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DEPARTMENT OF GEOGRAPHY AND ENVIRONMENTAL STUDIES

The Effects of Soil Conservation on Local Community Livelihood:The Case of Gindeberet Woreda, West Showa Zone, Oromia Region, Ethiopia

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Examiner

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Head of Department

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Declaration

Abebe Kebede and Markos Dira do here by declaring to the Wolkite University Department of Geography and Environmental Studies that this thesis is a product of our original research work and has not been submitted to any other university for any academic degree. Any materials and information in a report other than our own are duly acknowledged.

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Acronyms and Abbreviations

ACRP.....Association of clinical Research Professional

CSA.....Central Statistics Agency

EHRS..... ..Ethiopia Highland Reclamation Study

FADO..... Food and Agricultural development organization

FSCWD..... .Food Supplies and Consumer Welfare Department

GDoARD.....Gindeberet District of Agricultural and Rural Development

GDP.....Gross Domestic Product

GTP..... Growth and transformation plan

GWAB .....Gindeberet Woreda Administration Bureau

GWAO.....Gindeberet woreda agricultural office

GWASEP..... Gindebert woreda Administration socio-economic profile

GWCCB.....Gindeberet Woreda Climate Change Bureau

SCRP.....Soil Conservation Research Project

SIDA.....Swedish international development agent

SWC..... soil and water conservation

SWCD.....Soil and Water Conservation Development

WFP.....World Food Program

Abstract

Soil conservation plays a crucial role in sustaining local community livelihoods by preserving the natural resources essential for agriculture and overall environmental health. The one significant gap is the lack of awareness and education among community members regarding the benefits of soil conservation, as in the case of Gindeberet woreda. The researchers tried to assess the effect of soil conservation on local community livelihoods in Gormana Erga Kebele. The general objective of the study was to assess the effect of soil conservation on local community livelihood in Gindeberet woreda in the case of Gormana Erga Kebele. The research approach employed by the researchers in this study is a mixed-methods approach. The researchers selected 78 households from the total of 780 households in Goromana Erga Kebele for the sample size of the study on the effect of soil conservation on local community livelihood in Goromana Erga Kebele by using simple random sampling techniques. The major findings were Some community members actively participate in soil conservation efforts, while others may need more awareness and education about its benefits. However, some areas lack proper implementation of these practices due to resource constraints or a lack of knowledge. Soil conservation positively impacts livelihoods in several ways. The researchers finally recommended that the positive impact of soil conservation on community livelihoods underscores the need for its sustainable implementation at all levels. Ensuring local participation and empowerment remains crucial for successful soil conservation and improved livelihoods.

Keywords: *effects, soil, conservation, local community, livelihood*

Chapter One

1. Introduction

1.1. Background of the Study

The term conservation has many connotations, but the most widely accepted definition, as defined by the International Union for Conservation of Nature and Natural Resources, is the management of human use of natural resources so that it may yield the greatest sustainable benefit while maintaining its potential to meet the aspirations of future generations (Encyclopedia of Britannica 2009). Therefore, soil conservation is the sustainable use of soil by maintaining its potential and/or fertility without interrupting the needs and aspirations of future generations (Erentain, 2011). Natural resources are the basis for development. Soils play a critical role in the production of food and feed for a growing global population. In the most fundamental sense, soils are the basis for life on Earth, the support that plants rely on to keep on erect, provide the habitat for a vast biodiversity and biomass of soil organisms (Nielsen UN et al. 2015), and both generate and serve as the source for most of the carbon and nutrient elements that support life (Brevic EC and Sauer T. 2015). Soils hold the water that plants and soil organisms use to survive, slow the rate of water movement, and thus limit the rate of erosion and soil loss (Horton 2016). In addition Soils also contribute to the composition of the atmosphere and, by association, impact climate, and both are significant sources and sinks of greenhouse gases (Mayer A. *et al. 2018).* This is especially important in subsistence-based economies whose economic activities are predominantly agriculture (Hurni & Kebede, 2010). The overall importance of soil conservation is to obtain the maximum sustainable level of production from a given area of land. This is achieved by maintaining soil loss below a threshold level that theoretically permits the natural rate of soil formation to keep pace with the rate of soil erosion (Morgan, 2020). In specific terms, the importance of soil conservation is to maintain an adequate depth of fertile top soil and soil fertility, to reduce the loss of nutrients from agricultural lands, to prevent pollution of water bodies, to decrease the rate of sedimentation (in reservoirs, canals, ditches, and harbors), and, in the longer term, to prevent land deterioration in quality (Loger, 2010; Morgan, 2020).

But conservation and management of the natural resource bases (soil, water, and vegetation) for the sustainability of agricultural production and to reduce poverty in Sub-Saharan countries have become the most challenging policy issues these days (Bekele et *al*., 2009).Soil is an essential

input to agricultural production, especially for countries like Ethiopia, where agriculture is the backbone of the economy and the livelihood of the majority of the population depends on agriculture. This naturally abundant resource plays an important role in its productivity (Israel, 2011).

Today, most governments in the world give active support to programs of soil conservation because soil erosion is almost universally recognized as a serious threat to man's well-being, if not to his very existence (Hudson, 2010). Soil conservation in Ethiopia occupies a very important place. It has been firmly established in some parts of the country that the problem of soil degradation has gone beyond all limits of reversal, and the problem is expanding very fast (Kebeda, 2009). Therefore, to reverse this trend, major government efforts were made to introduce and implement soil conservation structures and tree planting. Moreover, in the study area, the community cooperated with the government to protect soil erosion by taking the instruction from the government through development agents, making the contour line, and doing soil conservation. To revise these trends of soil conservation and soil erosion, the government has been making efforts by introducing and implementing various soil water conservation measures. Therefore, this study helped to understand the government effort to take measures on the effect of soil conservation in the study area by introducing recommendations.

