ADDIS ABABA UNIVERSITY

COLLEGE OF SOCIAL SCIENCES, POSTGRADUATE PROGRAMS DEPARTMENT OF GEOGRAPHY & ENVIRONMENTAL STUDIES

ASSESSMENT OF SOIL FERTILITY DEGRADATION AND MANAGEMENT PRACTICES IN GIMBO DISTRICT, SOUTHERN ETHIOPIA

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ABSTRACT

The main concern of this study is to assess households' soil fertility degradation and management practices in Gimbo district, southern Ethiopia. In order to attain the above specified objectives both primary and secondary data were emphasized. The techniques of collecting primary data sources include structured household survey, discussion, field observations and interview. Secondary data were used from published and unpublished resources like research reports, journal articles, books and electronic documents. Purposive sampling method used to select sample Kebeles. Sampling technique was employed to choice farm household participants under each sample Kebeles. The data was analyzed using percentage mean, frequency and qualitative approach The majority of farm household respondents use soil fertility management measures to boost up their production. Soil fertility management activity was more dependent on the application of inorganic fertilizer which cannot alone ensure productivity of the land under cultivation. Farm households practiced crop rotation and intercropping, grass strip, contour farming and residue management in their farm land areas.

Appropriateness of technologies, inadequate funds to run the group's activities, Shortage of land in the area, distance of the farm land, Lack of awareness and training, non co-operative neighbors and technical support, off-farm activities, and lack of technical advice were the major factors influencing the local people soil fertility management practices. Lastly, in light of these results, wider range of sustenance and awareness creation, the delivery of practical based trainings, and institutional capacity development help the practice of active soil fertility organization in the study area.

Key Words: Agriculture,* management *Practices, Farm Households, Development agen

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CHAPTER ONE
INTRODUCTION

1.1. Background of the Study

The economic development of developing countries primarily depends on the performance of the agricultural sector. The contribution of this sector depends on how the agricultural resources are managed. Unfortunately, in the majority of developing nations, the quality and quantity of agricultural resources are decreasing because of degradation of these resources accompanied with natural disasters (for example, severe droughts and floods) and accelerated population growth. Soil erosion is a world-wide encounter for sustainability of agriculture particularly in the hot zone. The rate of soil erosion that exceed the generation of new top soil is a dynamic process which leads to decline in the soil fertility and productivity, and then low agricultural yield and income. The balance between soil-forming and depleting processes is of the most importance for attaining long-term sustainability in any production system.

Ethiopia is one of the deprived countries in the world (World Bank, 2003). Its economy is based mainly on agriculture; providing employment for over 80% of the labor force and accounts for a little over 50% the Gross Domestic Product (GDP). In fact, agriculture in Ethiopia is not only an economic action, but also a method of life for which agricultural land is a crucial resource upon which the well-being of the society is constructed. The livelihood of the massive majority of the population depends directly or indirectly on this subdivision. Such condition clearly leads to augmented susceptibility of the economy to problems linked to land degradation (Wegayehu, 2003).

Soil erosion is the main form of land degradation, caused by the interacting effects of factors, such as biophysical characteristics and socioeconomic aspects. The Ethiopian high lands have been facing declining soil richness as caused by sever soil devastation and concentrated farming on the steep and breakable land (Amsalu and de Graaff, 2006).

Serious soil erosionisestimatedtohaveaffected25% ofthe areaofthehighlands arenow seriously eroded that they will not be economically productive again in the foreseeable future. The capacity ofthe farming communities to sustain production is, therefore, under serious pressure. According to the Ethiopian Highlands Reclamation Study (EHRS) soil erosion is projected to rate the country 1.9 billion US$ between 1985and 2010 (Amsalu

and de Graaff, 2006). Recognizing land degradation as a major environmental and socio economic problem, the government of Ethiopia has made several mitigation interventions.

Among those mitigation strategies, the one was realized with the involvement of the world food program, which had been providing food- for work incentives for conservation activities in the 1980s and early 1990s (Bekele and Holden, 1998). As a result, in large areas stone and earth terracing and soil bunds have been used along with area closers and afforestation and reforestation programs (Bekele, 2011).

Moreover, the other extensive conservation projects were carried out with the support of the world food program WFP) (shiferaw and Hlden, 1998). Never the less, the achievements have fallen for below expectations. The country still drops a great amount of fertile upper soil and the danger of land degradation is disturbingly (Teklu, 2003). There are organizations that provide farmers with grains FFW (food for work) or cash payment for the participation in the funded conservation work.

Rural communities living in the study area are involved in soil and water conservation activities. Farmers are initially obligated to participate in the construction of conservation structures because this is under taken through group labor. Such projects have, however, been criticized for achieving limited success in addressing the problem and for putting emphasis only on structural conservation measures, most of which were unfamiliar measures to the farmers. Although food aid has helped to fight hunger in famine-stricken areas, it has not been successful in improving soil and water conservation in the long run (Amsalu and de Graaff, 2004). The most important reason for limited use of soil and water conservation (SWC) technologies is; farmers' low adoption behavior. Kessler (2006) reflects soil preservation actions fully applied only when their implementation is continued and fully combined in the household's farming system.

Moreover, previous study findings conducted by different researchers shown that various personal, economic, socio-institutional and bio-physical attributes have influential roles on realistic soil conservation practices. Unlike with this, Yonas (2005) argued that there have been hosts of cultural factors, community values and traditional belief systems, which used to favor the wise use of natural resources including soil management.

Furthermore, in line such debilitating situations, the evidences collected from the respective district agricultural office indicated that though there has been a great deal of soil conservation practices executed by government and local communities, crop productivity is declining from time to time.

The annual yield estimation collected for about three consecutive years (2009-2011EC) indicated that annual productivity is decreasing by 2.8% for which it has been registered in 11.5% annual growth (2008E.C.). Consequently; this drastic situation reminds us the need for the assessment the status and impacts of soil conservation practices in Gimbo District, Southern Ethiopia.

1.2. Statement of the Problem

Agriculture is the core economic activity of many Ethiopians and the main characteristic of Ethiopian agriculture is its reliance on rainfall. In Ethiopia loss of soil resulting from soil erosion was estimated to be about 12 billion tons per year (EHRS, 1986), of which around 55% occurs on crop farmlands and 21% occurs on overgrazed rangelands. This has resulted in loss of top fertile soils. Soil erosion has detrimental effects on agricultural productivity and soil quality since the majority of soil nutrients and soil organic matter are stored in the top soil that is most affected by erosion. The status of soil fertility has great impact on crop productivity, either positively if it is of high quality/status, or negatively, if it is degraded/low status. Therefore, augmentation of soil quality has become among the top priorities of the 17 Sustainable Development Goals (SDGs) of the 2030 Agenda (FAO, 2017).

The consequences of runoff and erosion are the impairment of the soil quality and productivity of the land. Although agriculture is an important sub-sector of economy that contributes to 53% of the country's Gross Domestic Products (GDP) and generates more than 45%of the country's export revenues (World Bank, 2011). The repeated cultivation and continuous use of the farm land leading to the loose of soil fertility. In accordance to this limited use of modern practices on keeping soil fertility techniques to regenerate the nutrient capacity is one of the greatest problems related with soil degradation practices in the study area.

In addition, water –induced erosion caused by the cultivation of excessively steep slope without adequate erosion controlling practices treats soil subject to continual degradation.

Soil degradation severely threatens the soil resource and the sustainability of agriculture. The problem still continues, regardless of the fact that satisfactory technical solutions now exist for maximum situations. Thus, this research is intended to fill the gap of information. In order to sort out the existing problems, the following basic question and specific research questions were raised.

1.3. Basic Research Question

- What are the households' opinion on the causes of soil fertility degradation?
- What are households' participation on the status of soil fertility degradation as caused by soil erosion?
- What arethe commen soil fertility management practices in the study area?
- What factors determine households' soil fertility management practices in the study area?

1.4. Research Objective

1.4.1. General Objective

The general objective of this study was to assess households'participation on soil fertility degradation and management practices in Gimbo district, southern Ethiopia.

1.4.2. The Specific Objectives:

- To assess the causes of soil fertility degradation.
- To examinethe status of soil fertility degradation as caused by soil erosion.
- To assess soil fertility management practices in the study area.
- To analyze factors that determine households' soil fertility management practices in the study area.

1.5. Significance of the Study

Since the study focuses on assessing the soil conservation practices and its impact on productivity, it is believed to contribute to the overall improvement of the farmers in the

area that needed to be addressed by them. Based on this, the study assists different stakeholders as follow:

- Farmers can benefit from the results of this study so that they have to put more effort to alleviate existing challenges.
- It also benefits local governments and related offices in the sense that they may gain more insight and understanding on the practices and prospect of the conservation strategies

  and establish ways and means to meet the needs of all farmers in mitigating the existing challenges and ways to enhance crop productivity
- Furthermore, policy makers would also gain insight and understandings, leading to formulations of appropriate policies that ensure the methods and strategies of soil conservation in general are addressed within local community.
- Scholars and researchers would benefit from the results of this study in that it may be used as a reference.

1.6. The Scope of the Study

Geographically, the study was conducted in SNNPR kefa zone in Gimbo district. It was surrounded to assess factors determining the adoption of households' opinion on soil fertility degradation andpreservation practices. It is not easy to study the whole aspects such as forests and other environmental protection practices within the available budget, resource and material. Therefore, it was significant to limit the study size and scope of the problem in to a controllable way. So, the range of the study was demarcated to socio-economic, physical, demographic and institutional factors that touch farmers in the adoption households' opinion on soil fertility degradation and management practices. Delimitations are the characteristics that define the scope or the boundaries of the study as (Clark, 2009). Furthermore, it is also conceptually delimited to the assessment of soil conservation practices giving emphasis on identifying currently existing practices and the challenges on the SWC practices.

1.7. Limitation of the Study

While leading this study, there were some restrictions that encountered. For example, some household farmers did not agreeable to respond and others did not want to give the essential evidence. On the other hand, the Woreda experts are not collaborating to give the appropriate data.

CHAPTER TWO
LITERATURE REVIEW

2.1. A Brief overview of the function of soil and its degradation

Soil is a naturally occurring unconsolidated, upper most layer of the earth's surface. This is the most important basic resource in which plants grow. It is the end product of a complex interaction of climatic, litho logical and biological factors. It is the essence of all terrestrial life and a cultural heritage but it was sentenced to degradation by natural and anthropogenic factors, and is non-renewable over the human timescale (Lal, 2015).

Soil fertility degradation means loose of soil nutrientsby various processes over time. These contrary changes can be set in signal by trouble of the dynamic equilibrium of soil with its setting either by natural causes or by social causes. The natural causes shift in vegetation, glaciations, climate changes are often slow, allowing soil to adjust or adapt to the new conditions (Iivari et al., 2004). While some human induced causes are deforestation, over cultivation or concentrated farming, excessive and indiscriminate use of chemicals, excessive grazing with high stocking rate, population movement and infrastructure expansion in ecologically sensitive areas, (Lal and Stewart, 1990). In addition to that, conferring to UNEP (1982), Soil degradation is defined as "the miscarriage in soil quality caused through its misuse by humans."

It is a wide-ranging and unclear term, however, and mentions to a reduction of the soil's existing and/or potential competence to produce quantitative or qualitative goods or services for the reason that one or more degradation processes (Lal and Stewart, 1990). In line with this, Soil deprivation is a process, which drops the current and/or future capacity of the soil to harvest goods or services (Aulakh and Sigh, 2004).

The Soil degradation are classified in to physical, chemical, and biological (Lal and Stewart, 1990; Iivari et al., 2004). Soilremoval processes mention to adverse changes in soil reaction or pH, decrease in reserves and obtainability of plant nutrients, the capability to inactivate toxic mixtures and reduce unwarranted buildup of salts in the root zone.

While the problem of soil degradation has been ever since cultivation of soils started (Aulakh and Sidhu, 2004). Today, however, due to the global trade in food, the global implementation of "exploitative farming methods" (Young and Orsini, 2015) and the extent to which forests and natural grasslands have rehabilitated to crop production; it is the whole global civilization that is threatens by progressive soil deprivation (Young and Orsini, 2015). Grounded on archaeological indication, soil deprivation was responsible for destruction of many ancient civilizations. For example, the devastation of the Harappa civilization in western India, Mesopotamia in western Asia, and the Mayan culture in Central America (Lal and Stewart, 1990). Yet, the existing statistics on the degree and severity of soil degradation are not consistent. Some statistics in the nonfiction indicate that the world is certainly running out of high quality soils (Iivari et al., 2004).

In the Ethiopian history, serious soil degradation problems had firstly experienced in the northern part of the country. This is true since its long history of sedentary agriculture and human settlement. In that time, Butzer (1981) noted soil erosion as one of the key causes for the downfall of the ancient Axumite Kingdom.

As the course of soil degradation advanced in the north, people had to move southwards. This process had attended by the same blowout of soil degradation, partly accounting for the fall of civilizations that grew further south. Hence, Hurni (1987) defines land degradation due to soil erosion as one of the essentials in the failure of the civilizations of Lalibela in the 14th century, of Gonder in the 17thcentury, and of Shewa in following years (Thomas, 1991).

The reason for agriculture sector is the main source of income and livelihood of the country's population in Ethiopia (Tesfu, 2011), and it is evident that agriculture sector is activated by changing forests and natural grasslands to crop production, which leads to progressive soil deprivation *(*Young and Orsini, 2015). This implies that, Ethiopia is one of the many developing countries of Africa that have affected by soil degradation caused through human –induced process (Lal and Stewart, 1990). In line with this, soil degradation diminishes economic growth, especially in countries where agriculture is the engine for economic development (Lal, 2015).

Similar to that, not less than since three thousand years, highlands of Ethiopian have degraded by agricultural expansion.

The driver causes of high soil destruction by water and digging as well as by land downhill are the mixture of erosive rainfall and steep slopes. This happens due to the quick tectonic uplift during the Pliocene and Pleistocene and human impact by deforestation, overgrazing, agricultural organizations where the open field controls, catastrophe of the farmers, and continuous agricultural techniques (Nyssen et al., 2015). Conventionally, region, the northern part of Ethiopia regarded as the most degraded part of the country (Hailu and Edwards, 2006). Since numerous events have severely degraded the land and affected the death of humans and livestock (Aklilu, 2014). Thus, in all of region and Ethiopia in general, severity of soil erosion has made cultivation of old farmland impossible, this is due to the result of the mountainous and hilly topography, heavy rainfall, and low degree of vegetation cover (Yibabe, 2002).

Soil is a vital resource for the forthcoming of humanity (Young and Orsini, 2015). Climate moderation through cycling, waste disposal, water percolation and purification, thus, because of many ecosystem facilities provisioned through soils (e.g., food, feed, fiber, elemental cycling), soil quality must be protected or restored to improve these services.

