloped topographic area, and their activities depend on mixing agriculture. As the table attempts to explain, the people have some awareness of soil conservation practices. In order to fulfill their needs and for survival, people start to tailgate at a young age. Because of this, land soil erosion is severe in the past and medium in the present (BNKA and RDO, 2008).

4.1.5. Respondents of distribution based on sex

Table 4. 5. Respondents of distribution based on sex

Sex distributuion	No of respondents	Percentage
male	55	71.66
female	36	50.33
Total	91	100

Source: - Field survey (2024)

As shown in table 4.3, The majority of the respondents are male (71.66%); the rest of the respondents (59.33%) are female from the total population of respondents in Bokoji Nageso kebele. This gender imbalance in the sample suggests that male farmers are more likely to participate in research activities related to soil conservation and management practices. This indicates that there are gender disparities in access to information, resources, and decision-making power in soil conservation practices in Bokoji Nageso Kebele.

4.1.6. Respondents of distribution based on religion

Table 4.6.Religion of the household

religion	No of respodents	Percentage
Orthodox	45	55.33
Muslim	30	45.33
Protestant	16	30
Total	91	100

Source: - Field survey (2024)

Table 4.4 shows that out of the total 91 sampled respondents, 55.33% were orthodox households. The remaining 45.33% and 30% were Muslim and Protestant households, respectively. Thus, according to the study results, more of the of the sampled farmers were orthodox. It can be concluded from these results that orthodox Christian farmers are more likely to participate in research activities.compared to farmers from other religious backgrounds. This is because the majority of people in this region are orthodox.

4.1.7. Level of Education

Table 4.7.Level of education of the sampled household

Leve of education	**No of respondents**	**percentage**
illitrate	50	70.33
Read and write	20	46.67
Secondary school	26	35
total	91	100

Source: Field survey (2024)

The above table indicates that out of the 91 sampled respondents, 70.33% were from ill-treated households. About 46.67% have read and written, and the remaining 35% were in secondary school. This table indicates that more sampled farmers or households in the study area were ill-treated households. This suggests that a significant portion of the population in the study area does not have basic education. This has an impact on their ability to access and understand information related to best agricultural practices, soil conservation,and other critical aspects of sustainable farming.

4.1.8. Family size of sample farmers

Table 4.8.Family size of sampled households

Family size	No of respondents	percentage
1-3	35	50.6
2-5	25	40.6
6-9	15	22
10-12	16	23.6
total	91	100

Source: - Field survey (2024)

Table 4.6 shows that out of the total 91 sampled respondents's 50.6% (have 1-3) family size. About 40.6% of them also have between 2 and 5) family sizes. The remaining 22% and 23.6% have family sizes of 6–9 and 10–12, respectively. This is because the large family size in the study area is capable of working, but it does not have an understanding of soil conservation practices and management.

4.1.9 Marital Status

Table 4.9.Marital Status Of The Sampled Household

Marital status	No respondents	percentage
Married	40	60.6
Unarried	25	35
Divorced	15	24
Widowed	11	20.6
total	91	100

Source: - Field survey (2024

Table 4.7 shows that out of the total 91 sampled respondents, 60.6% were married, and 35% were unmarried. Although the percentage of sampled farmers's distribution of divorced and widowed was 24% and 20.6%, respectively, So as the researchers concluded, the marital status of the study area was about 60.6%, and those had soil conservation problems. As we can see from here,that leads to increased population growth and increased soil erosion. This can be solved by sufficient public and government participation

.4.2. Type of soil conservation practices implemented in the study area

4.2.1 Traditional soil conservation practices

Table 4.10.Respondents distribution based on use compost.

Dou you use compost	**Response**	**frequency**	**percentage**
	Yes	**60**	**78**
	No	**31**	**48.33**
	Total	**91**	**100**

Source: Field survey (2024)

Table 4.10 shows that out of the total respondents, 60 (78%) sampled respondents use compost, and 31 (48.33%) sample respondents do not uses compost.reveals that a majority of the sampled respondents, 78%, are using compost as a soil amendment in their farming practices. Compost is a valuable organic fertilizer that can improve soil structure, fertility, and overall health. The high percentage of farmers using compost suggests a positive trend towards sustainable agricultural practices in the study area.