1.2. Statement of the Problem

Agriculture has remained the backbone of Ethiopia's economy. A report by the central statistical agency (CSA, 2017) pointed out that agriculture accounts for about 55% of the GDP, 80% of employment, and 60% of exports. However, agriculture in Ethiopia has many problems; among these, soil erosion has been the most critical problem for many centuries (Kiflu, 2010). According to Hurni (2008), the clearing of forests for cultivated land and accelerated soil erosion by the activity of man over a long period of time gradually destroyed the highlands that were tilled first. Furthermore, Charles (2012) indicated that the present rate of soil loss and deteriorating environment, in comparison with the rate of present population and economic growth, is so high that a stable condition would not be reached without radical change. According to the SCRP cited in Kruger et al. (2021) it is estimated that about 1.5 billion tons of soil are eroded every year in Ethiopia. Furthermore, Kruger et al. (2021) citing the Ethiopian Highlands Reclamation Study (EHRS), estimated that between 2007 and 2021, the rate of land degradation will cost 15.3 billion Ethiopian birr. Most of it (78%) is due to crop failure and low

yield. In Ethiopia, there are several problems regarding soil conservation, especially in Oromia regional state. These problems include soil erosion, deforestation, and so on. In Ethiopia, the government has taken measures to solve the problems of soil erosion that affect soil contents by producing soil erosion. In 2008, under the GTP, the government created conductive conditions for society towards the effects of soil conservation and took affirmative action regarding conservation method violations in all regions. In the same manner, the Oromia regional state government also takes measures to conserve soil in their GTP by providing public awareness about soil conservation effects on their lives and biodiversity protection in the area. The researchers were interested in conducting research on the effects of soil conservation in Oromia regional state in the case of Gindeberet woreda due to the area's especially high soil conservation.

Soil conservation plays a crucial role in sustaining local community livelihoods by preserving the natural resources essential for agriculture and overall environmental health. However, despite its importance, there are still gaps in understanding how soil conservation practices directly influence the well-being of local communities. One significant gap is the lack of awareness and education among community members regarding the benefits of soil conservation. Without proper knowledge, individuals may not fully engage in sustainable land management practices, leading to soil degradation and reduced agricultural productivity. Therefore, bridging this gap through targeted educational programs and outreach initiatives is essential to empowering communities to adopt soil conservation techniques effectively. Furthermore, the lack of policy support and enforcement mechanisms hinders the widespread implementation of soil conservation measures. In many regions, there is a disconnect between existing environmental policies and their practical application at the grassroots level. Strengthening policy frameworks, promoting community participation in decision-making processes, and enforcing regulations are vital steps to fill this gap and ensure the long-term success of soil conservation initiatives.

1.3. Objectives of the study

1.3.1. General Objective

The general objective of the study is to assess the effect of soil conservation on local community livelihoods in Gindeberet woreda.

1.3.1.1. Specific objective

- To identify the attitude of the local community towards soil conservation in the study area.
- To assess the existing soil conservation practices in the study area.
- To assess the effect of soil conservation on livelihood in the study area.

1.4. Research Question

What is the attitude of the local community towards soil conservation in the study area?

What soil conservation measures are in place in the study area?

What is the effect of soil conservation on the livelihood of the study area?

1.5. Significance of the study

In the study area, there is no study that deals with the effects of soil conservation on livelihood. Therefore, the final result of the study would be expected to help farmers, agricultural development agents, soil conservation experts, and other individuals in soil conservation planning. It also helps in identifying intervention areas that have reasonable effects by entertaining farmers's attitudes towards soil conservation. Moreover, this study served as a source for further studies based on this issue in the study area.

1.6. Scope of the Study

The scope of the study would be delimited to the Gindeberet Woreda, West Showa Zone, Oromia Regional State, Ethiopa. Due to limited resource and time at the disposal of research the total size of sampling would be 78 form house hold heads. In order to determine the size of the sample frame, the list of member of household of Gormona Erga kebele would be used. The total households in Gormona Erga kebele was 780. As the study would stress on Gormona Erga kebele as its major sources of primary data hence it was difficult to generalize the results to the entire woreda.

1.7. Limitation of the study

During the participation of the paper, the researchers were focused on some challenges, such as a lack of time, financial constraints, a lack of community experience to give information, and a lack of experience despite the obstacles. Thus, this research is a result of time and financial constraints as well as problems in the study area. It was limited to a study on the effects of soil conservation on livelihood in the study area.The researchers would apply mechanisms to overcome these limitations. These mechanisms reduce time and costs. The researchers in the study area conducted a two-month interval study and selected key informant interviewers, such as one Gindeberet woredas agricultural office,two soil conservation research project experts, two elders, and one key informant.

1.8. Organization of the Paper

This senior essay contains chapters such as chapter one, which include an introduction, statement problem, objective of the study, research questions, significance of the study, and limitations of the study. Chapter two, which includes a review of the related literature, mainly focuses on an overview of soil conservation and its effects. Chapter three, which includes material and methodology, Physical description of the study area, location of the study area, topography of the study area, climate of the study area, soil, vegetation of the study area, drainage of the study area, socioeconomic description of the study area, population characteristics of the study area, research methodology, research design, and sampling technique. Data types and sources, data collection methods, and data analysis methods Chapter four, which includes the result and discussion of the paper, and Chapter five, which includes the conclusion and recommendation,.

Chapter Two

2. A Review of the Related Literature

2.1. Soil Conservation in the World

Investing in the application of soil conservation measures is only meaningful when erosion rates are higher than acceptable. This can most easily be established when erosion rates can be reliably quantified. Quantitative information is indeed available for North America and Europe (Cerdan et al., 2010; NRCS, 2010). However, the quality of our estimates of soil erosion rates by water for other areas on the globe is often poor. Sometimes, estimates are based on a limited number of data points that are simply extrapolated to larger areas; this often leads to bias because erosion rates are generally measured at locations where erosion intensity is much higher than average (Cerdan et al., 2010).

2.1.1. Effects of Soil Conservation on the World

A global overview of the effects of various SCTs on water erosion control can provide evidence-based means for implementing more sustainable soil management practices. In addition, the results can provide information for the cover management (C-factor) and support practices (P-factor) parameters of the Universal Soil Loss Equation (USLE) (Maetens et al., 2012a) to assess soil loss risk on a large scale. Therefore, an extensive literature review is needed to compile the results of earlier studies and analyze the effects of various SCTs on water erosion control on a global scale.

2.2. Soil Conservation Practices in Africa

Designing sustainable soil management practices remains a major challenge in the East and Central African regions. Losses of SOC, N, and P due to soil erosion and poor cropping systems are estimated to be at rates of 270 million tons per year in Africa. Given the inherent low fertility of many soils in tropical and subtropical regions, the use of farmyard manure and inorganic fertilizer is particularly important due to their ability to improve both soil water content and soil properties. For instance, extensive work on highly weathered soils in Kenya (Otieno et al. 2018), Tanzania (Okalebo et al. 2006), Uganda (Pincus et al. 2016), the Democratic Republic of the Congo (Munyahali et al. 2017), and Angola (Rodrigues et al. 2018) has demonstrated the potential of crop residues to restore soil fertility. Improvement of soil productivity in degraded soils therefore not only requires the application of chemical fertilizers but also strategies that, for

instance, integrate legume cover crops into cropping systems (Nyawade et al., 2018b; Nyawade, 2015).