2.2. Farmers' participation in soil conservation practices

The aim of Soil Conservation is preventing reducing the effects of soil erosion is maintaining the soil quality (Graaff, 1993). Soil conservation is at the top of development agendas in Africa. Nearly every project related to agriculture or environment has a soil conservation component to it.

Extensive land degradation in the Ethiopian Highlands puts in danger the rural livelihood. Strengthened by swelling population pressure, farmers are enforced to expand their arable land by deforestation and thus worsening the soil erosion problem. Through the use of various soil conservation actions, farmers and authorities try to stop against further land degradation (Brenner et al., 2013).

The Ethiopian government first recognized the cruelty of the soil deprivation problem following the 1973/74 famines in Wollo. The 1973/74 droughts illustrated also the consideration of external supporters to land degradation problem and momentarily conservation become a priority (Berhanu and Swinton, 2003).

According to Berhanu and Swinton (2003), after the early 1970s, national energies to conserve land strengthened, these involvements largely trusted on organization of farm households and food for work (FFW) schemes to conserve degraded lands through the building of soil bunds, stone terraces and forestation. The care given by the Ethiopian government to the increase of preservation activities since the early 1970s is a sign of increasing attentiveness of the problem but true understanding of the manners and results to land deprivation and harshness are still deficient.

With heavy outer support, the government commenced a huge program of soil preservation and restoration in highest land degraded areas of the country following the 1975 land reform and formation of the peasant association (PAs), which were instrumental in mobilizing labor and assignment of local responsibilities. This involved above 30 million peasant workdays per year (Hurni, 1988).

In order to build balance, experts on the native practice stated that home-grown soil conservation like scientific soil conservation should become likely as a result of a more common knowledgeable courses of making order out of disorder not merely as a response to practical human needs.

In fact, there is clear margin between native and scientific soil upkeep mechanisms in which indigenous soil preservation is more of general and relies almost wholly on perception and knowledge whereas scientific once characterized by a greater ability to break data existing to the senses and re assemble it in different ways (Yeshambel ,2013*)*

During 1950s and 1960s, indigenous agricultural practices of least developed countries had considered as backward and insufficient to manage their natural resources due to the high desire for science besides technology, which broadly had observed as proficient to solve all human difficulties.

Thus, native resource organization system had taken as a difficulty and unreasonable to the growth of output. Today, however, the opposite is true, number of empirical studies

have been done that the being of a wide variety of local level resource administration systems that are both ecologically sustainable and effective. The Modern Soil Conservation techniques should have built its ground on the baseline of indigenous soil conservation practices. Because they fit better in to the local setting and socio economic circumstances.

Therefore, to be conventional and sustainable the technologies suggested by the Ethiopian soil preservation project should incorporate the indigenous erosion control practices of the several agro-ecological zones through involved and adaptive research (Belay, 1998:2).

2.3. Detrminantsof soil conservation practices

Since several empirical researchers examined the determinants of soil conservation technologiesadopt the existed indigenous soil conservation practices. Here, the investigation tried to review some of technological applications into existed knowledge of the indigenous community. It looks that the more technically with problematic innovation; the less attractive it might be for many farmers (Colman and Young, 1989:60). Soil preservation activity of farmers is influenced by numerous varieties of institutional, socio-economic and physical issues (Eshetu, 2014).

2.3.1. Demographic factor

The household variable that is considered to have effect on the adoption of Soil Conservation technologies included age, level of education, and family size and farm experience by(Aklilu2006). The influence of farmers' age on the adoption performance of soil conservation may be either positive or negative.

Certain studies approve that farm skill has a positive recommendation with the use of preservation practices (Aklilu and De Graaff, 2006).

The younger farmers might be influenced for the negative effect of age on the adoption decision of soil conservation practice.As well, education increases the capacity and skill to attain and apply applicable information concerning the use of soil preservation practices, since educated farmers were likely to have a good knowledge of the significance of soil conservation technologies and hence the requirement to adopt the

technologies (Ephraim, 2002). Some studies specify that the number of experience in farming has optimistic relationship with the use of conservation practices (Abera, 2003).

Family size is frequently reported as taking both negative and positive belongings on the implementation and protection of maintenance activities. With their study, of the central highland of Ethiopia, Bekele and Holden (1998) recognized that the age of the farmers and family size had significant negative belongings on the adoption of soil conservation practices. The reason for this observation is likely to be land scarcity is more serious with larger families and it makes difficult to adopt some soil conservation technologies (Tadesse and Belay 2004).

A household with a large size pays little attention to conservation activities because of the need to be engaged in off-farm activities to earn cash for buying food and other economic activities if the family households have small and fragmented land size. Contrary to this finding, those households who have large family are expected to adopt or have more chance to implement the practice more than those who lack of labor or comparatively less family availability (Pender and Kerr, 1998). Thus, it is problematic to say that, family size touches the practice only direction.

2.3.2. Physical Factor

The steeper slope of the farm land `-has been found to have a positive effect on the decision of Soil Conservation practices. Empirical studies in different parts of Ethiopia reported a positive and significant correlation between the slope of a farm and the decision of adopt Soil Conservation practices (Berhanu and Swinton, 2003). Agriculturalists' plots with steep slopes are more involved in the continuous use of soil conservation process than those who possess flat or gently sloping farmland. On steep slopes farmers are constructing soil bunds on their farmland to prevent soil erosion (Crambet *al.*, 2009).

Distance from residential areasacceptance has negatively and significantly influences the practice of soil conservation by farmers (Abera, 2003). Preservation structures are retained more on plots nearer to housing areas and more consideration is given to close plots. This can be attributed to the fact that farmers gave more attention to nearby plots and the maintenance and/or care given to fare distance is limited (Berhanu and Swinton,

2003). The soil richness condition of cultivated plots is a significant factor on farmers' choices on the continued use of soil preservation practices. The level of soil fertility has a bad and significant association with the degree of participation adoption and continued work. Farmers with plots of low or medium soil fertility are more involved in preservation work than those who have fertile land (FAO, 1999 and Eleni, 2008).

Subsequently, farmers with less fertile lands have anticipated to improve the low fertility of soil and upsurge the output of the plot, while farmers with very fertile lands certainly do not understand the adverse effects of erosion on their plots with in short term and no need to conserve their plots (Eleni, 2008)

2.3.3. Economic factors

Economic variables can play important role in determining the adoption of Soil Conservation practices of the household. Between the economic issues, farm size is significant variable in relation to the acknowledgment of soil conservation (Aklilu and De Graaff, 2006). Farm size is one of the factors that affect farmer's decision to soil conservation technologies (Tadesse and Belay 2004). Farm size is one of the factors that affect farmer's decision to soil conservation technologies (Aklilu and De Graaff, 2006), It implies that farmers with relatively larger land size had better chance of adaptation of soil preservation technologies than farmers with lesser plot of lands.

The reason towards the positive relation of farm size with adoption to the fact that conservation structures occupy part of the scarce land and due to these farmers with small plot of lands could not give to occupy part of their land through the soil structures. (Bekele and Holden, 1998)

2.4. Soil conservation practices in Ethiopia

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2.5. Types of soil conservation

2.5.1. Physical soil fertility management practices

A physical soil conservation preparation is applicable of soil management using knowledge or art with the goal protection of soil resource form utilization. In addition, among those diverse applications, different organization applied in different farm lands. However, these conservation applications are contingent on climate, soil type, vegetation cover and level of economy (Shiferaw, 2005).

2.5.2. Biological soil fertility management

Contour plowing is a conservation method that involves creating even terraces and telling perpendicularly to the slop this method used as conservation technique for water and soil because it increases the infiltration of water (Robert, Dave and Ketewa, 2008). It is across the slope plowing rather than ups and down which helps in order to reduce runoff and water loss. It is simplest way to prevent soil erosion. This water conservation practices are useful on gently slope soil (Mulinge et al., 2010).

2.5.3. Check dams:

Are techniques that help trap runoff water and washed soil in the runoff water this also increase infiltration and decrease the velocity of runoff water (Pender, 1998).

Proper soil management with increasing in organic matter of the soil, the soil structure will be kept and retained. This is extremely stimulated for soils that are extremely tilled and with poor structure it's due to the soils tendency to simply erode by surface runoff water (Teshome, 2010).

2.5.4. Physical Water Conservation

Physical water preservation measures are construction built for water conservation. This protects the destruction of soil degradation due to excess overflow.

2.5.4.1. Terracing:

It involves building level of surface at right angle to the slope to retain water and reduce amount of erosion. 5ince it requires moving of soil and stone to construct the level areas, it is expensive method of water conservation (Geremaw, 2005).

To bring sustainability on the basis of soil and water conservation natural resource management/ land management, integrated pest management, using new technology etc. /are important practices.

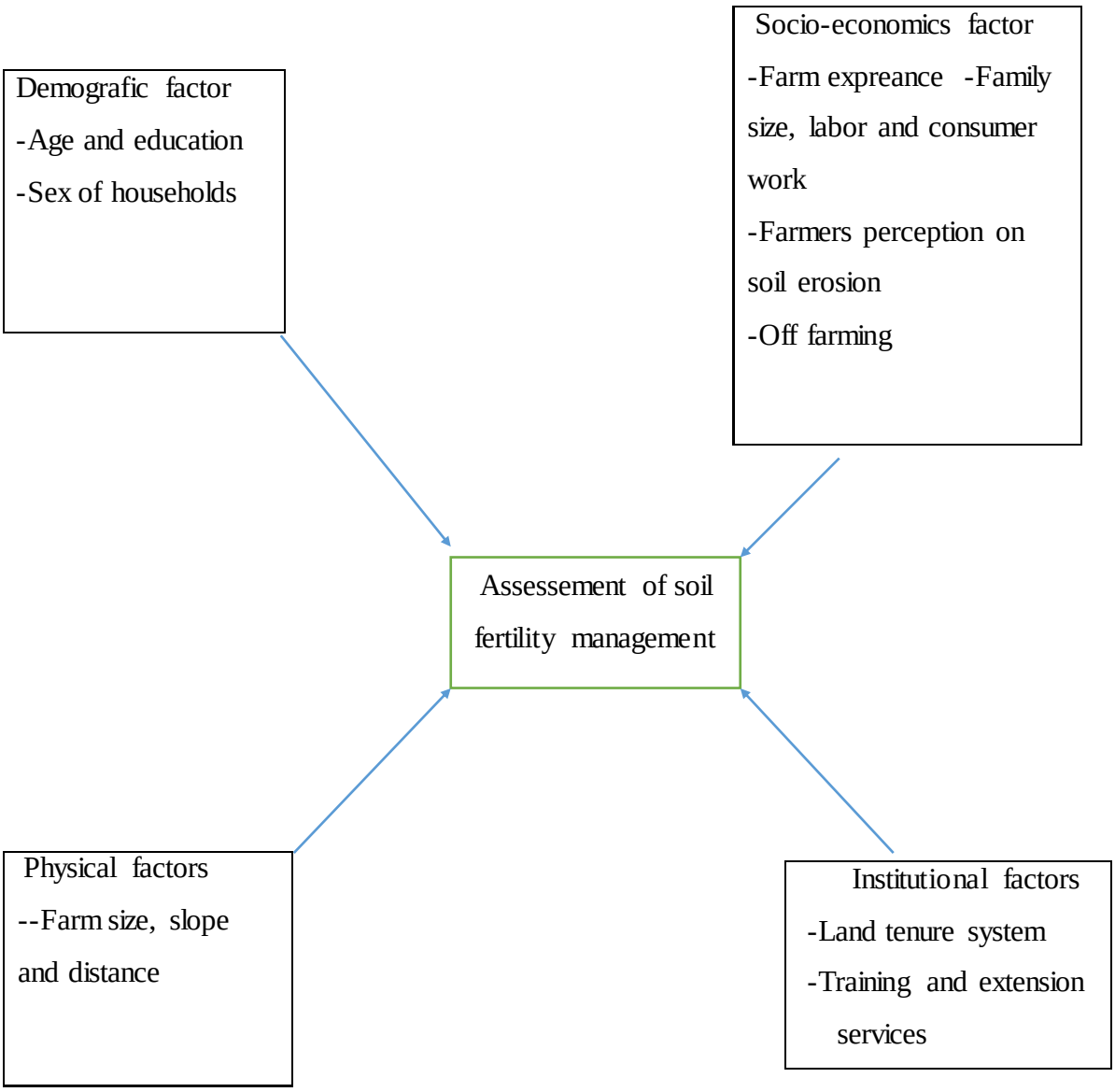
Those have to be done effectively for economic viability and food security on household level. Soil and water conservation performs in plateau areas can adoptive the production of various kinds of ecosystem facilities that have both upstream and downstream benefits. Land protected by plant biomass, living or dead, is more unaffected by to wind and water soil erosion and knowledge comparatively little erosion because rain drop and wind energy are debauched by the biomass level and the topmost soil is held together by the biomass (Pimentel et al., 2005). Soil - carbon based matter, prevailing on the soil surface as raw plant residues, helps to keep the soil from the consequence of rain wash, wind and sun. Removal or burning of residues depicts the soil to negative climatic influences and take away the soil organisms of their primary energy source (Bot and Benites, 2005).

With consciences of the farmer to proper application of techniques that keep or restore the capacity of soil to preserve water with the inorganic nutrients and organic substance increases. Farmers can intensely decrease agricultural water demand, reduce susceptibility to climate extremes drought and flooding, and also increasing soil carbon storage, as well as output. By reducing overflow and inorganic fertilizer input, downstream water quality recovers (MOA, 2015).

Erosion has decreased in many parts of the developed countries by means of good agricultural practices and Soil and water conservation methods. As a result, these countries produce more food today than 50 years ago. In fact, many of the world's industrialized counties augmented their food per capita in the last fifty years (Roetter and Keullen, 2008). In many cases crop residues are in high demand in some local market for different uses. Economic influence has been primarily attained through increased crop production. An increase in crops has two-fold effect. First, it helps to safe food for the domestic and, secondly, to create a extra which can be sold (Wagayehu, 2003).

2.6. Conceptual Framework

The measures of adoption in this study are the actual physical presence of conservation structures on farmers' plot of land. Hence, farmers were asked whether conservation structures are done in their field or not and still exist in each plot of land. In this study adopters are fanners who have a plot of land on which conservation structures have been put up. Thus, the dependent variable is a function of demographic, socio-economic, institutional and physical factors.



Figur 1: Conceptual Framework

CHAPTER THREE
RESEARCH METHODOLOGY

3.1. Research Design

In this study, the researcher had employed descriptive survey design because it enables the researcher to make inquiry with narration of events and drawing of conclusions based on the information attained from comparatively large and typical samples of the target population (Kothari, 2004). Additionally, descriptive research design aims to describe behaviors and to gather people perceptions, opinions, attitudes, and beliefs about a current issue in under investigation (Kumar, 2006).

