WOLKITE UNIVERSITY

COLLEGE OF AGRICULTURAL AND NATURAL RESOURSE

DEPARTIMENT OF NATURAL RESOURSE AND MANAGEMENT

ASSESSMENT OF INDIGENOUS SOIL CONSERVATION PRACTICES AND THEIR CONSTRAINTS IN CASE OF EWANE KEBELE, CHAHE WEREDA, GURAGE ZONE, CENTRAL ETHIOPIA REGIONAL STATE.

A SENIOR RESEARCH PAPER SUBMITTED TO THE DEPARTMENT OF NATURAL RESOURCE MANAGEMENT, COLLEGE OF AGRICULTURAL AND NATURAL RESOURCE, WOLKITE UNIVERSITY PARTIAL FULFILLMENT OF THE REQUIREMENT FOR (BS.C) IN NATURAL RESOURCE MANAGEMENT

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ABSTRACT

Soil degradation due to erosion and nutrient depletion remains a major environmental and agricultural challenge in Ethiopia. This study was conducted in Ewane Kebele, Chahe Wereda, Gurage Zone, to assess the roles and challenges of indigenous soil conservation practices. Data were collected from 87 farmers through questionnaires and interviews, supported by both primary and secondary sources. The results indicate that farmers possess significant awareness of soil erosion and actively implement various indigenous conservation techniques, including terracing, contour farming, stone bunds, crop rotation, and agroforestry. These practices have demonstrated effectiveness in improving soil fertility, reducing erosion, enhancing moisture retention, and increasing crop yields. However, their broader adoption is hindered by challenges such as limited land availability, Labor-Intensive *, poverty, inadequate extension services, and shifting perceptions, especially among younger farmers. The study recommends increased education, resource access, policy support, and integration of traditional knowledge with modern techniques to sustain and scale these practices for improved land productivity and environmental health.*

***Keywords**: Indigenous practices, soil conservation, Ewane Kebele, soil erosion, land degradation,*

ACCRONOMYS

FAO - Food and Agriculture Organization

IFPRI - International Food Policy Research Institute

SPSS - Statistical Package for the Social Sciences

CSA - Central Statistical Agency (Ethiopia)

UTM - Universal Transverse Mercator (a coordinate system)

BMPs - Best Management Practices

E.C. - Ethiopian Calendar

1. INTRODUCTION

1.1 Background of the study

Soil degradation is a global environmental challenge that threatens agricultural productivity, food security, and ecosystem stability. In Ethiopia, where agriculture is the backbone of the economy and the primary source of livelihood for over 80% of the population, soil erosion and nutrient depletion are particularly severe (Bewket, 2007). The loss of fertile topsoil due to erosion, coupled with declining soil fertility, has led to reduced crop yields, increased poverty, and food insecurity in many rural areas (Hurni, 1993). In response to these challenges, Ethiopian farmers have developed and maintained indigenous soil conservation practices over generations. These practices, deeply rooted in local knowledge and adapted to specific agro-ecological conditions, have played a critical role in mitigating soil degradation and sustaining agricultural productivity (Teshome et al., 2016).

Indigenous soil conservation practices encompass a wide range of techniques, including physical measures such as terracing, contour plowing, and stone bunds, as well as biological measures such as agroforestry, crop rotation, intercropping, and the use of organic manure (Shiferaw & Holden, 1999). These practices are not only cost-effective but also environmentally sustainable, as they rely on locally available resources and traditional knowledge. For instance, terraces and stone bunds have been widely used in the highlands of Ethiopia to reduce soil erosion and retain moisture, while agroforestry practices have helped improve soil fertility and biodiversity (Mekuria et al., 2007). Despite their proven effectiveness, indigenous soil conservation practices face numerous constraints that limit their adoption and sustainability.

One of the primary challenges is, labor-intensive and limited land availability nature of many traditional practices, which often require significant time and effort from farmers (Amsalu & de Graaff, 2007). In addition, the fragmentation of farmland due to population growth and inheritance laws has reduced the availability of land for conservation measures, making it difficult for farmers to implement practices such as fallowing or agroforestry (Teshome et al., 2016). Socio-economic factors, including poverty, limited access to credit, and lack of awareness, further hinder the adoption of these practices. Moreover, the perception of farmers towards indigenous practices often varies, with some viewing them as outdated or less effective compared to modern techniques (Shiferaw & Holden, 1999). Climate change and variability also pose significant challenges, as changing rainfall patterns and increased frequency of droughts undermine the effectiveness of traditional conservation methods (Bewket, 2007).