4.2.2. Physical soil conservation practices

Table 4. 11.Physical soil conservation practice

Types of soil conservation	No of Respondents							
	Upper slope		Medium slope		Lower slope total		total	
	no	%	No	%	No	%	No	%
Soil bound	10	25	15	25	10	6	35	45
Stone bound	4	2	3	15	7	14	14	30
Check dam	-	-	8	20	8	22	16	25
Cut-off dam	5	20	5	25	6	12	16	23
terracing	4	10	4	15	2	6	10	20
total	23	100	35	100	33	100	91	100

Source: Field survey (2024)

Table 4.11 shows that out of the total of 91 sampled respondents, 45% of farmers used soil bound, and 30% of farmers used stone bound. The remaining check dam, cut-off drain, and tracing are 25%, 23%, and 20%, respectively. Because in the study area, we are always using these soil conservation types. The high usage of soil bunds and stone bunds indicates that

these practices are well-accepted and effective soil conservation methods in the study area. Soil bunds are earthen barriers constructed along the contours of sloping land to prevent erosion and retain soil moisture, while stone bunds use rocks or stones to achieve a similar goal.4.2.3. Biological soil conservation practices

Table 4. 12.Use of biological soil conservation practices by sampled household

Biological conservation	No of respondents							
	Upper		Medium		Lower		Total	
	No	%	No	%	No	%	No	%
Inter cropping	11	5	10	15	12	20	33	50
Grass strip	8	15	6	10	10	10	24	35
Crop rotation	4	20	5	25.5	8	5	17	25,5
Mixed cropping	3	15	2	12	2	13	7	14.7
planting	4	23	2	10	4	10	10	15.5
	30	100	25	100	36	100	91	100

Source: Field survey (2024)

Table 4.12 shows that out of the total 91 sampled respondents, 50% of farmers were intercropping farmers, and other farmers were using grass strips, crop rotation, mixed farming, and planting activities, which account for 35%, 25.5%, 14.7%, and 15.5%, respectively. Thus, a biological type of soil conservation practice was not practiced because of a shortage of farm land. In general, biological practices involve the use of vegetation and soil tillage activities.

4.3. Challenges of soil conservation practices

Table 4. 13.Challenges of soil conservation practices

Challenges of soil conservation	No of respondents							
	Upper		Medium		Lower		total	
	No	%	No	%	No	%	No	%
Slope of land	10	10	-	-	10	10	20	40
Economy	12	25	2	10	9	15	23	35
Shortage of farm land	8	15	7	20	-	-	15	25
Lack awareness	4	-	5	10	-	-	9	22
Lack of skill man power	3	15	5	25	1	5	9	20
High rainfall	-	-	-	-	-	-	-	-
Food	3	10	1	2	-	-	6	15
healthiness	3	10	2	10	4	-	9	20
Total	43	100	22	100	26	100	91	100

Source: - Field survey (2024)

The above table shows that out of the total 91 sampled respondents, 40% of farmers said that slope of land and 22% lack of awareness are challenges in the study area. Farmers also say that economy, shortage of land, lack of skilled manpower, food, and healthiness account for 35%, 25%, 20%, 15%, and 20%, respectively. The major challenges in the study area were high rainfall, food problems, and a shortage of farm land. In general, from the above table, the main challenges to soil conservation practices are slope of land and economy in the upper area, but high floods and foods are challenges in both the medium and lower areas.