3.2. Research Method

Like research project different researchers defined research method. For instance, Dawson (2002) defined research methods as tools used to gather data such as questionnaires or interviews. Similarly, Neville (2007) defined research method as the several specific tools or ways data can be composed and examined, e.g. a survey; interview; observation specification; data analysis software etc. So, the above explanations tell us that, research method mentions to the tools that investigators apply to gather data necessary for the study. Therefore, the researcher used quantitative and qualitative method. Bysupporting this idea, McColl et.al. (2001) suggested that, quantitative data provides a numeric description of trends, attitudes, or opinions of a population by using questionnaires for data collection with the intent of generalizing from a sample to a population. In deed so the researcher gave more focus to quantitative data. This is not to mean that, qualitative data is not significant for this research. But to mean that, qualitative data is combined in this study to triangulate the quantitative data so that it will be influential enough to define the conditions of the subject under investigation.

3.3. Description of the Study Area

The specific study area of this research is Gimbo district, which is one of the twelve's district and two cities administrative division of the kafa zone. Ufa, its administrative town, is located at a distance of 18 km from Bonga. The district consists of 38 rural Kebeles and one urban Kebele.

It covers an area of 775.84 square kilometers bordering Shishoinde district in the west, Gewata district in the northwest, in south Bonga city administration, in south west with Decha district.

Kafa zone is one of the 14 administrative zonal and 4 special woreda administration Councils in Southern Nations, Nationalities and Peoples Region (SNNPR). The Zone has a total area of 10602.7 km^2 land bordering Oromiya in the north and north east, Bench Maji Zone in the south and south west, Sheka Zone in the northwest and Konta Special district in the east. Based on CSA (2007), the total population of the zone is 874,716 (Male, 431,778 Female 442,938)

The Zone is comprised of twelve districts and two city administrations namely: Chena, Bita, Adiyo, Gimbo, Tello, Decha, Goba-dishi Gewata, Gesha, Sayilem, Cheta, shishoinde districts and the rest Bonga and Wacha are town administration. The Administrative town of Kafa is Bonga. It is found in south western part of Ethiopia at a distance of 454 km from Addis Ababa and 724 km from the region town Hawassa.

From the topographic nature of the landscape and the experiences of farmers in an area towards soil conservationsimilarities, the researcher wants to study three of the thirty-nine kebeles on how people the soil practices soil fertility degradation manage system in this area.

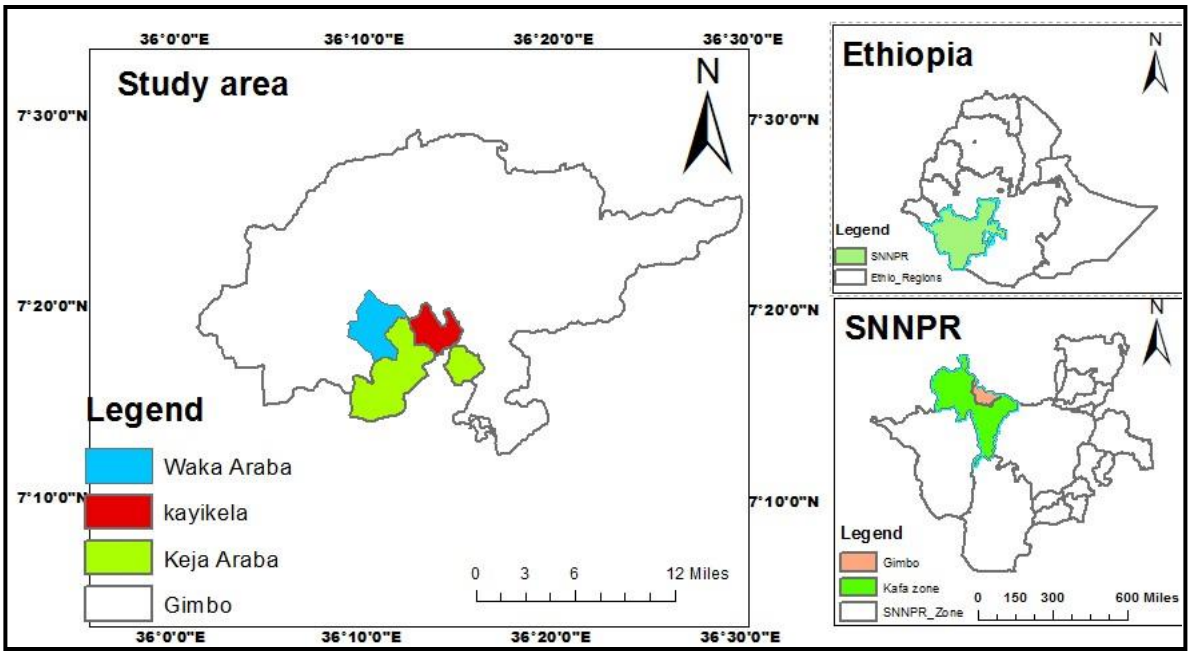


Figure 2: Map of the study area

3.4. Populations, Samples and Sampling Techniques of the Study

3.4.1. Population of the Study

The population of this study was including farmers from Kejaa Araba, Woka Araba and KayaKella kebeles, extension workers' expertise as well as district and Zonal Agriculture office experts. To make the study manageable and obtain valuable information, emphasis has been given to literate farmers who can read, write and easily understand to respond questionnaires. Furthermore, to keep gender composition, both sexes of respondents had been taken.

3.4.2Sampling Design

According to Fraenkel and Wallen (2008), a sample was a group on which information's were obtained in order to generalize it to the population. The sampling design of this study was involved as multi-stage stratified sampling technique. Both probability and non-probability sampling methods were employed in the sampling and selection process. Simple random sampling had employed as a typical method of probability sampling techniques, Moreover, this method was often used with a small number of the population,

for example, putting the name of all the population, a table of random numbers had been used to identify the population members that will make up the sample (Hayford, 2013). While purposive sampling method had been used as a key for non-probability sampling tool in selecting units/elements of the study. The study had employed in Gimbo district of Kafa Zone, SN.N.P.R. The selection process was based on the severity of problems as it was drawn from areas where soil erosion problems were serious enough to warrant data collection.

In study site, there were 38 rural and one urban kebeles, based on the information obtained from the district agricultural office, 26 kebeles including urban kebele which don't extensively practiced soil conservation and less suitability to soil erosion because of the flat nature of the landscape are excluded from the selection.

From 12 rural kebeles with severe soil erosion problem and high soil and water conservation practices by local government and farmers, three kebeles had been selected deliberately as samples for the study. The selection of the sample farmers in the selected kebeles was based on the following steps and procedures

Step 1: Establishing Sampling Frame

Before conducting the selection of sample farmers in the selected kebeles, sampling frame was established by taking the complete list of both female and male household farmers from the record available in the Gimbo Woreda administrative office. The actual and complete list of the sampling farmers would had been further checked by the heads of Keja Araba, Kaya Kella and Woka Araba Kebeles and key informants who knows the statistics of farmers very well. From the statistical data obtained from annual abstract of district finance and economic development office /2011/E.C / the total number of household farmers from the selected kebeles were 1041.

Step 2: Sample Size Determination

After getting the total number of household farmers in the selected kebeles, the next step had been determining the total sample size of the survey based on the established

sampling frame of the selected kebeles. The sample size was determined by using formula following Kohtari, (2004) method of sampling formula by considering an estimate of 95% expected significant and giving any particular outcome to be within 5% of marginal error and 95% confidence interval of certainty
(alpha=0.05). Based on this assumption, the actual sample size for this study was computed as: -

$$n = \frac{Z^2 * p * q * N}{e^2(N-1) + Z^2 * p * q}$$

Where: n= Sample Size

N= the total Population (1041) *e*: suitable error (the precision) (*e* = 0.05) p: standard deviation of inhabitants (p = 0.1) q: sample amount (q = 1-p) = 1- 0.1= 0.9
z: standard variant at a given self-confidence level (Z = 1.96)

$$n = \frac{1.96^2 * 0.1 * 0.9 * 1041}{0.05^2(1041-1) + 1.96^2 * 0.1 * 0.9} = \frac{359.919504}{2.945744} = 122$$

Therefore, n = 122 is the minimum sample size of house hold members for reliable results. Lastly, by using comparative distribution method the researcher stands decided to take sample members from three kebeles. These sample house hold members were drawn for data collection using simple random sampling method under consideration of gender proportionality by stratified sampling method.

n = 122

n_1 (Kejaa Araba) = $n*N_1/N$ = 122*500/1041 = 59 n_2 (Woka Araba) = $n*N_2/N$ = 122*320/1041 =37n_3 (Kaya Kella) = $n*N_3/N$ = 122*221/1041 =26

Table 1: Sampling frame

Name of Kebele	Target population			Selected Sample size		
	Male	**Female**	**Total**	**Male**	**Female**	**Total**
Kejaa Araba	343	157	500	40	19	59
Woka Araba	277	43	320	32	5	37
Kaya Kella	171	50	221	20	6	26
Total	**791**	**250**	**1041**	**92**	**30**	**122**

Source: GimboWoreda Finance and Economic Development Office, 2019

3.5. Sources of Data

Quantitative and qualitative facts were composed from diverse sources through several methods. These comprise both primary plus secondary data sources. The importance of collecting and considering both primary and secondary sources through qualitative and quantitative methods of data collection was used to complement and supplement the diverse data generated from different sources which in turn would had been used to make the data and the result of the research reliable.

3.6. Data Gathering Instruments and Procedures

The use of varied instruments to collect data on the same issue from the participants was a step towards clarifying and validating the information obtained. Based on this, two data gathering instruments were used. They were questionnaire and interview. The way such instruments were developed and scored was explained here under.

3.6.1. Questionnaire

Questionnaire can be defined as written form that ask exact questions of all individuals in the sample and which respondents can answer at their own convenience (Gall et.al 2007). Inquiry forms provide better homogeneousness across measurement circumstances than do interview. It also allowed anonymity which encouraged frankness on sensitive issues (Robson,2002). Moreover, each person responds to exactly the same questions because a standard instruction was given to the participants.

Considering such reality, the researcher developed questionnaire and used as it was believed to be better to get large amount of data from large number of participants in a

relatively short time with minimum cost in a way that would satisfy this research's goal. The content of the questions was principally obtained from the reviewed literature and sample questions were assessed from the previous related research. The entire questionnaire will have two parts. The first part dealt with the general background of the participants. The second and the largest part contained closed question items that addressed the basic question of the study.

To avoid language barriers that farmer respondents may encounter questionnaires was equipped in English version and interpreted into Amharic and kafinoonoo (kafigna language) as they can sayand write with languages. The conversion practice was formed by English and kafinoonoo linguistic subject professionals from Bonga College of Teacher Education.

3.6.2. Interview

The interview is the most common method in collecting qualitative data. Flick (2007) defines the interview as accessing a person's opinion and claims that the interview allows an interviewer to understand the interviewee's knowledge, information, likes and dislikes, attitudes, thinking and beliefs. The interview guide consisted of two parts i.e. general background of the participants and the selected themes. Subsequently, it will be used for selected five extension workers fromkebele and three expertsfrom district agriculture offices. The interview guide was prepared and held in accordance with general experiences and the practicesand challenges of soil conservation. The interview guide was prepared in English and translated to Amharic and local language /Kafinoonoo/to make the interaction more understandable and the discussion was made. The process of interview was recorded by audio material after taking the consent of each intervieweefor analyses purpose. The intensity of the study offered by a qualitative approach would strengthen the quantitative approach.

3.6.3. Focus group discussion

To triangulate the quantitative data with the qualitative information, few experts from respective disciplines had been chosen. Consequently, a total of nine extension workers were selected.

In addition, to substantiate the result of the study, from district agriculture office experts, five were selected and from zonal offices experts, based on their field of specialization and direct relation with the practices, three of them had sampled by purposive sampling techniques. Lastly to fill the information distortion and not to miss the information from the farmers, fifteen of them were included through FGD by availability sampling.

3.7. Validity and Reliability

Checking the validity and reliability of data collecting instruments before providing to the actual study is the core to assure the quality of data (Yallew, 1998). To ensure the validity of instruments, initially the instruments were developed by the researcher under close guidance of advisor and also a pilot study was carried out on 20 farmers who are engaged in farming career which are situated in different district of the same Zone. The participants of the pilot test were also well-informed about the objectives and how to fill, assess and give feedback on the significance of the contents, item length, simplicity of items, and details of the questionnaire. Based on their remarks, the instruments were amended before they were directed to the major participants' of the study to diminish errors. As a result, fifteen items were merged in to ten items; six lengthy items were shortened, and many unclear items and directions were made clear.

Reliability test was an important instrument to measure the degree of consistency of an attribute which is supposed to be measured. It can be likened with the steadiness, consistency or dependability of a gauging tool

3.8. Methods of Data Analysis

For this study, the data had been collected from both quantitative and qualitative sources. The collected data had arranged, organized and presented in a way to properly answer the research questions. The closed-ended items across sub-categories were computed and explored using frequency, percentage and mean scores. The items in the questionnaires would be offered in tables according to their concrete similarities. The scores of each item was organized, statistically compiled and imported into SPSS 21 to obtain the mean score of each item.

The percentage used to analyze the background information of the respondents that are related to the adoption of farmers' practices on their farm land to conserve the soil fertility for better productivity, the mean would be served as the basis for interpretation of the data as well as to summarize in simple and understandable way.

On the other hand, the data obtained from the one-to-one interview was analyzed qualitatively. The qualitative analysis had been done as follows. First, organizing and noting down of different categories would make to assess what types of themes may come through the instruments in line with the research questions. Accordingly, data obtained from interviews will be analyzed and presented using content analysis approach. Finally, the results had been triangulated with quantitative findings and conclusion and recommendation were forwarded.

This chapter establishes the key findings from the data analysis in addition to the discussion of the findings within the literature. The study used survey questionnaires through "face to face" meetings with stakeholders, and interviews. On top of this focus group discussions and fieldwork/visits have been used.

CHAPTERFOUR

4. Result and discussion on Assesment of Soil Fertility management Practices

4.1. Demographic Characteristics of Respondents

4.1.1.Sex and age of Respondents

This section illustrates the gender composition and age range of the respondents. As indicated in table 2 below, out of total respondents 24.6% (n=30) were females whereas the rest 75.4% (n=92) were males.

This implies that malesare more dominant in having the farm land than females' activity and more of the participation of the female interms of farming activity is rare as compared to male. This shows that, male household heads had more chances to involve in soil fertility management practices than female household heads. This maybe because of most women in the study area spent their time in domestic responsibilities and activities. Accordingly, the age groups for head of household are identified: 13.1% are between 15-25 years, 30.3% are between 26-35 years, 24.6% are in range of 36-45 years, 22.1% are in the age from 46-55 years' group. Farmers in this age group are assumed to have a goodunderstanding of problems of soil erosion due to access to information, and as a result, usually more interested in soil and water conservation practices. The proportion of elderly farmers is 9.8%, an age group in which labor shortage can be a hindrance to practicing soil conservation measures. However, these farmers usually implemented soil conservation practices because of having access to money for rented oxen as well as hired labor.