2.3. Soil Conservation in Ethiopia

A country-wide program, especially in the highlands areas of Ethiopia, has been launched by the government of Ethiopia through the Ministry of Agriculture with its departments FSCD, ACRP, SWCD, and so on. Assistance has been forthcoming from several sources, including international agencies and bilateral organizations (Horne, 2010). According to Horne (2012), the International Agency for World Food Programmes (WFP) was involved in conservation activities in the mid-2009s and has since expanded its support continuously. Later, other agents (SIDA), World Vision, and Conservation Ethiopia contributed much to soil and water conservation activities. (Wild, 2013). Soil conservation activities through the Ministry of Agriculture, supported by external aid, have been carried out on a large scale on cultivated land as control (level) bunds, on hillsides as forestation terraces, and on degraded hills as terraces were constructed. 310,000 hectares of highly denuded land were re-vegetated, and above 80,000 hectares of hillside were closed for natural re-generation. Thousands of cheek dams in gullies and other activities of land rehabilitation were carried out. (Growing, 2008). Modest success has been achieved, but the results achieved are lower in part than expected as compared to the relatively significant input or comparable with the magnitude of the problem (Kruger et al., 2011). Uniform application of single measures to the different agro-ecological conditions, overemphasis on structural measures, more attention given to controlling erosion in the degraded lands, over dependence on food for work, poor construction, and inadequate maintenance were the main reasons for the lower impact of conservation activities in the country (Kebede and Horne, 2010; Sconces et al., 2011; Kruger et al., 2011).

In general, environmental factors such as dissected terrain, the cultivation of slopes, erratic rainfall, and socio-political factors such as the top-down approach adopted by bodies intervening to improve SWC lead to a lower impact of conservation activity (Kruger et al., 2013; Hurni, 2014). Farmers have been minimally involved in soil conservation activities; indigenous knowledge has been undermined by soil conservation experts and policymakers (in planning, designing, and implementation); and indigenous soil conservation measures have been neglected. Therefore, the country is still losing an incredible amount of precious top soil annually (Kruger et al., 2014).

2.4. Soil and Water Conservation

There are always strong links between measures for soil and water conservation, and this applies to equality in semi-arid areas. Many measures are directed primarily at one or the other, but most contain an element of both. Reduction of surface run-off by structures or by changes in land management will also help to reduce erosion. Similarly, reducing erosion will usually involve preventing splash erosion, the formation of crusts, or the breaking down of structures, all of which will increase infiltration and thus help water conservation (Abbey, 2011). The assistance provided to farmers is to construct and repair erosion control structures in the field in the field (a terrace and waterways.

2.4.1. Definition of Community-Based SWC Conservation

Community'refers to the group of stakeholders in the land resources conservation programmers'. It also refers to a group of people who have a historical relationship with the land. (Isaac and Mohammed, 2012). SWC can be described as activities that reduce water losses through runoff and evaporation while maximizing in-soil moisture storage for crop production. Ditches, the construction of earth and some stone bunds, and vegetative barriers are normally defined as soil and water conservation (SWC) structures and are primarily promoted to reduce soil erosion. On sloping lands, terracing is necessary for reducing overland flow rates, thereby contributing to water and nutrient conservation. Although terracing steep lands in East Africa has been an indigenous technology among some communities, new methods have been evolving over the years as the need to be innovative with ever-decreasing space for cultivation grows with the population, especially in the densely populated and erosion-prone highlands (Critchley, 2012). The construction of physical structures is often labor-intensive since steep slopes make construction difficult. Thus, both construction and maintenance require long-term collaborative efforts by farmers, the local community, and the government (Tekalegni, 2011). People were already aware of the negative consequences of soil erosion on agricultural production and the environment centuries ago. As a result, soil and water conservation practices exist as indigenous knowledge in some areas of Ethiopia (Nyssen et al., 2007; Watson and Currey, 2009).

2.4.2. Attitude of Farmers Toward Soil Conservation Structures.

The term attitude, as cited by Mulugeta (2009), is the feeling or emotion towards some object, person, event, or idea." The feeling or emotion may be favorable or unfavorable. The attitude of farmers towards conservation structures is, therefore, the feeling or emotion towards the

conservation of soil (soil and water conservation structures). Depending on several socio-cultural and economic reasons, each farmer develops attitudes that influence his acceptance and maintenance of soil conservation structures (Mulugeta, 2012). According to Morgan (2014), the attitude of farmers towards soil conservation structures is influenced by the efficiency of structures in controlling run-off and fertilizers, land tenure, the technical design of structures, and others. For example, about 90% of the interviewed farmers in and around it had a negative attitude towards the design of the vertical waterway. Used to drain thaw tanager terraces (Johannes, 2015). On the contrary, the majority of farmers in the western catchments of the Charka River in southern Ethiopia developed a positive attitude towards soil conservation structures on their croplands (Mulugeta, 2012). In the most highland part of Ethiopia, particularly in northern Shewa, it has been observed that some of the terraces constructed before have been destroyed by the local farmers, while certain indigenous soil and water conservation measures such as stone terraces, cut-off drains, etc. continue to be used (Million, 2014). This is a reflection of a negative attitude towards modern soil conservation measures and a positive attitude towards indigenous soil conservation measures. According to a million farmers in north Shewa (2013), they develop a positive attitude towards indigenous soil conservation measures that are then introduced as an effective way of controlling soil erosion.

2.4.3. Farmers' perceptions of soil and water conservation measures

Farmers' perception of soil erosion plays a key role in their decision-making on SWC practices. Different farmers may have different attitudes towards soil conservation. Farmers's perceptions affect the selection and continued use of soil conservation practices (Bandara and Thiruchelvan, 2008). Sometimes farmers who have good attitudes may not practice soil conservation at a good level due to other factors influencing their practices. However, agricultural planners and scientists forget that farmers best understand their own lands and objectives (Taangahar*et al.*, 2011). While national policy and top-down agricultural development strategies have their place, these may only be implemented through the active participation of farmers. It is the farmers who mobilize their resources and take risks to help their crops overcome soil constraints on productivity. Many farmers are aware of land degradation, but their priorities are food production and income generation during the current or next cropping cycle rather than in the more distant future (Taangahar*et al.*, 2011). Understanding farmers' perceptions of soil erosion and its impact is important in promoting soil and water conservation technologies (Chizana et *al.*,

2013). Soil erosion is an insidious and slow process; therefore, farmers need to perceive its severity and the associated yield loss before they can consider implementing soil and water conservation practices. Perceiving the soil erosion problem and the positive effect of soil and water conservation measures also provides stimulus and shapes opinions about adopting conservation practices that stop the problem (Habtamu, 2014). The practice of traditionally known soil conservation methods tends to be influenced by some factors. For instance, farmers well know the importance of crop residues in enhancing soil fertility. However, crop residues and animal dung are used for fuel, energy, and other home uses. FAO (2015) described that the removal of plant materials impoverishes the soil, as it is no longer possible to recycle the nutrients present in the residue.