1.2 Statement of the problem

Soil erosion and land degradation were critical challenges affecting agricultural productivity and food security in Ethiopia, particularly in areas like Ewane Kebele in the Chahe Wereda of the Gurage Zone. Despite the rich cultural heritage of indigenous soil conservation practices, these methods often faced numerous challenges that hindered their effectiveness and sustainability. The problem stemmed from the lack of a comprehensive understanding of these indigenous practices, their implementation, and the specific constraints encountered by local communities. Additionally, there was often limited recognition of the value of indigenous knowledge among policymakers, which could lead to the marginalization of these practices in favor of more conventional, but potentially less suitable, agricultural techniques.

The research aimed to identify and assess the indigenous soil conservation practices in use within Ewane Kebele. It also explored the constraints faced by local farmers, including socio-economic factors, access to resources, and the impacts of external interventions. By highlighting these issues, the study sought to provide recommendations for enhancing the effectiveness of indigenous practices, thereby contributing to sustainable land management and improved agricultural productivity in the area.

1.3 Objective of the study

1.3.1 General objective

To assess the role indigenous soil conservation practices and its challenges in case of Ewane kebele, chahe wereda, gurage zone, central Ethiopia regional state.

1.3.2 Specific objective

- ✓ To identify indigenous soil conservation practices
- ✓ To assess the role of indigenous soil conservation practices
- ✓ To evaluate the effectiveness of indigenous soil conservation practice
- ✓ To assess challenges that hinder indigenous soil conservation practices

1.4 Research Question

Based on the above specific objectives, the research was to attempts to answer the following question:

1. What are the main indigenous soil conservation practices in the study area?
2. What are the kinds of constraints for the implementation and maintenance of indigenous soil conservation present in that study area?
3. How effective are these practices in preventing soil erosion?
4. What is the role of indigenous soil conservation in that study area?

1.5 Significance of the study

The findings of this study were expected to improve awareness among readers about the role and challenges of traditional soil conservation practices in addressing soil erosion in the study area. The study also improved understanding of the types of indigenous soil conservation practices employed in Ewane Kebele. Finally, the research provided baseline information for researchers, students, universities, research institutions, and farmers regarding indigenous soil conservation strategies for mitigating soil erosion in the area.

1.6 Limitation of the Study

While conducting this study, several limitations were encountered. These included the limited availability of documented historical data on indigenous soil conservation practices in Ewane Kebele, which restricted comparative analysis. Time constraints also posed a challenge, as the research period limited the scope of fieldwork and seasonal observations. Additionally, some respondents were hesitant to share detailed information due to cultural reservations or mistrust of external research initiatives, which occasionally affected the depth of qualitative data. Furthermore, the reliance on self-reported data from farmers introduced potential bias in recalling historical practices or overestimating the effectiveness of certain methods. Lastly, language barriers and the need to translate local terminologies into standardized scientific terms may have led to subtle misinterpretations of indigenous knowledge.

1.7 Scope of Study

The scope of this study encompasses a comprehensive examination of indigenous soil conservation practices and the constraints associated with their adoption and effectiveness. Geographically, the study focuses on specific regions or communities where these traditional practices are actively used, such as Ewane Kebele in the Gurage Zone of Ethiopia. This localized approach allows for an in-depth understanding of the practices within their unique agro-ecological and socio-cultural contexts. By concentrating on areas with high levels of soil degradation, the study aims to highlight the relevance of indigenous practices in addressing environmental challenges and improving agricultural productivity.

2. LITERATURE REVIEW

2.1 Concept of soil erosion

Soil erosion is the process by which the top layer of soil is displaced or worn away by natural forces such as wind, water, or human activities like deforestation and agriculture. This leads to the degradation of land, loss of fertile soil, and environmental imbalance FAO (Food and Agriculture Organization).Soil erosion is the systematic removal of soil including plant nutrients from the land surface by various agents. It is the movement of the soil practices from one place to another place by means of water, wind, Ice and gravity (Tripathic and singh 2001).

Soil erosion can be categorized into several types based on the agent of erosion. Water erosion is the most common form and occurs when rainfall or snowmelt displaces soil. It can be further divided into splash erosion, sheet erosion, rill erosion, and gully erosion, each representing different mechanisms and scales of soil movement (Morgan, 2005). Wind erosion occurs primarily in arid and semi-arid regions where strong winds can lift and transport loose soil particles, particularly during drought conditions (Sweeney et al., 2005). Lastly, glacial erosion involves the movement of soil and rock debris by glaciers, reshaping landscapes over time (Benn & Evans, 2010).