Table 2: Sex of respondents * age of resondents Crosstabulation

		age of resondents					Total
		15-25	26-35	36-45	46-55	56-65	
sex of respondents	Male	10	25	30	15	12	92
	female	6	12	12	0	0	30
Total		16	37	42	15	12	122

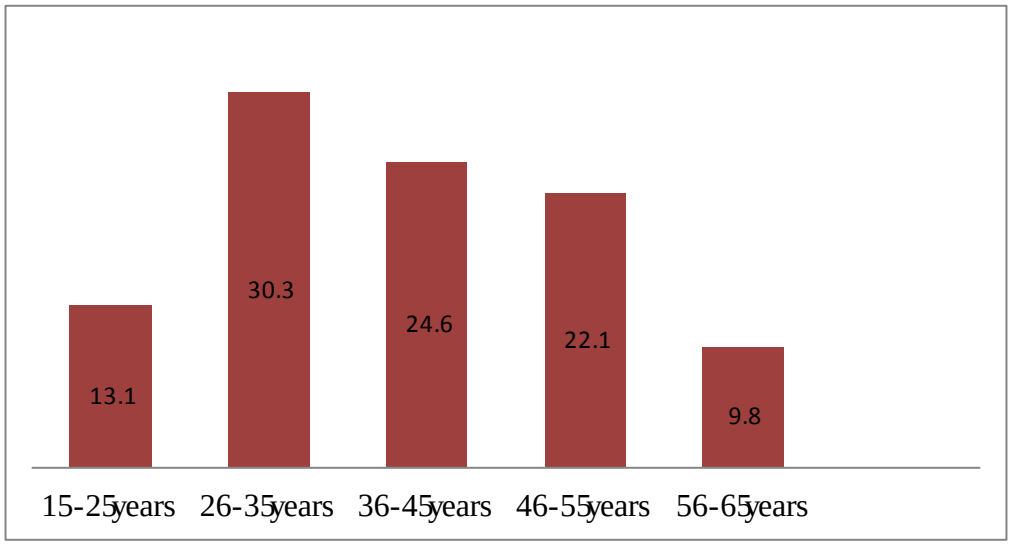


Figure 3: Age distribution of respondents

4.1.2. Marital Status of Respondents

In this section, respondents were sought to indicate their Marital Status. From the questionnaire survey (8.2%) of the respondents were single, (88. 5%) of the respondents were married, whiles (3. 3%) of them were being divorced. This shows that most of the people in the area are responsible with spouses and families who in one or the other may benefit from agricultural productivity.

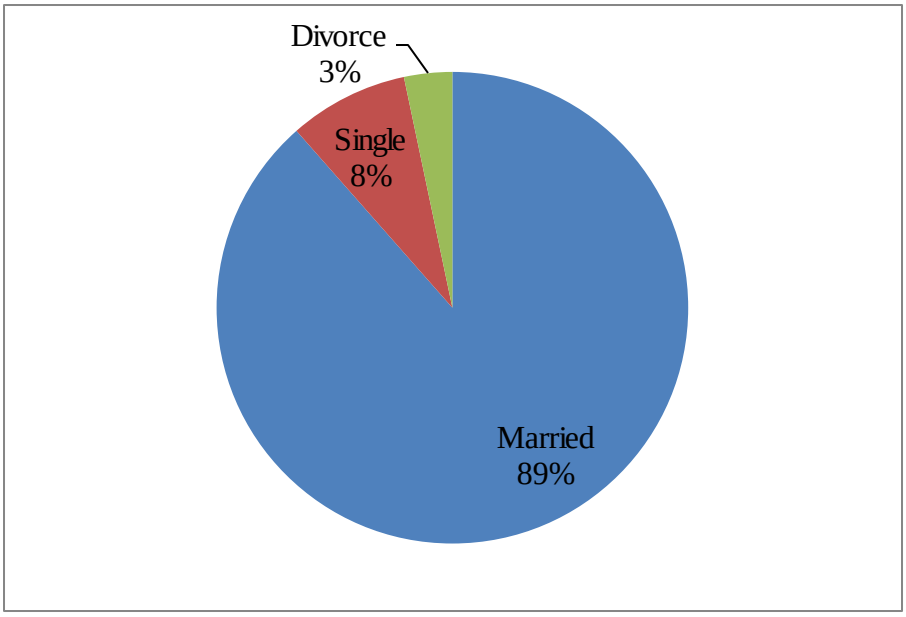


Figure 4: Marital status

4.2. Socio-Economic Characteristics

4.2.1. Educational Background

Moreover, regarding the educational back ground, 39.3% of respondents had no acsses for formal education, 32. 8% had completed grade 4, 22.1% were grade 5 to 8 and 5. 8% were from grade 9 to 12. This implies that the agricultural sector of the study area is still dominated by illiterate farmers which affectes fertility degradation practices.

Table 3: Educational level of respondents

Variables	Number	Percent
Noformaleducation	48	39. 3
Grade 1-4	40	32.8
Grade 5-8	27	22.1
Grade 9-12	7	5. 8
Total 122		**100.0**

4.2.2. Family size

Table 4 depicted the family size distribution of the respondents in the study area. Accordingly, 36.1% of the respondents had less than five family members, 37.7% of them had between five and seven family members, while26.2% of them had greater than seven family members. This implies that the majority of the households are with a large family size, because 63.9% of them had five and above family members (Table 4). This shows that most of the people in the area have high family members who in one or another way may benefit from agricultural labour force.

Table 4: Family Size of respondents

Family size	Frequency	Percent
<5 people	44	36.1
5-10 people	46	37. 7
>10 people	32	26.2
Total	**122**	**100.0**

4.2.3. Livelihood of the Respondents

Regarding the major livelihood characteristics of respondents as indicated in Figure 5, the major livelihood for all of the people of the study area was agriculture. This finding indicates that agriculture was the dominant source of income for all of the people of the study area.

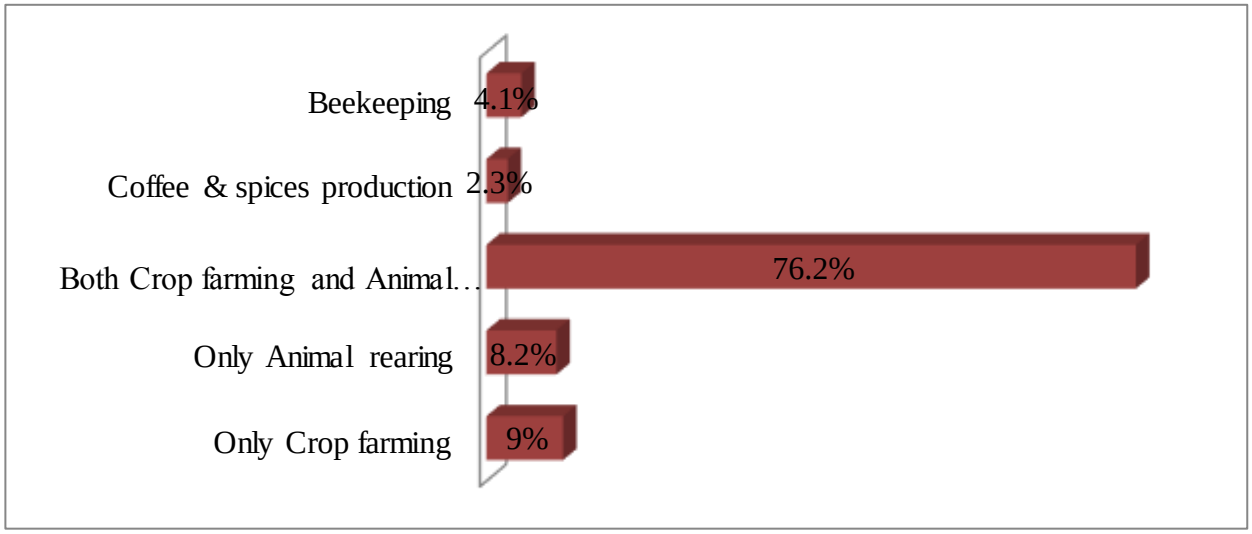


Figure 5: Major livelihoods of respondents

4.2.4. Landholding, Farmland Size and Agricultural Practice of Farmers

With regard to land possession, all (100%), of respondents have their own agricultural farmland. About 58.2%, 22.1%, and 15.6% of the total farm household, indicated that their land holding size is between 1-2, 2-4 and less than 1 hectare, respectively (Table 5). On the other hand, only few farm household, (4.1%) had farmland size greater than 4 hectares.

From this response delivery, one can understand that lesser land size in areas of high request might be a restriction for the implementation of land management practices for such smallholder farmers. Because, many research results stated that land holding size is one of the most severe restrictions in the adoption of farming land management practices. For example, farmers with greater farm land size are more likely to practice long-term

land management practices such as; fallowing, crop alternation, applying organic manure and incorporate crop remains. However, farmers with less farm size are more likely to practice either nothing or short-term management methods that insure only short-term productivity (Nkonya, *et al* 2008).

Regarding the agricultural practice of farm households', majority proportion of farm households (69.7%) were practitioners of only rainfed agriculture whereas about 1.6% and 28.7% of the entire sample farm households experienced only irrigation agriculture and both irrigation and rainfed agriculture correspondingly.

From this, one can understand that like with majority of Ethiopian agriculturalists most of farm household respondents in the study area have no additional irrigation agricultural practice. This also may lead framers to expose for scarcity of food due to crop failure at a time of severe weather condition. Furthermore, since the agricultural activity is more exposed to weather and climate variability associated problems, farmers are likely to carry out actual and suitable agricultural land administration practices to lessen their crop failure.

Table 5: Agricultural farm land andtype of agricultural practice

Item	Variables	Percent
the land size	< 1 hectare	15.6
	1-2hectare	58.2
	2-4hectare	22.1
	Above4hectare	4.1
	Total	**100.0**
agricultural practice	Only Rain fed based agriculture	69.7
	Only Irrigation agriculture	1.6
	Both Rain fed and Irrigation based agriculture	28.7
	Total	**100.0**

4.2.5. Productivity ofFarmland in terms of Family Size and Farm Experience

As the table below indicates, respondents were asked how they perceive participation/ contribution of their family members to farm production activities. Accordingly, about32.0% of respondents stated that their family members are active participants in the agricultural activities, whereas, about 68.0% of the household respondents indicated that they have more inactive/dependent household members (as either children or old age) than active agricultural household members (Table 6). That means adoption of households 'opinion on soil fertility degradation and management practices were influenced by the size of family. Farmers having smaller agricultural active family size were more likely to remove conservation structures totally or temporarily.

Farm experience is the sum of years the household involved in farming as an earnings of living. The range of farming experience of the households lies between 5 and 40 years and about 76.2% of the respondents had farming experiences between 11 and 30years (Table 6). In addition, the majority of household heads used their farm land for more than10years. With longer experience in farming, knowledge, skill s, and attitudes are gained on the agricultural operation including soil and water conservation practices. So, farmers with longer experience are less conservative and convinced.

It is more likely that farmers with longer fanning experience will be ready to accept changes and adopt new ideas and techniques for the increase of production on their farmincluding soil and water conservation measures.

Table 6: Farm household members' participation in agricultural activity (active or in inactive) and farm household head farm experience

Item	Variables	Percent
Participation of family members?	ctive family members than inactive member	32.0
	Many inactive/dependent family members than active members	68.0
	Total	**100.0**
Farm experience in years?	5 – 10	13.1
	11- 20	38.5
	21- 30	37.7
	30-40	10.7
	Total	**100.0**
Farm experiences?	5-10 years	26.2
	11-15years	31.1
	16-20years	13.1
	more than 20years	29.5
	Total	**100.0**

4.3. Households' Participation on of Soil Fertility Degradation management

The table below shows the responses of the participants of the study towards the main Causes of Soil erosion. As indicated in the table 7, the responses of participants revealed that they agreed that overgrazing, plowing steep slopes, high rainfall, limited use of soil fertility management practices, and continues cultivation in the area with mean values of 3.73, 3.48, 3.54, 4.26, and 3.63 respectively. On the other hand, they moderately agree on damaged conservation structures with mean value of 2.83, respectively. From this it is possible to conclude that overgrazing, plowing steep slopes, high rainfall, limited use of soil fertility management practices measures, and continues cultivation are the main causes of eoil Erosion table 7 in the study area.

Table 7: Respondents' opinion towards the causes of soil erosion

Causes of soil erosion	N	Min	Max	Mean
Overgrazing	122	1	5	3.73
Plowing steep slopes	122	1	5	3.48
High rainfall	122	1	5	3.54
Limited use of soil fertility management measures	122	1	5	4.26
Damaged conservation structures	122	1	5	2.83
Continues cultivation	122	1	5	3.63

4.4. Households' Opinion on the Status of Soil Fertility Degradation

4.4.1. Severity of soil erosion hazard

In the study area, the status and problems of agricultural land was assessed based on farm household respondents' understanding. Because in order to have an expressive sense on the agricultural land organization practices, evaluating the status and the current problems of agricultural land in the study area is very significant.

The majority of the farm respondents (26.2%) stated that their agricultural fields are suffering with severesoil erosion hazard. About (48.4%) and (14.8%) of the total farm households responded that this erosion with moderate and low hazard respectively. On the other hand, of the total respondents only (10.7%) of the respondents responded that soil erosion is not a problem in their farmlands.

In the study area, about (9.8%) of the total respondents also reported that erosion has minor effect on crop productivity has also increased over time. In addition, about (54.1%) of the total respondents responded that soil erosion has severe effect on crop yield productivity and crop productivity also declining over time. Whereas about (36.1%) of the respondents reported that crop yield productivity is remain constant.

Regarding what current action do they have to take to boost up their production, as can be understand from the response distribution, majority of farm household respondents

(52.5%) confirmed they use fertilizers to boost up their production in the agricultural fields of the study area? In addition, about (31.1%) of the total respondents responded that Using soil fertility management practices measures to boost up their production in the agricultural fields of the study area. Whereas about (11.5%) and (4.9%) of the respondents reported that they use manure and crop rotation to boost up their production in the agricultural fields of the study area.

Regarding the rain fall pattern in their locality, all 100% of the respondents also reported that the rain fall pattern in their area is adequate and timely.