2.5. The attitude of the local community to soil conservation

The attitude of local communities towards soil conservation can vary depending on factors such as cultural beliefs, socio-economic conditions, educational levels, and awareness of environmental issues. Understanding the attitudes of local communities is crucial for the successful implementation of soil conservation measures. Here are some reviews of literature on the attitudes of local communities towards soil conservation: Community Participation in Soil Conservation: A Review by Kariuki et al. (2019) examined the role of community participation in soil conservation efforts. The study found that involving local communities in decision-making processes and providing them with education and training on soil conservation practices can lead to positive attitudes and increased adoption of sustainable land management practices. Perceptions of Soil Conservation Benefits: An Analysis by Ouedraogo et al. (2017) explored the perceptions of local farmers on the benefits of soil conservation practices. The study revealed that farmers who perceived tangible benefits, such as increased crop yields, improved soil fertility, and reduced erosion, were more likely to adopt and support soil conservation initiatives. Barriers to Community Engagement in Soil Conservation: A literature review by Gichangi et al. (2018) identified barriers to community engagement in soil conservation efforts, including lack of access to resources, limited awareness of sustainable land management practices, and conflicting priorities. The study highlighted the importance of addressing these barriers to promote positive attitudes towards soil conservation among local communities.

2.6. The existent soil conservation

Soil conservation measures are critical for maintaining soil health and preventing erosion, degradation, and loss of soil fertility. Various soil conservation practices exist, and the literature provides a wealth of information on their effectiveness and implementation. Here are some common soil conservation measures, along with references to review the literature on each: Contour Farming: Contour farming involves planting crops along the contour lines of the land to reduce water runoff and soil erosion. Studies have shown that contour farming can effectively reduce soil erosion and improve water retention in sloping areas (Hudson et al., 2018). Terracing: Terracing involves constructing level platforms on sloping land to create steps that reduce water runoff and soil erosion. Research has demonstrated the effectiveness of terracing in preventing soil erosion and improving soil moisture retention in hilly terrains (Gebremedhin et al., 2017). Cover Cropping: Cover cropping involves planting non-cash crops or cover crops between main crops to protect the soil from erosion, improve soil structure, and enhance nutrient cycling. Studies have highlighted the benefits of cover cropping in reducing soil erosion, enhancing soil organic matter content, and promoting biodiversity (Kumar et al., 2020). Conservation Tillage: Conservation tillage practices, such as no-till or reduced tillage, involve minimizing soil disturbance during crop planting to maintain soil structure and reduce erosion. Literature reviews have shown that conservation tillage can improve soil health, increase water infiltration, and reduce soil erosion rates (Powlson et al., 2014).

2.7. The effects of soil conservation on livelihood

Impact of Soil Conservation on Livelihoods: A study by Mekonnen et al. (2016) investigated the effects of soil conservation practices on rural livelihoods in Ethiopia. The research found that the adoption of soil conservation measures, such as terracing and agroforestry, led to improved soil fertility, increased crop yields, and enhanced food security, ultimately contributing to the sustainable livelihoods of local communities. Soil Conservation and Livelihood Diversification: An Analysis by Nkonya et al. (2018) explored the relationship between soil conservation practices and livelihood diversification strategies in Sub-Saharan Africa. The study revealed that the adoption of sustainable land management practices, such as contour bunding and cover cropping, not only improved soil health but also provided opportunities for income diversification through activities like beekeeping and agro-processing, thereby enhancing rural livelihoods. Gender Perspectives on Soil Conservation and Livelihoods: A literature review by

Alene et al. (2019) examined the gender dimensions of soil conservation practices and their impact on livelihoods in developing countries. The research highlighted that women play a significant role in soil conservation efforts and benefit from increased access to resources, improved agricultural productivity, and enhanced household food security, thereby contributing to the overall well-being of rural communities.

Chapter Three

3. Description of the Study Area and Research Methodology

3.1. Physical description of the study area

3.1. Location of the study area

Gindeberet woreda is one of the 22 Woreda of West Showa Zone, Oromia regional State. The woreda administrative center was Kachisi town. It is 193 Km from Addis Ababa to the North West and 138Km from the west Showa zone town, Ambo to the North. The absolute location of Gindeberet district is located between 9° 24' 00" N and 9° 52' 00"N latitude and longitude between 37°36'00" E and 37°56'00" E which is in tropical climatic zone. Gindeberet is bounded in the south by Jeldu and chobi woreda in the southwest by Ambo/again by the Guder river, in the west again by the Guder river which separates it from the Horo Guduru Eastern Wolega Zone, on the north by the Abbay river which separates it from the Amhara Regional State, and in the east by Abuna Gindeberet district (GWAB, 2024).