The consequences of soil erosion are profound and multifaceted. One of the most significant impacts is the loss of fertile topsoil, which is essential for crop growth and agricultural productivity. Erosion removes nutrient-rich soil layers, leading to decreased yields and increased dependence on fertilizers (Pimentel, 2006). Furthermore, eroded soil often ends up in waterways, contributing to sedimentation and pollution, which can harm aquatic ecosystems and degrade water quality (Schueler, 1987). The economic costs of soil erosion are substantial, with estimates suggesting billions in losses due to reduced agricultural output and increased costs for sediment management (Pimentel et al., 1995).In conclusion; soil erosion is a critical environmental issue that poses challenges to agriculture, water quality, and ecosystem health. Understanding its causes, types, and impacts is essential for developing effective soil conservation strategies to mitigate its effects.

2.2 Soil conservation

Soil conservation is maintaining good health by various practices. The aim of soil conservation is to prevent soil erosion, the aim of soil conservation is to prevent soil erosion, prevent soils over use, and prevent soil contamination from chemicals. There are various measures that are used to maintain soil health and prevent the above harms to soil (Hudson, 1992).

Soil conservation is essential for sustainable agriculture, environmental protection, and combating climate change. It ensures that soil remains productive for future generations while maintaining ecological balance. By implementing these practices, farmers and land managers can mitigate the adverse effects of soil erosion, enhance soil health, and contribute to global food security and environmental sustainability (FAO, 2017).

2.3 Soil conservation in Ethiopia

Today soil conservation in Ethiopia is considered to be top priority, not only to maintain and improve agricultural production. But, also to achieve food self- efficiency, which is long term objective of the agricultural development program. Therefore, a massive effort is being made in soil conservation by the ministry of Agriculture (Hurni, 1990).

2.4. Indigenous soil conservation practices

Indigenous soil conservation practices refer to traditional methods developed by local communities over generations to manage soil health and prevent erosion. These practices are often tailored to specific environmental conditions and cultural contexts, reflecting the knowledge and experiences of the communities that implement them. Indigenous soil conservation techniques are crucial for sustainable agriculture, particularly in regions prone to soil degradation (FAO, 2018). Here some Indigenous Soil Conservation Practices

2.4.1 Crop rotation

Crop rotation are important for maintaining soil organic matter and nitrogen reduces soil through erosion and often condition soil on slopping land, other measures such as contour cultivation, contour strip cropping and cover needed to supplement crop rotation in order to reduces soil and water loss crop rotation not only have reduced the loss of the soil and water but, also have maintained or increased the yield (Taffa, 2002).

2.4.2 Fallow land

Fallow land is commonly used as a grazing ground for five to seven year depending on land holding of the farmer and the nature of the land to recover and important for soil fertility as well as minimize soil loss Teklu and Gezahegn(2003) .

2.4.3 Soil (stone) bund

Stone bund reduces and stops the velocity of runoff and can sequent reduce soil erosion and the steady decline in fertility. It increase soil moisture retention capacity of the soil profile and water availability to plant. On moderately sloping areas the farmers construct the soil bunds for erosion control (Triphathi, 1993).

2.4.4 Contour ploughing

Contour ploughing is a practice of tilling the land along the contours of the slop in order to reduce the runoff on steep slope land. It is used separately or in the combination with other conservation structures, such as plantation trees and cut-off drains. It is carried out using the ox-drawn plough. Hence, it is a part of the normal farming activity; it needs no extra labor and time for construction (Garrity, 1999).

2.4.5 Drainage ditches

Drainage ditches are one of the widely used soil conservation practices also known as indigenous ditches. It is important for dispose excess runoff from cut-off drain and graded terraces to the natural water course. Drainage is essential to good soil management and to improve favorable for the development of beneficial soil organism as well as suitable moisture condition for growth of plant. These are micro channels constructed on cultivated farms to drain off excess water and control soil erosion. The ditches are made wider and deeper in dimension and usually run diagonally across the field (Herweg and lud, 1999).

2.4.6 Terracing

This involves creating stepped levels on sloped land to slow down water runoff and reduce soil erosion. Terraces can be constructed using various materials, including stones and earth, and are commonly found in regions like the Chencha area of southern Ethiopia, where they have been used for over 800 years (IFPRI**,** 2017).

2.4.7 Cut off drains

Cut off drain are one of the physical structure constructed by digging the soil deep in order to divert the runoff before reaching the farm land. The farmer constructed such structure to prevent loss of seeds fertilizer and soil due to excessive runoff coming from uplands and dispose the excess water for the field and a greater role of control soil erosion by diverting excess runoff. In addition this structure used for to divert additional water to cultivated plots, dams, irrigation, in dry area (Herweg and Lud, 1999).