Table 8: Households opinion on the severity of Soil Erosion Hazard

Item	Variables	Percent
the severity level of soil erosion	Severe	26.2
	Moderate	48.4
	Minor	14.8
	It has no effect	10.7
	Total	**100.0**
yearly crop yield productivity	Increasing	9.8
	Declining	54.1
	No change	36.1
	Total	**100.0**
Current action done to boost production	Using SWC measures	31.1
	Using fertilizers	52.5
	Using manure	11.5
	Crop rotation	4.9
	Total	**100.0**
the rain fall pattern in area	Sufficient and timely	100.0
	Insufficient and erratic	0.0
	Too much but short duration	0.0
	Sufficient but very erratic	0.0
	Total	**100.0**

4.4.2. Consequence of Soil Erosion

Farmers' who have low awareness of soil erosion problem affects the adoption of soil conservation measures positively and significantly. The implication is that agriculturalists who feel that their farmlands are prone to soil loss are more likely to accept opinion on soil fertility degradation and management practices more likely than those who did not perceive the tricky of soil erosion.

Table shows the responses of the participants of the study towards the main consequences of households' opinion on soil fertility degradation and management practices of Soil Erosion.

Low crop production & productivity, loss of soil fertility, farm soildegradation, livestock feed shortage, Increased weed invasion, and demand extra labor for farming activity are the main consequences of soil erosion in the area with mean values of 3.62, 3.65,3.78,4.11,3.79, and 4.57 respectively.

Table 9: Respondents' opinion on the Consequence of Soil Erosion

Cons0equence of soil erosion	N	Min	Max	Mean
Low crop production & Productivity	122	1	5	3.62
Loss of soil fertility	122	1	5	3.65
Farm land devastation	122	1	5	3.78
Livestock feed shortage	122	1	5	4.11
Increased weed Invasion	122	1	5	3.79
Demand extra labor for farming activity	122	1	5	4.57

4.5. Soil Fertility Management Practices

4.5.1. Households' attitude towards the Benefits of Soil Fertility Management

Table 10 shows the attitude of the participants of the study towards advantage of soil fertility management practices structures constructed on farm land. The responses of participants revealed that they had good attitude towards the advantage of soil fertility management practices structures constructed on farm land and the need for its conservations with a mean value ranging from 3.67 to 4.42. This tells that the farmers of the area agreed that soil fertility management practices reduced soil erosion, increases crop yield, maintains the land for the future, sustains water availability, controls flood and restores grazing lands. From this it is possible to conclude that farmers of the area and the local community had a good attitude towards Soil fertility management strategies and this has a positive impact towards the conservation of the soil resource of the area.

Table 10: Attitude of respondents towards benefits of Soil Fertility Management

(Using ranks 5 = Very High, 4 = High, 3 = Satisfactory, 2 = Low, 1 = Very Low)

Benefits	N	Min	Max	Mean
Soil fertility management practices toreduce soil erosion	122	1	5	4.00
extent to increase crop yield	122	2	5	4.42
Level of practices to maintain the land for the future	122	1	5	4.15
Practices to sustain water availability	122	1	5	3.69
Soil fertility management practices to control flood	122	1	5	3.67
Level to restores grazing lands	122	1	5	3.89

4.5.2. Soil Fertility Management Practices in the Study Area

In this section, the study area has been assessed in relation to the practice of soil fertility management technologies particular to the improvement of soil nutrient status like; use of chemical fertilizer, compost, animal manure and improved crops, fallowing and crop rotation activities practiced by farmers. To examine farm households' level of adoption of soil nutrient management technologies practiced in their agricultural fields, surveyed farm household respondents were asked to rate their level of practice for the above soil fertilization technologies and agronomic organization choices. Their level of practices

graded using five point Likert type scale expressive test with reply options and its assigned marks (Always =5; Frequently =4; Sometimes =3; Rarely =2; and Not at all =1).

As shown in (Table 11), farm household respondents were asked to indicate soil fertility conservation technologies practiced in their agricultural fields. In this regard, the response revealed that the response mean score for inorganic fertilizer as a management method of soil fertilization practice was 3.78 which is far above the pre-determined ideal mean score value 3.0. Hence to suggest the farm families have a good level of practice of inorganic fertilizer as soil artificial insemination mechanism. However, as the survey result shown in (Table 11) and as it noted from informal group discussion and interview, the application trend of inorganic fertilizer was not as per the recommendation of experts. Most of the agriculturalists keep an eye on application of inorganic fertilizer efficiency with their own decision.

This implies that though farmers develop a good practice in use of inorganic fertilizer, it could not be effective unless their application is as per the recommendation of experts to manage soil nutrient toxicity and shortage over the agricultural fields with respect to the landscape and types of crops under cultivation.

Regarding the practice of compost, animal manure and green manure soil nutrient management technologies, mean score values of responses from farm household respondents were 2.15, 2.44, and 2.79 respectively. Since all results are less than the pre-determined ideal means score value 3.0, farm household respondents have relatively poor practice of compost, animal manure and green manure of agricultural land management technologies in their soil fertilization activity. For this also participant farmers in focused group discussions and farmers during interview indicated that farmers in the study area were never seen and hear green manure as conservation practices.

This indicated that farmers have information gap related to the adaptation and implementation of green manure conservation practice to increase the status of soil fertility.

In addition to this behind poor practice of compost as a mechanism of soil fertilization activity, through conversation some farmers have stated that early order from experts to prepare compost was stated as a challenge for its effectiveness. It is clear that compost

preparation is more effective in a time when there is enough moisture supply to enable the decay rate of organic matters.

However, not only the above justification given by some farmers but also farmers' perception towards the preparation of compost as it is a source of disease have been identified as an encounter in the practice of compost to enrich soil. Because, farmers detected that this outdated soil fertility management practice has no value since the application of inorganic fertilizer is inevitable. In code, the practice of such traditional soil fertility administration activities can safeguard the long run productivity of agronomic lands through their organic sources. Further, farmers can also decrease their expenditure on the cost of inorganic fertilizer. To accomplish the conclusions on soil fertility management practices in the study area, soil fertilization action was more reliant on the application of mineral fertilizer which cannot alone ensure long run output of the land under cultivation. Mostly the combined use of both organic and inorganic fertilizer that ensures the long run productivity of agricultural lands found to be poor even farmers' use of traditional soil fertility conservation practices are also neglected.

Table 11: How frequent is soil fertility management practice used by households

(Rate 1=Not at all, 2= Rarely, 3=seldom 4=Often 5=Always)

N	Practices	Rating of respondent					Mean
		Not at all	Rarely	Sometimes	Often	Always	
1	Inorganic fertilizer	29.5	33.6	22.1	14.8	0	3.78
2	Animal .manure	36.1	42.6	21.3	0	0	2.15
3	Compost	0	16.4	30.3	34.4	18.9	2.44

4.5.3. Management Practices Related to Soil Fertility

Soil fertility management practices have been claimed to have the potential of improving agricultural land productivity status and alleviating adverse environmental effects in both at local and global level (Bifarin, *et, al*, 2013).

In line with this, the study area had been assessed in the practice status of Soil fertility management practices as a means of agricultural land management mechanism.

The survey result indicated that about (21.3%) and (29.5%) of farm household respondents reported that they practiced crop Rotationand Intercropping in farm land areas respectively. Whereas, (7.4%), (26.2%) and (15.6%) of farm household respondents reported that they practiced Grass Strip, Contour Farming and Residue Management in their farm land areas respectively. During focus group discussion household respondents were perceived that plantation of trees along farmland areas reduces the plot of land under crop covers. This also directly linked with increasing request for land that used for only the farming of major crops to feed the increasing population pressure in the study area. Throughout the interview held with farmers, most of the informants also perceived that, only the cultivation of main and common crops like: Teff, wheat, barley and maize are safeguarded the fulfillment of their annual food consumption. As the farmers in the study area, agro forestry practices considered as simply the wastage of their cultivable farmlands used for these major crops.

As a result of this, during the researcher's observation agro-forestry practices were observed only along traditional land use systems. These were also for the purpose of demarking two adjacent farmlands that belong to different ownership and practiced near to the homestead of farm households' in the form of home garden as windbreak.

This implies that farmers have some knowledge gap on the possibility of applying agro forestry practices in small-scale land users' level that helps these smallholder farmers to diversify crops and their income sources. Beyond this, agro forestry practices has wider range of significance to enhancing biological activity of soil and its fertility, increase rate of water infiltration and deliver satisfactory microclimate for the agricultural practice, if it is widely experienced in the study area.

Table 12: Types of soil fertility management practices and effectiveness of soil fertility management practices used by households

Items	Variables	Frequency	Percent
types of soil fertility management practice used	Crop Rotation	26	21.3
	Intercropping	36	29.5
	Grass Strip	9	7.4
	Contour Farming	32	26.2
	Residue Management	19	15.6
	Total	**122**	**100.0**
Effectiveness of the management	very effective	17	13.9
	moderate	46	37.7
	less effective	59	48.4
	Total	**122**	**100.0**

4.5.4. Trend and Constraints of Inorganic Fertilizer Application

As shown in (Table 13), half of sample farm household respondents (50%) in the study area indicated that they used commercial fertilizer in the past five years and continuing trend in the application of mineral fertilizer on their farmlands improved over time. Generally, according to the survey result, over time increase in the application of inorganic fertilizer was the direct image for the increase of soil degradation and depletion of significant nutrients from the outline of soil over the agricultural fields in the study area. According to the report by majority of the DAs and agricultural specialists in the separate sample *Kebeles,* since it belongs to raised landscape, over 65% of the agricultural lands are highly vulnerable for erosion hazard.

During interview Woreda agricultural experts have explained that majority of the agricultural fields are mostly found under sloped landscapes and also found under severe degradation resulted from poor farming practices by widely held of farmers and deforestation in the study area. Moreover, even if there was an upsurge movement in the application of inorganic fertilizer in the study area, this tendency of inorganic fertilizer application was not applied as per the reference of experts.

It was only half respondents about (50%) of sampled farm households also agreed that they did not used commercial fertilizer in the past five years and their inorganic fertilizer application is going to be declined over time. this is because of High cost of fertilizer (52.5%), Inaccessibility of fertilizer (24.6%), Lack of credit provision (18.9%), and I use organic fertilizer (4. 1%). In relation to this, the majority of the total sample farm family respondents confirmed that they could not apply mineral fertilizer for all crops.

The respondents reported that this is due to the swelling trend on the price of inorganic fertilizer which is not easily affordable by such smallholder subsistence-farming actors.

Table 13: Trend and Constraints of Commercial Fertilizer Application

Variables		Frequency	Percent
Implementation leve of commercial fertilizer	Yes	61	50.0
	No	61	50.0
	Total	122	100.0
IThe reason not to use use fertilizer	High cost of fertilizer	32	52.5
	Inaccessibility of fertilizer	15	24.6
	Lack of credit provision	11	18.9
	I use organic fertilizer	3	4.1
	Total	**61**	**100.0**

4.5.5. Approaches used on farm plots

As shown in (Table 14), about half of sample farm household respondents (49.2%) in the study area indicated that they used Traditional method of physical Soil fertility management practices on their farmlands. on the other hand, more than half of sample farm household respondents (50.8%) in the study area indicated that they used Mixed method of physical Soil fertility management practices on their farmlands.

Table 14: Approaches used on farm plots

Variables		Frequency	Percent
method used on farm plot	Traditional method	60	49.2
	Mixed	62	50.8
	Total	**122**	**100.0**

4.6. Factors that Determine Households Soil fertility management Practices

4.6.1. Training and technical support of Soil Fertility Management Practices

Because awareness of soil fertility management practices technologies is likely to have a significant influence topactice soil fertility management technologies, it is important to look at the communication channels from which information about the soil fertility management practices technologies is spread. Telecommunication, radio, and other means of receiving information from mass media networks are not possible for many farmers within the study areas because of the lack of infrastructure, resources, and/or technology. In its place, the transfer of information relies primarily through face-to-face interactions with of farmers and agricultural extension agents.

Regarding training respondents were asked if they have got training about the soil fertility management practices. Accordingly, (54.9%) of rspondents from all study areas mentioned that they have got training about the soil fertility management practices. Whereas the rest (45.1%) of respondents mentioned that they have not got training about the soil fertility management practices.

segarding from whom have they got technical support about the soil fertility management practices. Accordingly, (16.4%) and (27.9%) of respondents from all study areas mentioned that they have got technical support about the soil fertility management practices from neighboring farmers and from field days and training respectively. Whereas the rest (55.7%) of respondents mentioned that they have not got technical support about the soil fertility management practices from regular extension services (DAs).

Table 15: Training and Technical Support of Soil Fertility Management

variables	Response	Frequency	Percent
Chance to get training about Soil fertility management	Yes	67	54.9
	No	55	45.1
	Total	122	100.0
technical support of soil fertility management	Neighboring farmers	20	16.4
	Regular extension services (DAs),	68	55.7
	From field days and training	34	27.9
	Total	122	100.0

4.6.2. Farm Distance

One of the major physical factors that determine the adoption of soil fertility management practices measure was distance between residence and farm land areas of household heads. Table below depicts that 44.3% of the adopters reported that yes there is distance from their home to farm land in traveling hours. On the other hand, about 55.7% of the adopters reported that no there is no distance from their home to farm land in traveling hours. The expanse that household heads travel was categorized into far, medium and near. The data result gained from interview and FGD indicated that the time required reaching at the farm land from their residence ranges from ≤ 10- 60 minute. The mean time required to reach their farm land is 22 minute and 77.2% of the respondents were transportable from 11-30 minute. Most of the time, farmers far from their farm land did not give much care to visit with the exclusion of farming, weeding and harvesting seasons. This shows that there was a difference in distance of farm land between the adopters and the no adopters to practice soil fertility management practices.

This outcome also supported by Tesfaye, *et al.*, 2013, Kessler 2006, Simon *et al.*, 2012 and Birhanu & Sewunet 2003 hypothesized that farm plot detachment from the house discouraged farmers to invest in soil preservation.

Table 16: Farm distance

Item	Variables	Frequency	Percent
Distance to farm land	Yes	54	44.3
	No	68	55.7
	Total	122	100.0

4.6.3. Factors affecting Soil Fertility Management

Table 17: Factors Influencing the Local People Adoption of Soil Fertility Management Practices

(Rating as 5 = strongly agree, 4 = agree, 3 = neutral, 2 = disagree, 1 = strongly disagree)

N	Possible determinants	N	Min	Max	Mean
1.	Appropriateness of technologies	122	1	5	3.80
2.	Slope of the farm	122	1	5	3.54
3.	Shortage of land	122	1	5	3.20
4.	Distance of the farm land	122	1	5	3.31
5.	Lack of Awareness and training	122	1	5	4.19
6.	Non co-operative neighbors	122	1	5	3.18
7.	Low short-term economic benefits of soil fertility management structures	122	2	5	3.61
8.	Material shortage	122	1	5	3.68
9.	Lack of strong governmental involvement and technical support	122	2	5	3.71
10.	Off-farm activities such as petty trade and selling of firewood	122	1	5	3.85
11.	Labor	122	1	5	2.88
12.	Lack of Technical advice	122	1	5	3.86

The above table indicates the major factors influencing the local people adoption of soil fertility management practices. Concerning appropriateness of technologies, the majority of respondents were strongly agreed and agreed that appropriateness of technologies is

one of the major factors influencing the local people adoption of soil fertility management practices with a mean value of 3.80. This indicates that appropriateness of technologies is one of the major factors influencing the local people adoption of soil fertility management practices in the study area.