4.3.1. The farmers should apply soil conservation practices.

The magnitude of the erosion hazard, as pointed out by the farmers and as indicated by, is so greater in the cultivation field. Therefore, one of the expectations of farmers for this problem is soil conservation. Farmers of Bokoji Nageso Kebele, especially those who live on upper and medium slopes of land, have practiced different types of physical and biological methods to tackle erosion problems since the earliest time. With regards to government-sponsored soil conservation structures, sampled farmers were asked different questions. First, they were asked whether they wanted to apply soil conservation structures to tackle the problems of erosion or not. The majority of the respondents said that they wanted to have erosion control measures in the cultivated fields.

Table 4.14.The farmers to apply soil conservation practices cultivated by sampled households

Attributes			
Farmers that not wanted to apply soil conservation measures in the cultivated field	No Of Respondent	Frequency	Percentage(%)
	yes	51	70.66
	no	40	30.33
Total		91	100

Source: - Field survey (2024)

As indicated by the above table, 70.66% of sampled farmers do not want to apply soil conservation practices because these farmers have a very small plot of land and 40 other farmers lost parcels of land. About 30.33% of sampled farmers wanted to apply soil conservation measures in the cultivated fields. These farmers were also further asked what types of soil conservation they wanted. The sampled farmers reported that they wanted to apply terracing (on the upper), cut-off drains (in the medium), and soil bund (in the lower land).

4.4.Analysis of Interviews

4.3.1 Determinant factors to soil conservation practices

The researchers interviewed the respondents to determine the major factors influencing soil conservation practices in the study area. According to the respondent interview results, there are various economic, social, institutional, and physical factors that determine proper soil conservation practices in the different parts of the countries as well as in the study area. These major economic factors affect conservation practice, such as level of income or capital, farm land size, and access to credit. The major institutionally related factors that determine conservation practice in the study area show the government and NGO's aid and support for conservation practice in the former state. The respondents were affected by the lack of access to extension services in order to conserve soil. There are many physical or natural factors that determine the practice of soil conservation. The nature of the soil, slope of the farm land, biologic nature of the soil, and farm distance were affected both positively and negatively. The practices of soil conservation in the study area revealed that there were different physical-related factors that determined the soil conservation practices in the study area. The majority of respondents replied that their soil conservation practices are affected by the slope of the farm.

4.3.2 Measures for soil conservation problem

The majority of farmers in the study area adopted a range of land management and soil conservation practices. Farmers are able to sustain their productivity over extended periods of time by using those strategies. Numerous farmers in the study area are engaged in various soil conservation and management activities with the support of various stakeholders, including the local government, NGOs, policymakers, extension workers,inform policy decisions, agricultural extension services, and community outreach efforts aimed at promoting sustainable soil conservation practices in the study area. The study area primary of soil conservation practices are area enclosure, agroforestry, and soil and water conservation. The following can be used to summarize the findings of the analysis of the key informant interview, sampled households' responses, and questionaries regarding the measures taken to soil conservation and their implications for land productivity practices:

CHAPTER FIVE

CONCLUSION AND RECOMMENDATIONS

5.1. Conclusion

Based on the study was identified assessed the challenges of soil conservation practices in Bokoji Nageso kebele. This study is focus on assess the challenges of soil conservation practices.

As the survey result show the whole household have family members and majority of they have married and some of them are unmarried. The majority of populations are married in the respondents. The labour availability plays a great role in agricultural and soil conservation activities but due to physical and socio-economic challenges there are labour shortage on the area since agriculture is the main source of rural area, crop production and livestock rearing are the core activities on that area.

The study area is characterised by more or less ragged topography with high rainfall and scarcity of arable land resources includes soil. The sampled farmers indicated that land degradation, high flood, problem of food, topography of land, shortage of farmers the major challenges of the respondents as pointed out on the analysis part. Those are the major constraints that challenge soil conservation structure and crop productivity. In addition to the above challenges steepness of the land, lack of skilled man power, lack of community awareness, healthiness, poor method of cultivation and poor management techniques were enumerated by the farmers in descending order as the major cause of soil erosion.