3. MATERIAL AND METHODOLOGY

3.1 Description of the Study Area

3.1.1 Location

The study was conducted in Ewane Kebele,Cheha Woreda, Gurage Zone, Central Ethiopia Regional State. Ewane Kebele is located in southwestern Ethiopia, within the Gurage Zone. The geographic coverage of the study area ranged from approximately 8° 05' 00" N to 8° 10' 00" N latitude and 37° 40' 00" E to 37° 50' 00" E longitude, encompassing an estimated area of approximately 50,000 hectares. The elevation in Ewane Kebele varied between 1900 and 2100 meters above sea level.

This woreda is situated on the southwestern plateau, approximately 60 km west of the main Ethiopian Rift Valley. An all-weather road was constructed in the 1970s, enhancing accessibility, and the kebele is now connected to major roads leading to towns such as Butajira and Wolkite.

Ewane Kebele is located about 180 km southwest of Addis Ababa and 30 km from the administrative center of Wolkite. It is approximately 12 km from the nearest town, Bue, and 18 km from the capital town of Cheha Woreda. (Source: Cheha Woreda Agricultural Office 2016 E.C.).

3.1.2 Topography

The landform of Ewane Kebele comprised a combination of gently sloping plains and hilly terrain. The topography was characterized by an average elevation ranging from 1900 to 2100 meters above sea level. The geographical coordinates for Ewane Kebele fell approximately between UTM 380,000 to 385,000 East and 396,000 to 900,000 North. This varied topography facilitated diverse agricultural practices and contributed to the local ecosystem. (Source: Cheha Woreda Agricultural Office 2016 E.C.)

3.1.3 Economic Activities

In Ewane Kebele, agricultural activities were the primary economic focus, with crop production being the major contributor. Farmers engaged predominantly in cultivating various crops, including teff, maize, and a variety of fruits and vegetables. Additionally, enset (Ensete ventricosum) was widely grown for food, with its products used in forms such as kocho, bulla, and amicho, as well as for medicinal purposes. The leaves of the enset were also utilized for feeding cattle and baking bread. Livestock rearing, particularly cattle, complemented crop production, with manure being used to enhance soil fertility for enset cultivation. (Source: Cheha Woreda Agricultural Office 2016 E.C.).

3.1.4 Climate

Ewane Kebele was characterized by three traditional agro-ecological zones: dega, woyna dega, and kola. The mean annual temperature ranged from 15°C to 26°C, reflecting a variety of hot to cold temperature conditions. The area had a relatively short growing season, with mean annual rainfall exceeding 700 mm, which was crucial for the agricultural activities in the kebele. (Source: Cheha Woreda Agricultural Office 2016 E.C.).

3.1.5 Soil

The soils in Ewane Kebele were predominantly clay in texture and were classified as strongly acidic to moderately acidic, with 70% being strongly acidic and 30% moderately acidic. Approximately 65% of the soil was black, while 35% was red in color. The soils exhibited diverse geomorphology and patterns. According to FAO soil classification, the most prevalent soil types in the area included vertisols, lithosols, nitosols, and cambisols, with vertisols being the most widespread. (Source: Cheha Woreda Agricultural Office 2016 E.C.)

3.1.6 Population

According to the CSA report from 2005, the total population of Cheha Woreda was 164,704, of which 84,521 were men and 80,183 were women. The urban population accounted for about 4.06% of the total, which was below the zone average of 6.3%. In Ewane Kebele, the population was approximately 5370, consisting of 2370 men and 3000 women. The total number of households in the kebele was 670, with 604 headed by men and 66 by women. (Source: Cheha Woreda Agricultural Office 2016 E.C.).

3.1.7 Vegetation

The climate in Ewane Kebele significantly influenced the distribution of vegetation in the area. The vegetation was diverse, featuring species such as Podocarpus gracilior, Cypress species, Olea africana, Cordia africana, along with various fruit trees like avocado, mango, and banana. Additionally, enset, chat, sugar cane, and various grasses were commonly found throughout the kebele, contributing to the rich biodiversity of the region. (Source: Cheha Woreda Agricultural Office 2016 E.C.).

3.2. Source of Data

We used both primary and secondary data. Primary data sources were obtained from purposively selected kebele, which in turn served as the sources of sample individual households. In this respect, questionnaires and interviews and field survey were used to gather information. Secondary data sources were obtained by reviewing and carefully examining documents, research reports, published and unpublished writings, journals, internet websites, and other relevant materials. The information and data required for the study was obtained by employing a combination of methods, including household surveys, field observations, and interviews.