With regard to inadequate funds to run the group's activities, the majorities of respondents were strongly agreed and agreed that slope of the farm, is one of the major factors influencing the local people adoption of soil fertility management practices in the study area, with a mean value of 3.54. This indicates that slope of the farm is one of the major factors influencing the local people adoption of soil fertility management practices in the study area. Concerning the shortage of land in the area, the majority respondents were rated as strongly agreed and agreed. The mean value of response is 3.20. This indicates that shortage of land is another major factor influencing the local people adoption of soil fertility management practices in the study area.

With regard to distance of the farm land, the majority respondents were rated as strongly agreed and agreed. The mean value of response is 3.31. This indicates that distance of the farm land is another major factor influencing the local people adoption of soil fertility management practices in the study area

With regard to lack of awareness and training, the majority respondents were rated as strongly agreed and agreed. The mean value of response is 4.19. This point toward that lack of awareness and training is another factor influencing the local people adoption of soil fertility management practices in the study area

With regard to non-co-operative neighbors, the majority respondents were rated as strongly agreed and agreed. The mean value of response is 3.18. This indicates that non co-operative neighbors are one of the major factors influencing the local people adoption of soil fertility management practices in the study area.

Regarding low short-term economic benefits of soil fertility management practices structures, the majority respondents were rated as strongly agreed and agreed. The mean value of response is 3.61. This indicates that low short-term economic benefits of soil fertility management practices structures is one of the major factors influencing the local

people adoption of soil fertility management practices in the study area. With regard to material shortage, the majority respondents were rated as strongly agreed and agreed. The mean value of response is 3.68. This indicates that material shortage is another major factor influencing the local people adoption of soil fertility management practices in the study area. Regarding lack of strong governmental involvement and technical support, the majority respondents were rated as strongly agreed and agreed. The mean value of response is 3.71.

This indicates that lack of strong governmental involvement and technical support is one of the major factors influencing the local people adoption of soil fertility management practices in the study area.

Besides, data gained from FDGs showed that the support of government is very weak in terms of monitoring and evaluation, awareness creation and strengthening the adoption of soil fertility management practices.

Additionally, evidence gained from the key informant interview (natural resource experts at kebele, woreda and zone), indicated that the support of the government is weak particularly weak in terms of monitoring and evaluation, awareness creation and strengthening the adoption of soil fertility management practices.

This indicates that weak government supports particularly the agriculture sectors at different administrative levels constraint to the goal of both conservation and community needs.

In line with this finding, the research conducted by gobeze *et al.* (2009) in Bonga farmers revealed that government is not strongly commuted in allocating sufficient resources to monitor and support the scheme but also disappointingly give legal assistance for land users against soil and water degradation. Besides, the study carried out by Irene (2014) in Cameroon indicated that lack of government support is one of the challenges that the local community has faced in the adoption of soil fertility management practices. Therefore, as seen from the response analysis and triangulation of different data sources, we can say that lack of strong governmental involvement and technical support is one of the major factors influencing the local people adoption of soil fertility management practices in the study area.

With regard to off-farm activities such as petty trade and selling of firewood, the majority respondents were rated as strongly agreed and agreed. The mean value of response is 3.85. This indicates that off-farm activities such as petty trade and selling of firewood were other major factors influencing the local people adoption of soil fertility management practices in the study area.

Regarding lack of labor, the majority of respondents were rated as strongly agreed and agreed that lack of labor is not a serious problem in relation with adoption of soil fertility management practices in the study area. Moreover, confirmation in the analysis indicated that there is a significant difference in the level of agreement among respondents with mean is equal to 2.88. The mean value of response shows that lack of labor is not a major factor influencing the local people adoption of soil fertility management practices in the study area.

With regard to lack of technical advice, the majority respondents were rated as strongly agreed and agreed. The mean value of response is 3.86. This indicates that lack of technical advice was another major factor influencing the local people adoption of soil fertility management practices in the study area. Besides, evidence gained from key informant interview (kebele level natural resource experts) showed that lack of technical advice from the concerned bodies for farmers' adoption of soil fertility management practices in the study areaisa major factor influencing the local people adoption of soil fertility management practices in the study area.

Therefore, as seen from the response analysis and triangulation of different data sources, it is possible to say that lack of technical advice from the concerned bodies for farmers' adoption of soil fertility management practices is becoming one of the obstacles for sustainable soil management in the study area.

CHAPTER FIVE
CONCLUSSION AND RECOMMENDATIONS

5.1. Conclusion

The study attempted to assess practices and challenges on farmers' adoption of soil fertility management practices in Gimbo Woreda. Thus, the following major conclusions have been made based on the results of the research.

The finding of the data revealed that farmers in the study area have had good attitude towards the advantage of soil fertility practices carried on on farm land.as indicated in the analysis, overgrazing, plowing steep slopes, high rainfall, limited use of soil fertility management measures, and continues cultivation are the main causes of soil erosion in the study area. The agricultural fields are undergoing severe, moderate and minor hazard soil erosion. The majority of farm households use fertilizers and soil fertility management measures to boost up their production in the agricultural fields of the study area. Soil fertility management activity was more reliant on the application of inorganic fertilizer which cannot alone guarantee long run productivity of the land under cultivation. Mostly the combined use of both organic and inorganic fertilizer ensures the long run productivity of agricultural lands. However, use of traditional soil fertility conservation practices found to be poor and neglected in the study area.

The majority of farm households reported that they practiced crop rotation and intercropping in farm land areas. whereas, small proportion of farm household respondents reported that they practiced grass strip, contour farming and residue management in their farm land areas.

Appropriateness of technologies, inadequate funds to run the group's activities, shortage of land in the area, distance of the farm land,lack of awareness and training, non co-operative neighbors, low short-term economic benefits of soil fertility management structures, material shortage,lack of strong governmental involvement and technical support, off-farm activities, and lack of technical advice from concerned bodies for farmers' on soil fertility management isinfluencing factors for sustainable soil erosion fertility degradation management practices in the study area.

5. 2. Recommendations

Based on the results and conclusions drawn, the following recommendations were made:

- The implementation strategy of the existing soil fertility management program should be revised by conducting discussions with the local farmers and keep in focus their constraints and opportunities to get their full support and participation.
- The implementation of soil fertility management practices need to be adopted and the existing farming practice should be supported by the practical implementation of appropriate land use policy.
- To improve farmers' farming practice and their acceptance to practice soil conservation technologies the established framer-training centers should be strong enough and should work for the intended objective in increasing farmers' confidence on the new soil and water conservation technologies. If the farmers' training centers are strong enough in their role, these centers can be an opportunity in changing farmers' perception towards new management technologies.
- The supporting roles of development agents in frequent visiting of farmers' farmlands and in their cooperation role with farmers have shown that it is not full. To come up with full supporting role of the agricultural development agents the agriculture office of Gimbo woreda should rearrange continues trainings, supervisions and giving a chance to update their educational status with different incentives.
- Farmers in the study area were bring into being to be more dependent on inorganic fertilizer as a sole source of soil nutrient supply.

  To improve soil fertility status through a long run and come up with a solution for farmers complain about the cost of inorganic fertilizer, wider range of support, awareness creation and encouragement are needed to combine framers traditional soil fertility practices that have organic sources with that of the modern inorganic fertilizer.
- The technical gaps on the practice of soil and water conservation technologies should continuously be supported through practical and theoretical based trainings particularly for development agents (DAs).

- Finally, the researcher also recommends conducting further study in the area to examine the issue in depth and particularly in the status of soil fertility and its agricultural potential aspect.

References

Amsalu, A. (2004). Farmers views of soil and water erosion problems and their preservation knowledge.

Ayer, A. (1995). Soil erosion and conservation for production. Longman Bekele,

S. (1997). A farms housed hold analysis of resource use and conservation decisions of small holders and application to highland farmers in Ethiopia discussion paper No3 department of economics and social science. Norway.

Berhanu, G. (2003). Investment in Soil preservation in Northern Ethiopia.

Beweket W. (2001). The willingness for a participatory approach to soil and water conservation (SWC) in the Ethiopian highlands. Africa Social Science Research Review, 43-68.

Birhanu, G. (2003). Counter Furrows for institute soil and water conservation.

Boserup, E. (1965). The conditions of Agricultural Growth. London: EarthScan.

FAO (2017). Soil Organic Carbon: the hidden potential. Food and Agricultural managementof the United Nations Rome, Italy.

Fikrte, A. (2002). Factors affecting farmers' willingness to participate in soil conservation practice in the highlands of Bale:

Gebremedihin, B. (2003). Investment in soil preservation in northern Ethiopia.

Graffa, A. (1995). Farmers perspective of Soil Erosion Problems and their preservation Knowledge at Beressa Watershed, Central Highland of Ethiopia. Longman.

Green land, D. (1994). Soil, water, and nutrient management research. Bangkok: Thil and. Hailu, Z. (2001). soil degradation assessment along the slope gradient of the cultivated land in Jidda woreda east show zone. soil degradation assessment along the slope gradient of the cultivated land in Jidda woreda east show zone.

Hudso, N. (1992). Soil preservstion McGraw-Hill Companies.

Lal, R. (2015). Soil erosion research method. Ankeny.

MCDonald. (2000). Soil and water preservation projects and rural. Option of the design and Research to enhance adoption and adaptation, 343-361.

Mitiku, H. (2006). Sustainable land management.

Nyssen. (2002). Demographic response to ecological degrades ton agricultural productivity.

Reji, A. (1996). Soil and water preservstion for production and environmental protection. Prehaslam New Delih.

SEmali, S. (1991). Population pressure and land degradation on the case of Ethiopian journal of agricultural management. Population pressure and land degradation on the case of Ethiopian journal of agricultural management, 18-30.

Semgalawe, Z. (2000). Household adoption behavior of improved soil conservation: Household adoption behavior of improved soil conservation, 321-336.

Shiferaw, B. H. (1998). Resource depletion and adoption of land preservation technologies in the Ethiopian highlands: Resource degradation and adoption of land Conservation technologies in the Ethiopian highlands: 233-247.

Strock H, B. A. (1991). Farming methods and Farm Management Practices of Smallholders in the Hararghe Highlands. Farming method and resource Economics in the tropics.

T., B. (1992). Farmers' outlook of erosion hazards and attitudes towards soil conservation.

Ethiopian Journal of Development Ethiopia, 31-58.

Tegene, B. (1992). Farmers outlook of erosion hazards and attitudes towards soil conservation.Farmers outlook of erosion hazards and attitudes towards soil conservation.

Tesfu, G. a. (2011). Assessments on farmer`s practice on soil erosion.

Tilahun, Y. (1996). Impacts of conservation bunds on crops yields in Degua, Tembien, North Ethiopia. MSC Thesis agricultural university of Norway(NLH)World Bank, World Development Report.

UNEP. (1982). Linkages between land management and degradation and poverty. Addis Ababa.

Warren. (1995). forest cans version soil degradation dry land Africa. Nabob: ICRAI.

APPENDICES

ADDIS ABABA UNIVERSITY

COLLEGE OF SOCIAL SCIENCES, POSTGRADUATE PROGRAMS

DEPARTMENT OF GEOGRAPHY & ENVIRONMENTAL STUDIES

Appendix 1: Questionnaires for Farmers

Dear Research Respondent!

The main purpose of this questionnaire is to obtain information about the assessment of households' opinion on soil fertility degradation and management practices. It will focus on current practices of farmers on soil degradation conservation and challenges that farmers facing.

Specifically, it will intend to assess the farmers' practices and challenges in keja Araba, Wokka Araba and Keya Kella kebele addressing the participation of farmers related with issues of soil fertility degradation and management practicesthat directly affect their livelihood. The information's you provide are used only for research purpose. No need to write your name. But your genuine responses to all items across all the sections of thequestionnaire contribute a lot to the successful completion of this study. You are therefore politely requested to provide genuine information.

Thank you very much for your cooperation!

PART ONE: - GENERAL INFORMATION.

Put (X) mark in the box for the answer youchoose.

1. Sex 1) male ☐ 2) female ☐
2. Age in years .1)15-25 ☐ 2)26-35 3/36-45 ☐ 4)46-55

   5) 56-60 ☐

3.Marital status I) marital 2) single 3) divorced 4) widowed

4.Educational status of household:

1. Illiterate 2. Only writing and reading 3. Primary education
4. High school education

5.The number of household members

1. <3 2. 3-4 3. 5-7 4. 8-9 5. >10

6.What is your livelihood? 1/Agriculture 2. other business 3. both

P*art Two: -Main body questionnaire for literate farmer house holds*

Instruction: - Following are statements which expresses the assessment of households' opinion and its impacts on crop productivity practices adopted by farmers in the study area. Hence, you are kindly requested to encircle the choice of your answer given below.

1.Do you have your own agricultural farm land? 1) Yes 2) No

2.How much is the land size you have?

1. < 1 hectare 2. 1-2 hectare 3. 2-4 hectare 4. Above4 hectare

3. What type of agricultural practice do you have?

1. Only Rain fed based agriculture 2. Only Irrigation agriculture
3. Both Rain fed and Irrigation based agriculture 4. Only animal raring

4.How do you perceive your farm productivity in terms of your family size?

1.Well, I have participative families 2. burden, I do have more dependent population

5.How long is your Farm experience in years? 1./5 – 10 2/ 11- 20 3. 21- 30
4/ 30-40 5/above 40 years

6.For how many years did you used your farm land?

1) For about 5-10 2) 11-15 years 3) 16-20 years 4) for more than 20 Years

7. Do you have experience of soil and water conservation practices in your farm land?

1) Yes 2) No

8.Is your farm land well productive enough as expected? 1/Yes 2/ No

9.The causes of unproductivity might be linked with:

1/ Long duration of plowing 2/ unwise management of farm practice

3. Traditional modality system

10.How do you see the severity level of soil erosion hazard on your crop yield productivity? 1. Severe 2. Moderate 3. Minor 4. It has no effect

11. How is yearly crop yield productivity of your agricultural farm land?

1. Increasing 2. Declining 3. No change

12.What current action do you have to take to boost up your production?

1.Using SWC measures 2. using fertilizers 3. Using manure 4. crop rotation

13. How is the rain fall pattern in your locality?

1.Sufficient and timely 2. too much but short duration

3.insufficient and erratic 4. sufficient but very erratic

14.Do you use physical soil and water conservation measures in your field?

1. Yes 2. No

15.Indicate the level soil fertility degradation and management practices used by households.