Farmers used different ways of improving soil fertility for increasing crop productivity. There are grass strip, crop rotation, mixed farming and planting due to shortage of land. The different soil conservation was constructed reduced soil erosion in the study area. However, most farmers are illiterate of design of soil conservation structures. Hence a considerable amount of physical structure is low through farming activities and sometimes farmers deliberately fail the structures. Moreover most farmers are skilled to maintain the soil conservation study structure of the help government organization grain and soil for their work.

A significance influence on the socio-economic development of the study area is fragmentation of plot, tenure insecurity which has an implication on degradation of land and productivity.

5.2. Recommendations

The finding of the research indicates that there is increasing soil conservation practice problem in the study area. Different soil conservation and management activities are being practiced in order to conserve resource base and to maximize agricultural production.The aim of the study was more attend the constraints of adopting of soil conservation practices to perform correctly some problems must be solved.

- ✓ The farm plot size of the area is way smelled less productive and more farmers prone to covertly, the government should be aware about the problem and tried to expand off-farm activities.
- ✓ The land tenure system of the household, were supported by certificate cards but farmers are very low practices, thus the government and other institution bodies should give information to the farmer as well.
- ✓ The crop livestock management of the area is no well thus; any responsible agencies must give attention and managed property.
- ✓ Strengthen collaboration between government agencies, NGOs, and local communities to address soil erosion challenges.
- ✓ The whole farmers were to adopt the new technologies but there is a better than the government should be avoid such barriers.
- ✓ Local government should have priority to town for facilitating soil conservation:in order to attract governmental and private investors.
- ✓ Community mobilization to improve soil fertility through the application compost should be given due consideration to reduce the rising expenses of that farmers are incurring as a result of increasing cost of chemical fertilizers.

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APPENDIX

WOLKITE UNIVERSITY

Faculty of Social Science and Humanities

Department of Geography and Environmental Studies

Dear Respondent

This questionnaire is prepares to study the challenges of soil conservation practices in Bokoji Nageso kebele. So, that your genuine information is important for the purpose of this study. Be sure that this information only for the academic purpose.

part 1 Background information of the respondents

1. Sex: A. Male B. Female
2. Age: A. 24-36 B. 37-46 C. 47-56 D. 56-65 E. >6
3. Religion: A. Orthodox B. Protestant C. Muslim D. Other
4. Marital status: A. Married B. Unmarried C, Divorce D. Widowed
5. Education background: A. Illiterate B. 1-4 C. 5-8 D. 9-10 >10

Part 2 Question related to soil conservation practices and challenges

1. Do you think soil erosion exist in Bokoji Nageso kebele?

A. Yes B. No

2. Do you involve (participate) in soil conservation practices?

A. Yes B. No

3. If question No two your answers "yes" in what types of soil conservation practices?

A. Mechanical soil conservation practices B. Biological soil conservation practices

C. Agronomical soil conservation practices D. All

4. Do you use different soil conservation technology in your farmers?

A. Yes B. No

5. If question No four your answer is "yes" which of the following conservation technology you adopt?

A. Soil bound B. Stone bound C. Check dam D. Cut-off drain E. Terracing

6. Do you use compost?

A. Yes B. No

7. If question No sex your answer is "yes" what is the reason you use compost?

A. To increasing the productivity of the soil B. Minimizing cost

C. It is important for land that artificial D. All

8. What are factoring that affecting soil conservation practices in Bokoji Nageso kebele?

A. Slope of the land B. Low skill human power

C. Low participation of community D. All

9. How you used biological soil conservation practices?

A. Yes B. No

10. If question No (9) answer "yes" make order the following biological soil conservation techniques based on their uses.

A. Inter cropping B. Grass strip C. Crop rotation

D. Counter ploughing E. Planting F. All

11. Which one is the best soil conservation practice in Bokoji Nageso kebele.

A.Mechanical (physical) soil conservation practices B. Biological soil conservation practices C. Agronomic soil conservation practices D. All

Part 3 Interviewee questions

14. What are the factors affects soil conservation.....?

15. What are you and society that contribute to privation to soil conservation.....?

16. What major that take to prevent soil conservation.....?