3.3. Types of Data

This study comprised both quantitative and qualitative data. The qualitative data were organized and presented in the form of statements, while the quantitative data were organized using descriptive statistics and presented in tables indicating counts, frequencies, and percentages. The qualitative data were used to support arguments and substantiate the quantitative data. We analyzed the data using percentages and ratios and presented our findings in tables and figures, using SPSS software.

3.4. Data

For the purpose of this study, both primary and secondary data were collected from primary and secondary sources. The primary data were collected by employing structured questionnaires and were supported by direct field observation. To gain general insight into the topic, we held interviews and distributed questionnaires to representatives from the Ewane Kebele farmers' kebele administration office and community members from various wealth statuses, including women, elders, and youth. Secondary data were collected from annual reports, magazines, journals, articles, and other sources (e.g., internet services).

3.5. Sample Size and Techniques

The total number of households in Ewane Kebele was 670, with 604 headed by men and 66 by women. To determine the sample size, we used simple random sampling methods, which helped reduce time and costs while ensuring accessibility to information. We applied the Yamane formula (2012) for sample size determination:

S=N/1+N(e2)

S = sample size

N = total number of households (670)

e = error margin (10% or 0.1)

Substituting the values:

$S=N/ (1+N (e)^{2}$, N=670, E=10%=0.1

$S= (670/1+670(0.1)^{2})$, S=87

3.6. Data Analysis and Presentation

We analyzed both quantitative and qualitative data. The qualitative data were organized and presented in the form of statements, while the quantitative data were organized using descriptive statistics and presented in tables indicating counts, averages, and percentages. We used SPSS software for quantitative data analysis. The qualitative data supported arguments and substantiated the quantitative data, with results presented in tables and figures.

4. RESULTS AND DISCUSSION

The results and discussions part of the study clearly shows the overall findings of the study in different sections. The section briefly describes the result of each session throughout the chapter.

4.1 Demographic and Socio Economic Characteristics of Background of the Respondents

This study investigates indigenous soil conservation practices and their constraints in Ewane Kebele, Chahe Wereda, Gurage Zone, located within the Central Ethiopia Regional State. Data were collected through 87 structured questionnaires distributed to purposively selected respondents. Of these, 75 questionnaires (86.2% response rate) were successfully returned and utilized for analysis. The analysis incorporates two key demographic variables: sex (gender) and age of respondents.

4.1.1 Sex composition of the respondents

Table 1: Sex composition of the respondents

Sex	Frequency	%
Male	65	74.7
Female	22	25.3
Total	87	100

Source: Our field survey result, 2025

Table 1 presents the sex composition of the respondents, highlighting the gender distribution among the surveyed farmers. A significant majority, 65 individuals (74.7%), identified as male. This indicates that men predominantly comprise the farming population in the surveyed area, which may reflect traditional gender roles and responsibilities in agriculture. In contrast, 22 respondents (25.3%) were female. This smaller percentage suggests that women are underrepresented in the farming community, which could have implications for gender equity in agricultural practices and decision-making.

Overall, the data reveals a marked disparity in gender representation, with men significantly outnumbering women. Addressing this imbalance may be crucial for promoting inclusive agricultural development and empowering women in farming roles.

4.1.2 Age Distribution of Respondents

Table 2: Age Distribution of Respondents

Age of the respondents	**Frequency**	**Percent**
18-30	10	11.5
30-46	34	39
46-60	30	34.5
>60	13	15
Total	87	100

Source: Our field survey result, 2025

Table 2 presents the age distribution of the respondents, providing insights into the demographic profile of the surveyed farmers. The largest group falls within the age range of 30-46 years, with 34 individuals, accounting for 39% of the total. This age bracket likely represents the most active segment of the farming population, potentially characterized by greater productivity and involvement in agricultural decision-making. The second-largest group is those aged 46-60 years, comprising 30 respondents (34.5%). This demographic may possess significant experience in farming, contributing to their agricultural knowledge and practices.

In contrast, 10 respondents (11.5%) were aged 18-30, representing the youngest segment. Their relatively low number may indicate challenges in engaging younger individuals in agriculture, possibly due to migration or shifts in career preferences. Lastly, 13 respondents (15%) were over 60 years old. This group may be approaching retirement, highlighting the importance of succession planning and knowledge transfer to ensure the sustainability of farming practices.

Overall, the data indicates a predominantly middle-aged farming population, which could have implications for agricultural productivity, innovation, and the transfer of traditional knowledge to younger generations.