Use (X) sign. (1=Always 2= Often 3=Sometimes 4=Rarely 5=not at all)

Type	1	2	3	4	5
.Inorganic fertilizer					
.Animal .manure					
Compost					
Use of improved seed					

16. Which type of soil fertility management method do you use in your field?

(Possible to select more than one answer)

1. Crop rotation 2. Intercropping 3. Grass strip 4. Contour farming

5 Residue management

17.Is physical SWC Practices are effective on improving crop land?

productivity? 1. Yes 2. No

18.. How effective is the soil fertility degradation and management practices?

1. Very effective 2. Moderately 3. Less effective

19. From whom have you got technical support of soil fertility degradation and management practices? 1. Neighboring farmers 2.NGO services (DAs),

3. Regular extension 4. From field days and training

20.What other measures are you using to improve soil fertility?

1. Inorganic fertilizer 2. /Farm plot manure- 3. Fallowing

21.How do you construct SWC structures/ technologies?

1. With group 2. Family labor 3. Debo / wonfel/

22. Do you have an intention to implement soil fertility degradation measures currently in farm land? 1.Necesserly 2. No 3. Not decided

23. Is there distance from your home to farm land in traveling hours? 1. Yes 2. N

24.. Have you used commercial fertilizer in the past five years and continuing? 1. Yes 2. No

25. If you didn't use fertilizer, why?

1.High cost of fertilizer 2. Inaccessibility of fertilizer 3. Lack of credit provision

4. I use organic fertilizer

26. Have you ever got training about the soil fertility management practices? 1.Yes 2. No

27. If you have good-looking in agriculture, which method would you use on your farm plots? 1/Traditional method 2/ Modern approach 3/ Mixed

28.Have you ever used modern type of soil fertility degradation measures on your plots? 1) Yes 2) No

29/Factors influencing soil fertility management

R.n	Factors	5	4	3	2	1
		Strongly agree	Agree	neutral	Disagree	Strongly disagree
1	Appropriateness of technologies					
2	Slope of the farm					
3	Shortage of land					
4	Distance of farm land					
5	Lack of awareness and training					
6	Non co-operative neighbors					
7	Low/short term economic benefit of soil fertility management system.					
8	Material shortage.					
9	Lack of strong governmental involvement and technical support.					
10	Off farm activities such as petty trade and selling of fire wood.					
11	Labor					
12	Lack of technical advice					

FACTORS THAT DETERMINING THE FARMERS PHYSICAL SOIL AND WATER CONSERVATION PRACTICES.

1. Have you done or currently doing any soil improvement or any soil and water conservation works on your land?

2.If not, what are your main reasons?

3.Do you realize a change in yield/productivity with farmland by using with and without SWC structures?

4.What is the slope of your farm land?

5.Have you ever used traditional types of soil conservation measures on your plots?

6. If yes for question number (5), which type of traditional soil fertility degradation measure do you construct?

7.Have you ever used soil conse3rvation measures on your plots?

8.How frequent do you maintain the soil fertility degradation structures?

9.Do the maintenance and construction of soil fertility degradation management structures done co-commitantly with other farm activities?

10. What major problems do you face regarding SWC structures recommended by the district Agricultural Office?

Please write your opinion on the given space.

1.How did the government providing opportunities for Soil fertility degradation management practices in regular farmers' farm/plot?

_____

_____

2.Do you adapt agricultural expertise assist in your farm land? If yes list

_____

_____

- 3.Are there any problems which limit soil fertility degradation and management practices in your locality with respect to?

Farmers understanding / precision /on soil fertility degradation and management practices

_____

- Provision of modern technologies?

_____

_____

Your farm physical environment??

_____

_____

- Your family interaction on soil fertility degradation and management practices practices?

_____

4. What is to be done to improve the practices on soil fertility degradation and management practices for better achievement in crop productivity?

- Government

_____

- DA expertise

_____

- Neighboring farmers

_____

- Family members

_____

5.What are th general problems encountered in sustaining soil fertility degradation and management practices?

To indicate the level 1= high level 2=medium level 3=low level

Problems	Rank
extension education is not widely diffused	
SWC technologies are labor, land, capital intensive	
lack of awareness about soil erosion problem and importance of soil fertility degradation management practices.	
shortage of land problem of land tenure security	
problem of free grazing	
frequent drought and famine	

6. What general opinion do you have to improve the current effort towards better soil and wate conservation practice in your land?

_____

7. What advantage do you observe from SWC structures constructed on your land? Use the table and rank / 1=greatly, 2=medium, 3=low/ "please mark(X)sign in the table"

Advantages /benefits	1	2	3
To what extent soil fertility degradation and management practices reduced soil erosion			
To what extent it increases crop yield			
To what level fertility maintains the land for the future			
For how long the soil sustains water availability			
To what degree soil fertility degradation and management practices controls flood			
To what level soil fertility degradation and management practices restores grazing lands			

8. What are the main causes of soil erosion in your opinion and rank them? Use the table

Causes of soil erosion	Rank
Overgrazing	
Plowing steep slopes	
High rainfall	
Limited use of soil fertility degradation and management practices measures	
Damaged conservation structures	
Continues cultivation	

9. What general opinion do you have to improve the current effort towards better soil fertilitydegradation and management practices practiced in your land?

_____

_____

10. What would be the consequence of soil erosion on your land?

Consequence of soil erosion	Rank
Low crop production & Productivity	
Loss of soil fertility	
farm land devastation	
Livestock feed shortage	
Increased weed Invasion	
Demand extra labor for farming activity	

Appendix 2

Interview guide for development agents, SWC experts as well as agro forestry experts

1.Sex of participant Male ☐ Female ☐

2.Educational status. Diploma ☐ BA/BSc Degree ☐

MA/MSc ☐

3.How long have you stayed or served in this position?

4.How do you feel about the problems in your locality and the study area in particular?

5. What efforts to be done by your office with regard to SWC measures?

6.Is there any SWC package in your district?

7.If yes, what major strength's and weakness does it has?

8.What opinion do you have with regarding to the effectiveness of SWC measures controlling soil conservation problems?

9.What do you think the major factors influencing farmers that are commented by district agricultural office for adoption of SWC structures in the study area?

10.What major problems do you face in the application of SWC techniques in the study area?

11.What comments do you have on the planning, designing, implementations and evaluation of SWC structures in the study area?

ppendix 3

Guide for Focus Group Discussion

1.Do you practice soil fertility degradation and management practices in your farm land?

2.If Yes, why you practice the SWC?

3.Discuss the extent of soil erosion problems in your farm land.

4.What kind of measures do you implement in controlling soil erosion problems in your farm land?

5.Are these measures effectives in controlling soil erosion problems in your farm plots?

If Yes, how?

6.. Do you participate in the designing and planning of soil fertility degradation and management practices measures before implementation on your farm?

7.Do you get adequate support from agricultural expertise such as DA's during implementation ofsoil fertility degradation and management practices?

8.What benefits do you expect from soil fertility degradation and management practices implemented on your land?

9.What limitations/problems do you face from soil fertility degradation and management practices measures implemented on your farm plots?

10.What general opinion do you have for the sustainability of soil fertility degradation and management practices measure in your farm plots?

11What are the factors that determine you to use soil fertility degradation and management practices (in reduction of soil fertility agricultural credit)?

በአዲስ አበባ ዩኒቨርሲቲ ድህረ ምረቃ ፕሮግራም የሥነ ምድርናአከባቢያዊ ጥናት ትምህርት ክፍል በተፈጥሮአዊ የአፈርና ዉኃ ጥበቃ ትግበራ ማንበብና መፃፍ ለሚችሉ መላሾች የቀረበ

ዉድ መላሽ

የዚህ ጥናት ዋና ዓላማ ተፈጥሯዊ የአፈር ለምነት ትግበራ በምርትና ምርታማት ላይ ስላለዉ ተጽዕኖና ጥናቱ በሚካሔድበት አካባቢ አርሰዉ አደሮችን የሚገጥሟቸዉን ተግዳሮቶች ለመፈተሽ ታስቦ የሚደረግ ጥናት ነዉ።ጥናቱ በሚካሄድበት በቀጃ አራባ፣ወካ አራባና ካያ ኬላ ቀበሌ የአርሶ አደሮችን የአፈርና እጥበት ጥበቃ ትግበራና ተዛማጅ ሁኔታዎች በአርሶ አደሮች ህይወት ላይ ስላለዉ ተፅዕኖ ለማዬት ነዉ።ስለዚህ የሚሰጡኝ መረጃ ሁሉ ለጥናቱ አገልግሎት ብቻ የሚዉል በመሆኑ ሥምዎን መግለጽ ሳያስያፈልግ ቀና ሃሳብዎ ለጥናቱ ስኬት እጅግ አስፈላጊ መሆኑን በመረዳት ትክክለኛዉን መልስ በመስጠት እንዲተባበሩ በትህትና እጠይቃለሁ።

ስለትብብርዎ በጣም አመሰግንዎታለሁ።

ማንበብና መፃፍ ለሚችሉ አባወ ራዎች የቀረበ

ክፍልአንድ፡አጠቃላይመረጃ

እባክዎትን ለምርጫዎ ይህንን (X) ምልክት ይጠቀሙ፡

1/ ጸታ ፣. ወንድ ☐ 2. ሴት☐3. 36- 45 ☐

2/ዕድሜ በዓመት 1. 15 ☐ 2. 26-35 ☐

4. 46-55 ☐ 5. 56-65 ☐

3/ የጋብቻ ሁኔታ 1. ያገባ/ች ☐ 2. ያላገባ/ች ☐ 3. የፈታ/ች ☐ 4. የሞተበት/ባት☐

4/የአርሶ አደሩ የትም/ትደረጃ 1.1ኛደረጃ 1-4 ☐ 2.1ኛደረጃ 5-8 ☐

3. 2ኛደረጃ 9-10 ☐4.2ኛደረጃ 11-12 ☐

5.የአባወራዉ የቤተሰብ ብዛት በዕድሜ

1. <3 2. 3-4 3. 5-7 4. 8-9 5. >10

6/ የኑሮ መሠረትዎ ምን ይሆን? 1/ግብርና 2. ከግብርና ዉጭ ሌላ ሥራ 3/ሁለቱም

ዋናዉ የመጠይቁ አካል፡፡

ቀጥሎ የቀረቡ መጠይቆች አርሶ አደሩ ምን ያህል የአፈር ለምነት ትግበራ ሥራ ላይ እንዳለና በምርትና ምርታማት ላይ ስላለዉ ተጽዕኖለመለየት የሚደረግ በመሆኑ ከቀረቡት አማራጮች ተስማሚዉን በመክበብ ይመልሱ፡፡

1./የግልዎ የሆነ የእርሻ መሬት አለዎት? ነ/አዎ 2/ የለኝም

2.ያለዎት የእርሻ ቦታ መጠን በሄክታር ምን ያህል ነዉ?

1. < 1 ሄክ. 2. 1-2 ሄክ. 3. 2-4 ሄክ. 4. ከ4 ሄክ. በላይ

3.ምን ዓይነት የእርሻ ትግበራ አለዎት?

1.ዝናብ ተኮር 2. መስኖ ብቻ 3. ዝናብ ተኮርና መስኖ 4. እንስሳት እርባታ ብቻ

4. የቤተሰብዎን ብዛት ከምርታማነታቸዉ ጋር እንዴት ያዩታል?

1/ተሳታፊ ቤተሰብ አለኝ 2/ታዳጊዎች ስለሆኑ የሥራዉ ጫና አለብኝ

5.. የአባዎራዉ የእርሻ ሥራ ልምድ በዓመት ሲገለጽ1 5 – 10 2/11- 20 3/21- 30

4/ 31-40 5/40ዓመት በላይ

6.የእርሻ መሬትዎን ለምን ያህል ጊዜ ተጠቅመዋል?

ነ.ከ5—10 ዓመት 2. ከ11—15 ዓመት 3. ከ16—20 ዓመት 4. ከ20 ዓመት በላይ

7/ በእርሻ ማሳዎ ላይ የአፈርና ዉኃ ጥበቃ የማድረግ ልምድ አለዎት?ነ. አዎን2. የለኝም

8. የእርሻ መሬትዎ እንደሚጠ በቀዉ ልክ ምርታማ ነበር? 1/አዎን 2/አይደለም

9.ማሳዎ ምርታማ ላለመሆኑ ምክንያት ፡

ነ.ለረዝም ጊዜ የታረሰ መሆኑ 2. ዕዉቀት የጎደለዉ የአፈር ጥበቃ ሐ. ልማዳዊ የአፈር ጥበቃ ሥራ

10.የአፈር እጥበት. በእርሻዎ ምርታማነት ላይ ያለዉን አስከፊነት እንዴት ያዩታል?

1. ከፊተኛ 2. መካከለኛ3. ዝቅተኛ 4. ምንምተጽዕኖ የለዉም

11 የእርሻ መሬትዎ ዓመታዊ ምርታማነት ምን ያህል ነዉ.?

1.እያደገ ያለ 2. እየቀነሰ ያለ 3. ለዉጥ የለዉም

12. በአሁን ላይ ምርታማነትን ለመጨመር ምን ዓይነት ሥራ ይሠራሉ?

1.የአፈርና ዉኃ ጥበቃ ስራ 2. ማዳበሪያ መጠቀም 3. ዕዳሪ መጠቀም 4. አዝሪዕት ማዘዋወር

13. በአከባቢዎ የዝናብ ሥርጭት ምን ይመስላል? 1/በቂና ወቅታዊ 2/ በቂ ያለሆነና ያልተስተካለ

3/ከመጠን በላይ የሆነ ግንለአጭር ጊዜ 4/ በቂ የሆነ ነገር ግን በጣም ያልተስተካከለ 14/በማሳዎ

ነ4.ተፈጥሯዊ የአፈርና ዉኃ ጥበቃ ይጠቀማሉ? ነ/አዎን 2/አይደለም

15.Iበእርሻ ማሳዎ የአፈር ለምነት እጥበትና፣ ለመከላከል የሚጠቀሙበትን ዘዴና ያለበትን ደረጃ (×)ያመልክቱ

1= ሁልጊዜ 2=ብዙጊዜ 3 = አንዳንዴ 4 =በጥቂቱ 5 = ምንም

ዓይነት	1	2	3	4	5
የተፈጥሮ ማዳበሪያ					
የእንስሳት ዕዳሪ					
ብሸባሽ					
ምርጥ ዘር					

16.በእርሻ መሬትዎ ላይ ምን ዓይነት የአፈርና ዉኃ ጥበቃ ትግበራ ያደርጋሉ? (ከአንድ በላይ መመለስ ይቻላል)

1.አዝሪዕት ማፈራረቅ 2. ቀይጦ መዝራ3.ሣር ማልበስ 4. አግድመት ማረስ 5. የማሳ ቅሪት መጠቀም

17/ ተፈጥሮአዊ የአፈርና ዉኃ ጥበቃ ሥራ የአዝርዕት እርሻ መሬትን ለምነትን በማሻሻል ምርታማነትን በመጨመር ዉጤታማ ነበር? 1/አዎን 2/ አይደለም

18/ የአፈር መከላትን የመቆጣጠርያ ዘዴ ምን ያህል ዉጤታማ ነበር?