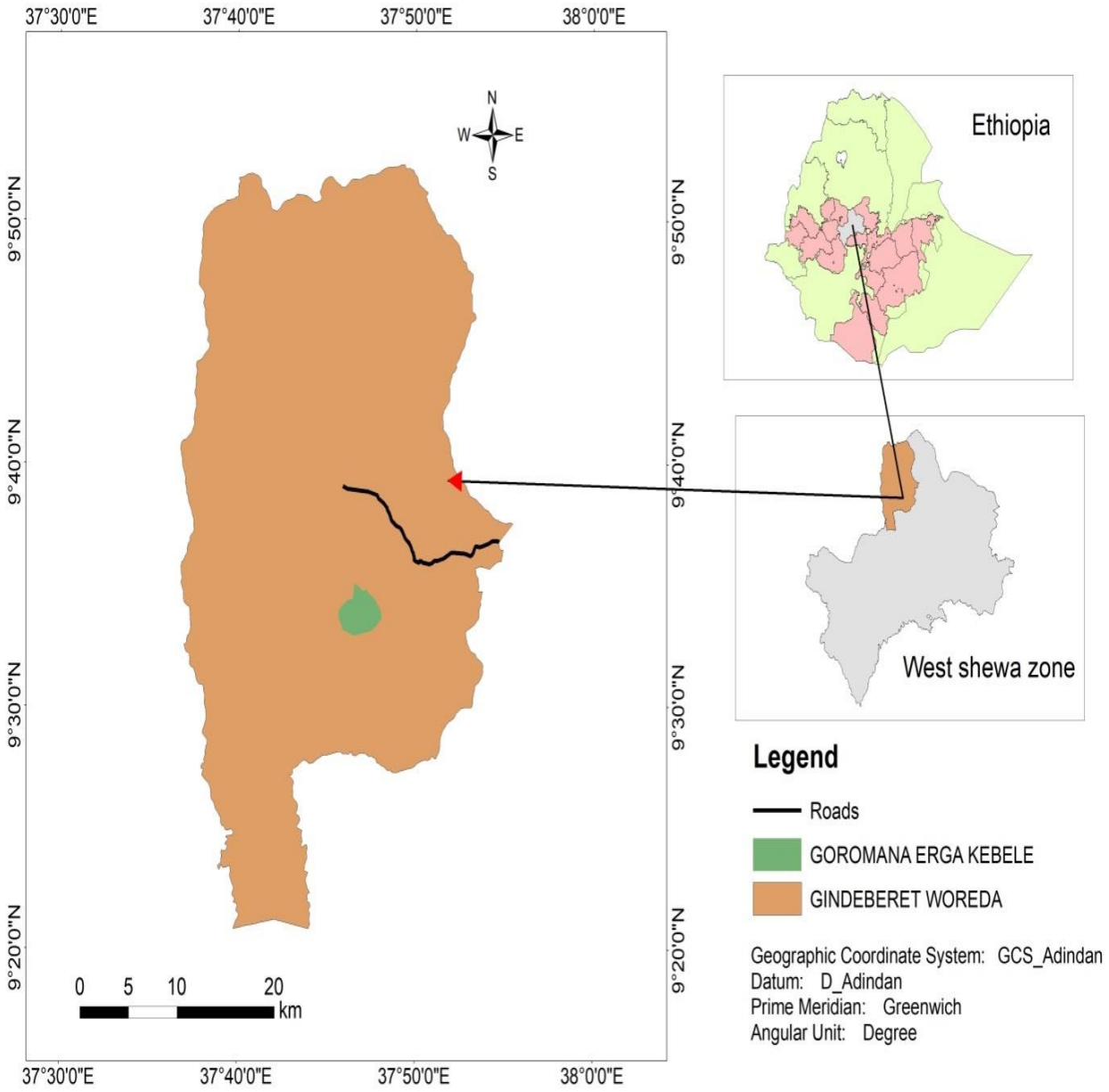


Figure 1. Locational Map of Gindeberet Woreda

Source:Researchers in 2024

3.1.2. Topography of the study area

The topography of the Gindeberet district was made up of a chain of mountains, hills, water bodies (which include medium and small rivers), arable land, bush land, and forest land. The cultivated area covers 40.8% of the district's total area and is planted in annual crops, while 36.1% is pasture, 1.3% is forest, 9% is bush land, 8.8% is degraded on non-arable land, 2% is covered by water bodies, and all other categories of land make up 2% (GWAB, 2024).

3.1.3. Climate

This Woreda is divided into two agro-ecological zones, called 'Dega', or highland, which comprises 40% of the total area and has an altitude ranging between 1500 and 2604 m.a.s.l., and lowland, 'Weyina Dega', which comprises 60% and has an altitude between 1000 and 2500 m.a.s.l. The 'Dega' zone is much cooler and receives more rainfall than the 'Weyina Dega'. Accordingly, Gindeberet district agro-ecological data, the specific site of the study area, has an average altitude of 1901 m.a.s.l. The average annual temperature of the district was about 21.4 °C, while the average annual rainfall of the district was 845 mm. The study district receives bimodal rainfall, with long and good rain from June to September and short and very rare rains from March to May (GWCCB, 2024).

3.1.4. Soil of the study area

There was no reliable data regarding soil types found in the district. However, information obtained from the district office on the issue indicates that there are black soil, red soil, and gory brownish soil types found in the district. So the type of soil mentioned above is suitable for agricultural production (GDoARD, 2024).

3.1.5. Vegetation of the study area

In the typical vegetation found in the Gindeberet district (GWAB, 2024), the major crop types were barley, wheat, maize, teff, sorghum, beans, peas, noug, and flax seeds, which were widely cultivated crops in the Gindeberet district. The dominant vegetables grown on irrigated land in the study area are potatoes, tomatoes, onions, carrots, garlic, cabbage, and fruits such as oranges, bananas, avocados, mangoes, and apples. The main dominant woodlots and cash crop plants are Eucalyptus, and sugar cane, chat, and coffee were very common in the study area, respectively. The high plateau of the district is open woodland with discontinuous canopy and larger trees (e.g., Affrocarpus flatus (bribers), Cordial Africana (wades), Ficus spp. (e.g., Harbu, Kiltu),

Croton macrostarchyus (bakanis), Ekebergia capensis (sombo), Oleo Europeansup, and Caspdland) interspersed with cultivated land (GWAB, 2024).

3.1.6. Drainage of the study area

Gindeberet is one of the woreda in the Oromia region of Ethiopia, part of the West Shewa zone. Gindebetet woreda is bordered on the south by Jeldu, on the south west by Ambo, on the west by the Guder River, which separates it from the Horoguduru Wolega zone, on the north by the Abbey River, which separates it from the Amara region, on the east by the Mugger River, which separates it from the North Shewa zone, and on the south east by Meta Robi. The major town in Gindebertworeda is Kachisi (also called Kachisi).

3.1.7. Population characteristics of the study area

According to the recent (2007) census result, the total population of Woreda is 107,844, of which males and females account for 48.5% and 51.5%, respectively. About 87% of the total population resides in rural areas, while the remaining 13% are urban dwellers. The number of households is estimated to be 17,736, while 15% of them are estimated to be female-headed. Protestantism and Orthodoxism are the dominant religions in the area. Ethnically, it consists of Oromo and Amhara ethnic groups, with the former being the majority. The livelihood of the community is mainly based on mixed farming, crop, and livestock husbandry.

3.1.8. Socio-economic description of the study area

About 89.44% of the total population of the Gindeberet district engages in a mixed farming system of agricultural activities. Other activities include: trading activity (2%), civil servants (8%), and the unemployed population (0.56%). Agriculture is the leading economic activity in the study area. That means it serves as a livelihood for almost all of the population of the study area. It was the main source of domestic food production. The farming system is a mixed type of crop production; livestock rearing and beekeeping were the main types of farming in the Gindeberet district, according to the Gindeberet District Agricultural Development Office (2024). The major crop types were barley, wheat, maize, teff, sorghum, beans, peas, noug, and flax seeds, which were widely cultivated crops in the Gindeberet district. The dominant vegetables grown on irrigated land in the study area are potatoes, tomatoes, onions, carrots, garlic, cabbage, and fruits such as oranges, bananas, avocados, mangoes, and apples. The main dominant woodlots and cash crop plants are Eucalyptus, and sugar cane, chat, and coffee were very common in the study area, respectively. The livestock rearing sector comprises big

ruminant animals (cattle), small ruminant animals (sheep and goats), non-ruminant animals (pack animals), including horses, donkeys, and mules, and poultry, respectively. (GDoARD, 2024).