4.1.3 Educational status of the households

Table 3: Educational status of the households

Educational level	**frequency**	**%**
Illiterate	50	57.47
Read and write only	10	11.5
1-4	12	13.8
5-8	8	9.2
9-12	7	8
Total	87	100

Source: Our field survey result, 2025

Table 3 presents the educational status of the households surveyed, highlighting the distribution of educational attainment among respondents. A significant majority, 50 individuals (57.47%), were classified as illiterate. This high percentage suggests that many farmers may face challenges in accessing information and resources, which could impact their agricultural practices and overall livelihoods. Following this, 10 respondents (11.5%) reported being able to read and write only. This indicates a limited level of literacy, which may still restrict their ability to fully engage with educational materials or extension services.

In terms of formal education, 12 respondents (13.8%) completed grades 1-4, while 8 individuals (9.2%) completed grades 5-8. Only 7 respondents (8%) reached grades 9-12, representing the smallest group. This low level of educational attainment may reflect barriers such as economic constraints or a lack of access to educational institutions. Overall, the data reveals a predominantly low educational status among the respondents, which may have significant implications for their agricultural productivity and community engagement. Addressing these educational gaps could be crucial for improving farming practices and enhancing economic opportunities in the region.

4.1.4. Marital status of the respondent

Table 4: Marital status of the respondent

Marital status	Frequency	%
Married	72	82.76
Single	13	14.94
Widow	2	2.3
Total	87	100

Source: Our field survey result, 2025

Table 4 outlines the marital status of the respondents, providing insights into the demographic composition of the surveyed farmers. The majority of respondents, 72 individuals, or 82.76%, were married. This high percentage suggests that a significant portion of the farming population is likely to have established family units, which may influence their agricultural decisions and economic stability. In contrast, 13 respondents (14.94%) identified as single. This group may include younger individuals or those who have not yet formed families, potentially impacting their engagement in farming activities and community roles.

Finally, only 2 respondents (2.3%) were widowed, representing the smallest segment of the population. This low number may reflect the overall stability of family structures within the community. Overall, the data indicates a predominantly married demographic, which may play a significant role in shaping social and economic dynamics among the farmers

4.1.5 Family size of the respondents

Table 5: family size of the respondents

Family size	Frequency	%
1-2	35	40.2
3-4	40	46
5-6	12	13.8
Total	87	100

Source: Our field survey result, 2025

Table 5 presents the family size of the respondents, indicating the distribution of household members among the surveyed farmers. The most common family size was 3-4 members, reported by 40 respondents, accounting for 46% of the total. This suggests that a significant portion of the farming population tends to have medium-sized households, which may influence their labor availability and social dynamics. Following closely, the 1-2 members category was noted by 35 respondents (40.2%). This indicates that a notable number of farmers live in smaller households, which could impact their resources and support systems.

In contrast, the 5-6 members category included only 12 respondents (13.8%), representing the smallest group. This smaller family size may reflect various factors, including economic constraints or personal choices regarding family planning. Overall, the data highlights a predominance of small to medium family sizes among the respondents, which may play a crucial role in shaping their agricultural practices and economic activities.

4.1.6. Land holding size of the farmers

Table 6: Land holding size of the farmers

Size of Farm land in hectares	**Frequency**	**%**
1	20	23
2	30	34.5
3	26	29.9
4	11	12.6
Total	87	100

Source: Our field survey result, 2025

Table 6 summarizes the landholding sizes of farmers surveyed, categorizing them by the size of their farmland in hectares. The data reveals the distribution of farm sizes among the respondents. The most common landholding size was 2 hectares, reported by 30 farmers, which constituted 34.5% of the total. This indicates that a significant portion of farmers operates on a moderate scale, likely balancing subsistence and commercial farming. Following this, 1 hectare was reported by 20 farmers (23%), suggesting that a smaller number of farmers manage limited land, potentially impacting their productivity and income.

The third category, 3 hectares, was noted by 26 farmers (29.9%), indicating a robust segment of the farming community engaged in slightly larger-scale operations. Lastly, 4 hectares were owned by 11 farmers (12.6%), representing the smallest group. This smaller percentage may reflect the challenges of acquiring larger plots of land or the preference for more intensive management of smaller areas.

Overall, the data illustrates a diverse range of landholding sizes among farmers, with a concentration around 2 hectares, which may influence their agricultural practices and economic viability.