ነ/በጣም ዉጤታማ 2/መካከለኛ 3/ዝቅተኛ ዉጤታማ

19/ የአፈርና ዉኃ ጥበቃ ዘዴዎችን ለማድረግ የመረጃ ምንጭዎ ምን ነበር?

ነ/ ጎረቤቱ ያሉ ገበሬዎች 2/መንግስታዊ ያልሆኑ ድርጅቶች 3/የግብርና ባለሙያዎች 4/ከእርሻ ዉሎ

20/የአፈርን ለምነት ለመጨመር ም ን ዓይነት ዘዴ ይጠቀማሉ? (ከአንድ በላይመመለስ ይቻላል)

1.የፋብሪካ ማዳበሪያ 2. ብስባሽ 3. ዕዳሪ መተዉ

21. የአፈርና ዉኃ ጥበቃ ቴክኖሎጂን እንዴት ይጠቀሙታል?

ነ.በቡድን 2. በቤተሰብ ጉልበት 3. ደቦ ወይም ወንፈል

22. የአፈርና ዉኃ ጥበቃ ሥራ ባልተጠቀሙባቸዉ እርሻ መሬትዎ ላይ የመጠቀም ፍላጎት አለዎት?

ሀ) አዎን የግድ ለ) ኣይ የለኝም ሐ) ለጊዜዉ አልወሰንኩበትም

23. ከቤትዎ እስከ እርሻ መሬትዎ ርቀት አለ? ነ.አዎን 2. የለም

24. ካለፉት አምስት ዓመት ወዲህ ዘመናዊ ማዳበርያ ተጠቀመዉ ያዉቃሉ? ነ.አዎን 2. አላዉቅም

25. ካልተጠቀሙ ለምን?ነ/የማዳበሪያ ዉድነት 2/አቅርቦቱ አነስተኛ በመሆኑ 3/የብድር አገልግሎት ስላልተመቻቸ 4/ተፈጥሯዊ ማዳበሪያ ስለምጠቀም

26. የአፈርና ዉኃ ጥበቃ ልምድ ሥልጠና ሁልጊዜ ያገኛሉ? ነ.አዎን 2. አላገኘሁም

27 / በእርሻ ሥራ ደስተኛ ከሆኑ በማሳዎ ላይ ምን ዓይነት ዘዴ ይጠቀማሉ?

ነ/ባህላዊ የመሬት አጠባበቅ ዘዴ 2/ዘመናዊ አጠባበቅ ዘዴ 3. ሁለቱንም

28. ዘመናዊ የአፈር እጥበት አጠባበቅ ዘዴ ተጠቅመዉ ያዉቁ ነበር? 1/አዎን 2/ አላዉቅም

29/የአፈር ለምነት ጥበቃ ላይ ተጽዕኖ የሚፈጥሩ ነገሮች፤

ተ. ቁ	ተጽዕየሚፈጥሩ ነገሮች	5 በጣም እስማማለሁ	4 እስማማለሁ	3 መካከለኛ	2 አልስማማም	1 በጣም አልስማማም
1	የቴክኖሎጂ ምቹነት					
2	የመሬቱ አቀማመጥ					
3	የእርሻ ቦታ እጥረት					
4	ከመኖሪያ ቤት የማሳ ርቀት					
5	የሥልጠናናየግንዛቤ እጥረት					
6	ከነሬቤት ትብብር እጥረት					
7	የአፈርን ለምነት ለአጭር ጊዜ ጥቅም ብቻ ሲሉ የመያዝ ዘዴ					
8	የቁሳቁስ እጥረት					
9	የምንግሥት ጽኑ ተሳትፎና ቴክኒካዊ ድጋፍ እጥረት					
10	ከእርሻ ዉጭ የሆኑ እንደ ንግድና የእነጨት ሽያጭ ሥራ					
11	ጉለበት					

12	የቴክኒካዊ ምክር እጥረት					

ማንበብና መፃፍ ለሚችሉ አባወራዎች የሚቀርብ መጠይቅ

ከዚህ በታች የቀረቡት ጥያቄዎች በጥናቱ አከባቢ ላይ የሚተገበረዉን ተፈጠሯዊ የአፈር ለምነት ክብካቤ ዘዴ በተመለከተ ማንበብና መጻፍ ለሚችሉ አርሶ አደሮች የቀረበ መጠይቅ በመሆኑ የቀረቡትን አማራጮች በመክበብ እንዲመልሱልን እጠይቃለሁ፡፡

1.በእርሻ ማሳዎ በፊትም ይሁን አሁን ላይ የአፈርን ለምነት ለመጠበቅ ምን ይጠቀማሉ?

2.ካልተጠቀሙ ምክንያቶት ምን ይሆን?

3.የአፈርን ለምንት መጠበቂያ ዘዴ በመጠቀምዎ የምርት መሻሻል ለዉጥ እንዳለ አረጋግጠዋል?

4.የእርሻ መሬትዎ ዝማሜ እነዴት ነበር?

5.ልማዳዊ የአፈር ጥበቃ ዘዴ ይጠቀሙ ነበር?

6.መልስዎ አዎን የሚል ከሆነ የትኛዉን ዓይነት የመጠበቂያ ዘዴ ይጠቀሙ ነበር?

7.በማሳዎ ላይ የአፈር መከላትን የመከላከል ዘዴ ተጠቅመዉ ያዉቃሉ?

8.በምን ያህል ጊዜ ዉስጥ የአፈር ለምነት መጠበቂያ ዘዴ ይጠቀማሉ?

9. የአፈር ለምነት መጠበቂያ ዘዴ ከሌሎች የእርሻ ሥራ ጋር ጎን ለጎን አብሮ ይሠራ ነበር?

10.የአፈርና ዉኃ ጥበቃ ሥራ ሲሰሩ ከወረዳ ግብርና ቢሮ ያጋጠመዎት ዋነኛ ችግር ምንድን ናቸዉ?

ለሚመለከታቸዉ ቡድኖች አስተያየት እንዲሰጡ የቀረቡ ክፍት ጥያቄዎች(አንባቢያን)

1/በመደበኛ የአርሶ አደር ማሳ ላይ መንግስት የአፈር ለምነት ብክነት ለመከላከል ምን ዓይነት አማራጮችን ያቀርባል?

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2/የግብርና ባለ ሙያዎችን ምክርና ድጋፍ በእርሻ መሬትና ምርትዎ ላይ ይጠቀማሉ? አዎን ካሉ ይዘርዝሯቸዉ

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3//በአካባቢዎ የአፈርና ዉኃ ጥበቃ ሥራ እንዳያደርጉ የሚከለክሉ ተግዳሮቶችአሉ?

- የገበሬዎች ዕዉቀት ወይም ጥንቃቄ

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- ዘመናዊ ቴክኖሎጂ አቅርቦት

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- የእርሻዎ ተፈጥሯዊ አካባቢያዊ ሁኔታ

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- በአፈርና ዉኃ ጥበቃ ሥራ ላይ የቤተሰብዎ ተሳትፎ

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4./የተሻለምርታማነትን ለማምጣት በአፈርና ዉኃጥበቃሥራ ማን ምን ሊሠራይገባል?

- በመንግሥት

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- የግብርናባለሙያዎች

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- ጎረቤትአርሶአደሮች

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- የቤተሰብአባላት

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5./የአፈርናዉኃጥበቃሥራንለማስቀጠልሊገጥሙ የሚችሉአጠቃላይችግሮች

ችግሮች	ደረጃ
ተከታታይ የግንዛቤትምህርትያለመሠራጨት	
የአፈርናዉኃጥበቃ ቴክኖሎጂ ለጉልበትመሬትናገንዘብያለዉ ፍላጎት	
ስለአፈርእጥበትችግርናበአፈርናዉኃጥበቃሥራጥቅምግንዛቤእጥረት	
የመሬትባለቤትነትሥርዓትናየመሬትጥበትችግር	
ነፃየግጦሽቦታ ችግር	
በተደጋጋሚ የሚከሰትድርቅናረሐብ	

6//በአካባቢዎአሁንያለዉንየአፈርናዉኃጥበቃሥራየተሻለእንዲሆንያለዎትአመለካከት_____

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7/ ከአፈርና ዉኃ ጥበቃ ቴክኖሎጂ አሠራር በመሬትዎ ላይ ምን ዓይነት ጥቅም አስተዋሉ?

ሠንጠረዡን በመጠቀም 1 = ከፍተኛ፣2 = መካከለኛ፣ 3 = ዝቅተኛ በማለት ደረጃ (×) ምልክት በማስቀመጥ ይመልሱ፤

ጥቅማጥቅሞች	1	2	3
የአፈርናዉኃጥበቃምንያህልየአፈርእጥበትንይከላከላል?			
ምርታማነትንምንያህልይጨምራል?			
የአፈርናዉኃጥበቃአፈርንለመጪዉዘምንያህልይጠብቃል?			
የአፈርናዉኃጥበቃምንያህልዉኃንይጠብቃል?			
የአፈርናዉኃጥበቃምንያህልጎርፍንመከላከልደረጃይጠብቃል?			
የአፈርናዉኃጥበቃምንያህልየግጦሽመሬትንእንዲያገግምያደርጋል?			

8./እንደ አስተሳሰብዎ ለአፈር እጥበት ዋነኛዉ የሆኑ ምክንቶች ምንድን ናቸዉ? በደረጃ ያስቀጧቸዉ፤፤

የአፈርእጥበትምክንያት	ደረጃ
ያልተገባ የግጦሽ አጠቃቀም	
ቁልቁል ማረስ	

ከፍተኛ ዝናብ	
የአፈር ጥበቃ ሥራ ዉስንነት	
ደካማ የሆነ የእንክብካቤ ሥራ	
አከታትሎ ማረስ	

9./በአካባቢዎ የተሸለ የአፈርና ዉኃ ጥበቃ ሥራ የተሸለ እንዲሆን ያለዎት አመለካከት

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10. የአፈር እጥበት ለመጪዉ ጊዜ በማሳዎ ላይ ምን ያመጣል ብለዉ ያስባሉ?

የአፈር እጥበት የሚያስከትለዉ ዉጤት	ደረጃ/በቅደም ተከተል
ዝቅተኛ የምርት ዉጤት	
የለም አፈር ብክነት	
የእርሻ መሬት ምርት ያለመስጠት	
ለእንስሳት የግጦሽ እጥረት	
ከፍተኛ የአረም መሠራጨት	
የአፈርን ለምነት ለመመለስ የሚችል የሰዉ ጉልበትፍላጎት	

ለልማት ሰራተኞች (ለአፈረና ዉኃ ጥበቃዎች) እንዲሁም ለደንና ተፈጥሮ ሃብት ጥበቃዎች የሚቀርብ

1/ የተሳታፊ ፆታ ወንድ ☐ ሴት ☐

2/ የትምህርት ደረጃ ዲፕሎማ ቢኤ/ ቢኤስ ሲ ድግሪ ☐ ማስትሬት ድግሪ ☐ 3/ በዚህ ደረጃ ለምን ያህል ጊዜ ወይም ዓመታት ቆይተዋል?

4/የአፈር እጥበት ችግሮችን በአጠቃላይ እንደ ወረዳና በተለይም እንደጥናቱ አካባቢ እንዴት ያዩታል?

5/በቢሮዎ ደረጃ የአፈር ብክለትን ለመቆጣጠር ምን ዓይነት ጥረት ይ ደረጋል? 6/ በወረዳዎ ስለአፈርና ዉኃ ጥበቃ የትግበራ ግንዛቤ አለ?

7/አዎ የሚሉ ከሆነ ምን ዓየነት ጥንካሬና ድክመት አለዉ?

8/ የአፈር ለምነት ብክነት መከላከያ ጥበቃ ሥራን በሚመለከት ከዉጤታማነቱ አንፃር ምን ዓይነት አስተያየት አለዎት?

9/በጥናቱ አካባቢ አርሶ አደሮች ላይ ተጽዕኖ የሚፈጥሩ የሚባሉ በወረዳ ግብርና ቢሮ አስተያየት የተሰጠባቸዉ ነገሮች ምንድን ናቸዉ?

10.የአፈርናዉኃጥበቃንአርሶአደሮችእንዳይቀበሉተፅዕኖየሚያደርጉምንድንናቸዉብለዉያስባሉ፤

11/በወረዳዎ የአፈርና ዉኃ ጥበቃ ሥራ በማቀድ በመንደፍ በመተግበርና በመገምገም ህደት ላይ ምን አስተያት አለዎት?

ማንበብና መፃፍ ለማይችሉ አርሶአደሮች ቡን ዉይይት የቀረ

1. በእርሻ ማሳዎ ላይ የአፈር ለምነት ጥበቃ ሥራን ይተገብራሉ? አዎ ካሉ ምን ዓይነት
2. አዎን የሚሉ ከሆነ ለምን ምክንያት ያደርጋሉ?
3. በማሳዎ ላይ የአፈር እጥበት ችግሮችን ይግለጹ፤
4. የአፈርን ለምነት እጥበት ችግሮችን ለማስወገድ ምን ዓይነት ርምጃ ይወስደሉ
5. እነዚህ ርምጃዎች የአፈር እጥበትን ከመቆጣጠር ረገድ ዉጤታማ ነበር? መልስዎ አዎን ከሆነ እንዴት?
6. 6.በእርሻ ማሳዎ ላይ በሚተገበረዉ የአፈርና ዉኃ ጥበቃ ሥራ ከትግበራ ሥራ በፊት በመንደፍና በማቀድ በኩል ይሳተፉ ነበር?
7. 7.በአፈርና ዉኃ ጥበቃ ሥራ ትግበራ ወቅት የግብርና ባለሙያዎች በቂ ድጋፍ ይሰጡ ነበር?
8. 8./በእርሻ ማሳዎ ላይ በሚተገበረዉ የአፈርና ዉኃ ጥበቃ ሥራ ምን ዓይነት ጥቅም አግኝተዋል?
9. በእርሻ ማሳዎ ላይ በሚተገበረዉ የአፈርና ዉኃ ጥበቃ ሥራ ምን ዓይነት ጉድለት ወይም ችግር ገጥሞዎታል?
10. በእርሻሳዎ ላይ በሚተገበረዉ የአፈርና ዉኃ ጥበቃ ሥራ ቀጣይነት ምን ዓይነት አስተያየት አለዎት?
11. የአፈርና ዉኃ ጥበቃ ሥራን በሚተገብሩበት ወቅት የሚወስኑ ተግዳሮቶች ምንድን ናቸዉ? (የአፈር ለምነት መቀነስ የእርሻ ግብአቶች የዱቤ አገልግሎት እጥረት)