3.2. Research Methodology

Even though there were various types of research methodology, in this study, the researchers used descriptive research methodology, mostly cross-sectional studies method was apply.This study method was selected due to its time efficiency and appropriateness to the study. Both quantitative and qualitative methods were used in order to realize the aforementioned objectives.

3.2.1. Research design

The research design method used to implement the study is the descriptive method. A descriptive investigation is important to describe the study area, like population, economic status, climate, source of income, time of farming, family status, the capacity to practice soil conservation, and when the farmers start to practice soil conservation. Moreover, an interview schedule was prepared for households, and all the formative material was in English and translated into the local language of the study area for understanding of each question and to promote an appropriate response.

3.2.2. Research approach

To achieve the objective of the study the researchers was follow mixed research approach. both quantitative and qualitative research can support each other towards a better understanding of the issue under study. In quantitative approach the researchers collected data would be analyzed and interpreted through statically procedure by using table and percentage. While the qualitative research approach the researchers was concerned to describing the phenomena in qualitative analysis like word and statement.

3.3.Sampling Technique and Sampling size

3.3.1. Sampling Technique

To conduct this study, researchers have employed a simple random sampling technique. The use of this simple random sampling technique is that it provides an equal chance of being included in the sample for each population. In general, this sampling technique was preferred over other sampling systems in order to avoid bias, take a good sample from a representative of the whole population, and save time.

3.3.2. Sampling size

Goromona Erga Kebele was selected from the 34 kebeles of Gindeberet woreda. The reason for the random selection of this kebele is because almost all kebele in Gindeberet woreda were

characterized by similar agro-ecology and climatic conditions. The livelihood and lifestyle of the woreda are also similar. For this reason, Goromona Erga Kebele was selected at random as the study area. By using Yamane's (1967) proper sample size determination formula, encompassing all the population in the study area is impossible because of cost, time, and measurement procedure limitations. Because of this, 78 household head respondents were selected from Goromona Erga by using simple random methods. We used this method to give equal chances to all housewives without any bias and We selected key informant interviewers such as one woredas agricultural office, two soil conservation research project experts, two elders, and one key informant.

Gendeberet woreda has a total population of 107,844, of which males and females account for 48.5% and 51.5%, respectively. The total number of households is 780, found in Goromona Erga Kebele. From the total number of households, the sample size is determined proportionally by using the percentile method, which means 10% of the total study (dividing the total households into representative households for each household) because of a shortage of time and money and the problem of data collection from house to house. Therefore, the sample size of the study is 78 households, and the techniques used to collect data are simple random sampling in order to minimize biases, save money and time, and select another resource from every ten individuals.

From the whole household, 78 individuals were selected as a sample by using Yamane (1967).

Proper sample size determination formula (n=N/1+N (e) 2).

Where n is the number of sample sizes.

N = number of total households (HHs)

e = confidential error

1= constant

n = N / 1+ N (e)

78= 780/1+780(0.10745)2

78 = 780/1+ 780 (0.01154)

78= 780/1+9.00

78= 780/10.00

78=78

Therefore, of the whole households, 78 were selected randomly.

3.4. Data Type and Source

This study uses both primary and secondary data sources, but primary data sources were employed for the collection of data through questionnaires, key informants, and interviews. Secondary data were obtained from the reports of the woreda office, agriculture, woreda administrative council, central statistics, and authority reports. Primary and secondary data were collected to answer the question and achieve the objective of this study.

3.4.1. Primary data source

Primary data sources were employed to gather first-hand information about the field. To collect primary data such as demographics, the characteristics of the sample household head, their farming system, soil fertility status, and attitudes of the farmer towards soil conservation, both open-ended and closed-ended questionnaires were employed for the respondents.

3.4.2. Secondary data source.

The researchers collected information from different secondary data sources. Secondary data was obtained from the woreda of agriculture and rural development of the woreda, and the period of data collection was from January 1, 2023, to April 30, 2024. And published and unpublished books.

3.5. Data Collection Methods

The interests of the respondents in a survey are an issue to be given priority, and farmers might not be willing to cooperate unless their concerns are taken very seriously. The techniques researchers employed to collect data were questionnaires and key informant interviews.

3.5.1. Questionnaires:

The questionnaire was used to gather information from the respondents. It consists of both closed and open-ended questions, and the questionnaire for the households is first prepared in Amharic and later translated into English to get reliable data from the subject. Closed and open-ended types of questionnaires allow the respondents to answer the question in multi-dimensional ways, and this is used to get all possible answers. The researchers developed the questionnaire for the respondents.

3.5.2. Key informant interviews:

This is also another way of collecting data from key informants. The researchers prepared and conducted a structural interview for the house.

Finally, the collected data, organized in such a manner that they answered the research question, was administered to the household respondent according to the planned schedule and collected.

3.6. Methods of data analysis

The study used both qualitative and quantitative methods of data analysis. The qualitative data was analyzed by descriptive tools, and the quantitative data was analyzed by graphic tables in the form of frequency and percentage. In this study, therefore, descriptive statistics analysis methods such as mode, percentage, and frequency tabulation were applied using the Microsoft Excel 2011 computer software program.

Descriptive tools were supplemented by a qualitative analytical method (mainly for these data acquired through the interview or qualitative method), like the interpretation and explanation of various opinions and views, and summarized, categorized, and presented in conventional forms.

Chapter Four

4. Result and Discussions

4.1. Introduction

This chapter discusses the overall findings of the study presented under different sections. This study intended to examine the effects of soil conservation on local community livelihood in the study area. By using descriptive statically analysis which includes mode, percentage and frequency tabulation.

4.2.0. The attitude of local community towards soil conservation in study area.

Table 1.Attitude of Farmers towards importance of soil conservation

Is the attitude of farmers towards soil conservation important in your local area?	No of households	Male	Female	Percentage(%)
Very unimportant	3	2	1	3.85
Unimportant	25	19	6	32.05
Neutral	17	3	14	21.79
Important	19	16	3	24.36
Very important	14	9	5	17.95
Total	78	49	29	100

Source: - field survey,(2024)

Table 1. The few 3 (3.85%) respondents said that the attitude of farmers towards soil conservation is very unimportant; others 25 (32.05%) respond that it is unimportant; 17 (21.79%) respond that it is neutral; 19 (24.36%) respondents also said that the attitude of farmers towards soil conservation is important; and 14 (17.95%) respondents said it is very important. The researchers concluded that most of the respondents regarding the attitude of farmers towards soil conservation said that it was unimportant in the local area.