4.1.7. Number of livestock for the respondents

Table 7. Number of livestock for the respondents

Type of livestock	Number of livestock	%
Cow	61	17.83
oxen	50	14.61
Goat	60	17.54
cattle	66	19.29
Donkey	40	11.69
sheep	10	2.92
Total	342	100

Source: our field survey result, 2025

Table 7 presents the distribution of livestock owned by respondents, highlighting the variety and significance of different types within their agricultural practices. "Cattle" was the most common type, with 66 individuals, accounting for 19.29% of the total livestock. This indicates their importance for both labor and food production. Closely following, "cows" numbered 61, making up 17.83%, suggesting a focus on dairy and meat production. "Goats," with 60 individuals (17.54%), were also significant, valued for their adaptability and multiple uses, including meat and milk. "Oxen" were reported at 50 (14.61%), highlighting their critical role in agricultural labor, particularly for plowing.

"Donkeys" totaled 40 (11.69%), primarily used for transportation, while "sheep" were the least common, with only 10 (2.92%). This low figure may reflect specific market demands or environmental factors. Overall, the data indicates a diverse livestock portfolio among farmers, emphasizing the integral role of these animals in supporting livelihoods, food security, and agricultural practices.

4.1.8. Farmers perception on causes of soil erosion

Table 8: Farmers perception on causes of soil erosion

Causes of erosion	Frequency	%
High rain fall	50	57.5
Extensive cultivate	9	10.3
Overgrazing	10	11.5
Less following period	15	17.2
Deforestation	3	3.5
Total	87	100

Source: our field survey result, 2025

The data presented in Table 8 reflects farmers' perceptions of the causes of soil erosion, offering insights into the factors they believe contribute to this significant environmental issue. The survey identified five primary causes, along with their respective frequencies and percentages, revealing a varied understanding among farmers. The most frequently cited cause was "high rainfall," which was acknowledged by 57.5% of the respondents. This substantial majority indicates that many farmers perceived heavy rainfall as a critical factor in soil erosion. The recognition of rainfall as a primary cause suggests that farmers had likely experienced the adverse effects of intense rain events, which can lead to increased runoff and soil displacement. This perception highlights the vulnerability of agricultural practices to climatic conditions, emphasizing the need for strategies to manage soil health during periods of heavy precipitation.

In contrast, "extensive cultivation" was identified as a cause of soil erosion by only 10.3% of farmers. This relatively low figure may reflect a limited awareness among respondents regarding how intensive agricultural practices can contribute to soil degradation. Similarly, "overgrazing" was recognized by 11.5% of the farmers, indicating that while some acknowledged the impact of livestock management on soil health, it was not a widespread concern. This suggests a need for greater education on the consequences of overgrazing and its role in exacerbating erosion. Another factor, "less fallowing period," was noted by 17.2% of respondents. This indicates that some farmers understood the importance of allowing land to rest and rejuvenate. Insufficient fallow periods can lead to soil depletion and increased erosion, and this awareness among a portion of farmers highlights a potential area for further education and intervention.

Finally, "deforestation" was the least recognized cause, with only 3.5% of farmers identifying it as a contributing factor. This low percentage may suggest a lack of awareness about the relationship between tree cover and soil stability. Deforestation can significantly increase soil erosion by removing the protective cover that vegetation provides.

In summary, Table 8 illustrates that while high rainfall is widely recognized as a major cause of soil erosion, there are significant gaps in awareness regarding agricultural practices and land management strategies. Addressing these gaps through targeted educational initiatives could empower farmers to adopt more sustainable practices, ultimately helping to reduce soil erosion and enhance the resilience of their agricultural systems. By fostering a broader understanding of all contributing factors, stakeholders can work collaboratively to implement effective soil conservation measures.

4.1.9. Farmer perception on extent of soil erosion

Table 9 Farmer perception on extent of soil erosion

Extension of soil erosion	**Frequency**	**%**
Very high	32	36.8
high	24	27.6
mediate	20	23
Low	7	8
Very low	4	4.6
Total	87	100

Source: our field survey result, 2025

4.1.10. The trend of soil erosion in the study area

Table 10 The trend of soil erosion in the study area

Trends of soil erosion	Frequency	%
Increasing	50	57.5%
Decreasing	17	19.5%
same	20	23.0%
Total	87	100%

Source: our field survey result, 2025

Table 10 presented data on the trends of soil erosion in the study area, revealing the perceptions of respondents regarding changes in soil conditions. A significant majority of the respondents, 50 individuals, reported that soil erosion was increasing, which accounted for 57.5% of the total. This finding indicated widespread concern about the deteriorating state of soil health, suggesting that many farmers were experiencing the negative impacts of erosion on their agricultural practices. The perception of increasing erosion could be attributed to various factors, including deforestation, poor land management, or climate change, all of which may have contributed to the degradation of soil quality over time.