4.2.1. Awareness of farmers about soil conservation

Table 2. Awareness of farmers about soil conservation

Do you have awareness about the conservation of soil in your area?	No of Household (respondents)	Male	Female	Percentage(%)
Very unaware	45	29	16	57.70
Unaware	20	13	7	25.64
Neither aware or unaware	5	1	4	6.41
Aware	6	5	1	7.69
Very aware	2	2	0	2.56
Total	78	50	28	100

Source: survey of the field (2024)

As indicated on the above table, 2 (2.56%) of the respondents revealed a very aware answer to the questions regarding their awareness of soil conservation. About 6 (7.69%) respondents said they were aware, 5 (6.41%) respondents said they were neither aware nor unaware, and 20 (25.64%) respondents said they were not aware, whereas 45 (57.70%) of the respondents replied that they were very unaware of the questions regarding their awareness of soil conservation in the area of the study. Therefore, the researchers concluded that the majority of the respondents identified as being very unaware regarding soil conservation in their local area.

4.2.2. Crop Land Fertility

Table 3. Crop Land Fertility and Productivity in the Year

Your crop land fertility and productivity are	Alternative	No of house hold	Male	Female	Percentage (%)
	Increase	26	21	5	33.33

increasing or decreasing, according to your opinion, when compared to previous years ?	Decline	3	2	1	3.85
	No change	49	40	9	62.82
	Total	78	63	15	100

Source: survey of fields (2024)

As shown on the above table, 3 (3.85%) of the respondents depict that the crop fertility and productivity are declining from the previous year, and 26 (33.33%) of the respondents revealed that the crop land fertility and productivity from previous years increased, and 49 (62.82%) of the land fertility and productivity, in your opinion, when compared to the previous years, were declining because of soil conservation in the kebele, as the researchers concluded based on the above table. So researchers concluded that a greater number of respondents revealed that crop land fertility and productivity had not changed when compared to previous years.

In general, the researchers concluded that in 2024, the major findings depended on the specific objective, which was the attitude of the local community towards soil conservation. The local community's attitude toward soil conservation is generally positive. They recognize the importance of preserving soil health for sustainable agriculture and ecosystem balance. Some community members actively participate in soil conservation efforts, while others may need more awareness and education about its benefits.

4.3.0. The existing soil conservation practices in the study area

Table 4. Which Soil Conservation Measures Do You Practice?

What kinds of soil conservation measures are taken in your area?	No of house hold	Male	Female	Percentage (%)
Traditional soil conservation	39	29	10	50
Modern soil conservation	39	27	12	50
Total	78	56	22	100

Source: - survey field ,(2024)

According to the above table shown 39 (50%) of the respondents indicated that kinds of soil conservation was traditional method and also 39(50%) of the respondents revealed that the kinds

of soil conservation was Modern soil conservation. Therefore, the researchers concluded that respondents depict both traditional and modern soil conservation measures were observed in their fields.

4.3.1. Experience of Farmers for Using Land Farms conservation

Table 5. Experience of Land Farming conservation

What is your experience in land farming?	No of households	Male	Female	Percentage (%)
1-2 Years	-	-	-	-
3-4 Years	12	10	2	15.38
6 Years	28	24	4	35.90
More than 6 year	38	36	2	48.72
Total	78	50	8	100

Source: Field Survey (2024)

Table 5. shows us that the farmers' experiences ranged from 3 years to more than 6 years. These indicate that, in the study area, most percent 38 (48.72%) of the farmers were experienced for more than 6 years, and only a few 12 (15.38%) experienced for only 3 years. In general, as the researcher informed the respondents through experience, the farmers improved their own soil conservation. For example, since the time of dam construction, they have been usable and productive.

4.3.2. Soil Conservation

Table 6. Method of Soil Conservation

What methods do you apply to restore soil conservation?	No of respondents	male	Female	Percentage(%)
Fallowing	12	8	4	15.38
Crop rotation	36	30	6	46.15
Use of compost or maturing	22	18	4	28.20
Others	8	6	2	10.26
Total	78	62	16	100

Source: field survey, 2024

There is no one method of sustaining soil fertility that is universally applicable; the application of soil fertility measures depends on the farmer's physical environment and economic circumstances (Wild, 2013). Therefore, farmers in Goromana Erga Kebele used a variety of methods to maintain soil fertility. The dominant ones include the application of crop rotation, maturing, and fallowing. As we can see from above table 36 (46.15%), the respondents use crop rotation to improve crop land soil fertility, use fallowing (12 (15.38%), use compost or maturing (22 (28.20%)), and 8 (10.26%) use other methods. So that table 6. tells us the fertility of the soil in the study area was found to be soil fertility when the land became fallowed. Because of all four methods of restoring soil fertility, such as crop rotation, fallowing, maturing, and other methods as follows:.

4.3.3. The role of soil conservation practice

Table 7. Soil conservation practice

Do you think the role of soil conservation practices is useful for farmers?	No of households	Male	Female	Percentage (%)
Yes	25	18	7	32.05
No	53	44	9	67.95
Total	78	62	16	100

Source: field survey (2024)

Table 7 . shows that the farmers in the study area have practiced soil conservation; thus, all of them gave 25 (32.05%) responses as to, Yes, we were practiced, whereas 53 (67.95%) of the respondents said that they were not useful. Therefore, researchers concluded that most farmers have negative attitudes and that soil conservation practices are not useful for farmers.

4.3.4. Methods to Apply to Restore Soil Conservation

Table 8. The Methods of Applying to Restore Soil Conservation

What methods do you alternatively apply to restore soil conservation?	No of households	Male	Female	Percentage (%)

Crop rotation	22	16	6	28.21
Use of compost maturing	40	33	7	51.28
Following	16	11	5	20.51
Total	78	60	18	100

Source: field of survey (2024)

According to the above table, indicated that 22 (28.21%) of the respondents showed that the method that applied to restoring soil conservation was crop rotation in the study area, and 40 (51.28%) of the respondents released that the method that applied to restoring soil conservation was the use of compost management. 16 (20.51%) indicated the following: Therefore, the researchers released that most of the respondents indicated that the method that applied to restoring soil conservation was the use of compost maturing, followed by crop rotation, and following.

In general, the researchers concluded that in 2024, the major findings depended on two specific objectives: existent soil conservation practices in the study area. Soil conservation practices vary within the community. Common practices include terracing, which involves creating steps or ridges on slopes to prevent soil erosion. Contour farming: planting crops along the natural contours of the land to reduce runoff. Agroforestry: Integrating trees and crops to improve soil fertility and prevent erosion. Cover cropping: planting cover crops during fallow periods to protect the soil. However, there's room for improvement. Some areas lack proper implementation of these practices due to resource constraints or a lack of knowledge.

4.4.0. The effect of soil conservation on the local community's livelihood

Table 9. Effect of soil conservation on the local community livelihood

Do you see the effect of soil conservation on the livelihood of the livelihood of the local community in the study area?	No of households	Male	Female	Percentage(%)
Yes	30	22	8	38.46
No	48	12	36	61.54

Total	78	34	44	100

Source: field survey (2024)

Table 9. shows that the effect of soil conservation on the livelihood of the local community Thus, some of them gave 30 (38.46%) responses as to whether there was an effect, whereas 48 (61.54%) of the respondents said there was no effect. Therefore, researchers concluded that most respondents said there was no effect of soil conservation on the livelihood of the local community in the study area.

The researchers concluded that in 2024, the major findings depended on the specific objective 3, which was the effect of soil conservation on livelihood in the study area. Soil conservation positively impacts livelihoods in several ways:Increased crop yield: Proper soil management leads to better crop productivity, ensuring food security. Reduced soil erosion: Less erosion means preserved top soil, which supports long-term agricultural sustainability.Income diversification: Soil conservation practices like agroforestry can provide additional income through tree products.Improved water quality: soil conservation prevents pollutants from entering water bodies, benefiting both humans and ecosystems.

Chapter Five

5. Conclusion and Recommendation

5.1. Conclusion

Farmers in Goromana Erga Kebele used a variety of soil fertility-maintaining techniques. The major soil fertility-maintaining techniques include the implementation of crop rations, manure, and the application of organic fertilizers; however, because of the scarcity of land and the prevalence of rapid population growth, farmers could not use fallowing as a fertility-maintaining technique. The study also reveals that farmers try to conserve soil on their crop land traditionally by using stone bund; traditional ditches into gullies are shortcomings of traditional soil conservation structures.

Besides, traditional soil conservation techniques and modern soil conservation techniques were introduced in the study area. Physical soil conservation structures such as tracing check dams and water diversion channels were constructed in highly degraded areas. Some of the constructed terraces and check dams did not conserve the soil effectively because of the technical challenges faced in the process of construction. In some areas, they were effective because of their better construction and maintenance status.

This study also reveals that the majority of farmers had an appositive attitude towards modern soil conservation structures. Some of the farmers developed a negative attitude, mainly due to the resulting difficulties in plugging, their impact on reducing farm size, and their habitation as rodents. In addition, some of the structures were effective in preventing the loss of soil and fertilizer by runoff. Generally, an assessment of the challenges and opportunities of soil conservation technologies is not available in the area, and instead, the challenges of the technique after and before implementation are very visible.

5.2. Recommendation

Based on the major findings of the study, the following recommendations were forwarded by the researchers:

1. Since the farmers in the study area have a better attitude towards the traditional soil conservation department of the Gindeberet woreda office of agriculture, they should use the existing traditional soil conservation techniques by integrating them with modern soil conservation techniques, i.e., by improving their standards. In order to implement an improved traditional soil conservation structure, it is necessary to educate the farmers about the merits and techniques by using demonstration sites. This may help reduce the high intensity of soil erosion in the study area. In addition to the severely degraded lands, emphasis must be given to existing productive lands. In line with this, the implementation of a family planning program is a must to reduce population pressure on land.

Since farmers have a negative attitude towards soil conservation structures, their training should come prior to the implementation phase. In addition to improving the attitude of farmers, training should also help to improve serving the intended purpose. The positive impact of soil conservation on community livelihoods underscores the need for its sustainable implementation at all levels. Ensuring local participation and empowerment remains crucial for successful soil conservation and improved livelihoods.

2. To solve the farmer's problem of a shortage of necessary tools for maintenance and construction (spade, shovel, pickaxe), the Gindeberet woreda office of agriculture should provide the tools to the office development agents. Hence, farmers can borrow and use it during conservation and maintenance.In order to reduce the shortcoming of soil conservation structures, the woreda office of agriculture should provide pesticides and herbicides at a lower cost so as to prevent weeds and control the spread of grasses on their agriculture fields.

Generally, from the results of the present study for the better performance of soil conservation technologies, it is suggested that providing knowledge about the benefits and opportunities of soil conservation or the farmer community should be prioritized, and to make the structure sustainable, the responsible body should ensure the land is highly dependent on or lend security, and stakeholders involvement and commitment towards improving soil fertility and crop production need to be applied urgently to ensure sustainable resource use.

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Appendex

Wolkite University

College of Social Science and Humanities

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Question for gathering information

On the topic, an assessment of the effect of soil conservation on local community livelihood in the case of Gindeberet woreda.

The following questions will be set to understand the effects of soil conservation on local community livelihoods in the case of Goromana Erga Kebele. Gindeberet District, West Shewa Zone, Oromia Regional State of Ethiopia. The answer is confidential and will not have any consequences for you in any way. Please give the correct answer to the following questions:.

1. Is the attitude of farmers towards soil conservation important in your local area?

A.Very unimportant B. Unimportant C. Neutral D. Important E. Very Important

2. Do you have awareness about the conservation of soil in your area?

A.Very unaware B. Unaware C. Neither aware nor unaware D. Aware E. very aware

3. What methods do you apply to restore soil conservation?

A. Crop rotation B. use of compost maturing C. Following

4. Your crop land fertility and productivity are increasing or decreasing, according to your opinion, when compared to previous years?

A.Increase B. Decline C. No change

5. What kinds of soil conservation measures are taken in your area?

A. Traditional soil conservation B. Modern soil conservation

6. What is your experience in land farming?

A.1-2 years B. 3–4 years C. 5-6Years D. more than 6 years

7. What methods do you apply to restore soil conservation?

A. Crop rotation B. use of compost maturing C. Following

8. Do you think the role of soil conservation practices is useful for farmers?

A.Yes B. No

9. What are the methods of soil conservation in your area?

A. Fallowing B. crop rotation C. use of compost or maturing D. others

10. Do you see the effect of soil conservation on the livelihood of the livelihood of the local community in the study area?

A. Yes B. No

11. In your opinion, what should be done to solve the soil erosion problem in your PA in general and your cultivated land in particular?

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