In contrast, a smaller group of 17 respondents, representing 19.5%, observed that soil erosion was decreasing. This perspective could suggest that some farmers had implemented effective soil conservation practices or had benefitted from changes in land management that positively impacted soil stability. The presence of this minority view indicates that while many faced challenges, there were also examples of successful interventions that could serve as models for others in the community. Additionally, 20 respondents, making up 23.0%, felt that the trend of soil erosion remained the same. This sentiment highlighted a state of stability in soil conditions for these individuals, suggesting that they had not witnessed significant changes in either direction. This group’s experiences may reflect localized factors, such as the type of crops grown or specific land management practices that maintained their soil conditions over time.

4.2 Farmers Indigenous soil conservation measures

The Ewane kebele people are known by their indigenous soil conservation practice. As noted by the local elders, the people of the Ewane kebele began such practice in the earliest time in the older to compact soil erosion since people have been practicing to protect the soil from loss.

The area also known by its biological and structural indigenous soil conservation methods, the biological methods are used to maintain soil fertility. Such methods are crop rotation strip cropping and application of animal drug. While the structural methods the one that mainly used for the purpose of controlling soil removal, such used soil or stone bund, contouring, water way, cut of rains.

4.2.1 Type of indigenous soil conservation practices

Table 11: type of indigenous soil conservation practices

Practices	**Frequency**	**%**
Terracing	20	22.99
Check Dams	10	11.49
Planting tree	8	9.20
Animal dung	9	10.34
Crop rotation	8	9.20
Cut of drains	10	11.49
Strip cropping	13	14.94
Enset based Agroforestry	9	10.3
Total	87	100

Source: our field survey result, 2025

Table 11 provided insights into the types of indigenous soil conservation practices employed by respondents in the study area. Among the various practices, terracing was the most commonly reported, with 20 farmers (22.99%) utilizing this method. Farmers expressed that terracing had been effective in reducing soil erosion on their slopes, allowing them to cultivate their land more sustainably. Many noted that by creating steps on the hillside, they were able to slow down water runoff and retain moisture, benefiting their crops during dry spells. Check dams were employed by 10 respondents (11.49%), who shared that these structures had helped capture water and sediment, contributing to improved soil fertility. Farmers mentioned how the check dams had transformed areas that were once prone to erosion into more productive land, enabling them to cultivate crops that they had previously struggled to grow.

Planting trees was another practice reported by 8 farmers (9.20%). They highlighted the dual benefits of trees: providing shade for crops and preventing soil erosion. Many expressed a deep appreciation for the role of trees in maintaining soil health, with some even noting that certain species had become vital for their livelihoods. Animal dung, used by 9 respondents (10.34%), was recognized as a natural fertilizer that not only enriched the soil but also helped in soil structure. Farmers remarked on how integrating animal dung into their farming practices had led to healthier crops, fostering a more sustainable farming system.

Crop rotation, also practiced by 8 farmers (9.20%), was appreciated for its ability to enhance soil fertility and reduce pest and disease pressures. Respondents noted that rotating different crops allowed them to maximize their land's potential while minimizing the risk of soil depletion. Additionally, 10 farmers (11.49%) employed cut-off drains, which they found beneficial in managing water runoff and preventing erosion during heavy rains. They emphasized that this practice had been crucial in protecting their fields from washouts.

Strip cropping, practiced by 13 respondents (14.94%), was recognized for its effectiveness in mitigating erosion. Farmers shared that alternating strips of different crops helped maintain soil cover, reducing the impact of rain on bare soil. Finally, enset-based agroforestry was utilized by 9 farmers (10.3%). They underscored the importance of this integrated approach, which combined the cultivation of enset with other crops and trees, creating a diverse ecosystem that supported soil conservation.

Overall, the responses reflected a rich tapestry of indigenous knowledge and practices aimed at soil conservation. Farmers demonstrated a strong commitment to sustainable agriculture, leveraging traditional methods that had been passed down through generations. Their experiences highlighted the importance of these practices in enhancing soil health, increasing productivity, and promoting resilience in the face of environmental challenges.

4.3 Challenges of indigenous soil construction practices

Indigenous soil construction practice have several and countable benefit. For the construction of environment as a general and soil resource in particular, even though such positive aspects and crucial value of construction such as erosion controls maintenance of soil fertility and water conservation, but there are some challenges that have been observed in the study area. This challenge may results from improper indigenous farming system and other related factor. Therefore, the following are some drawn back or challenges of traditional soil conservation methods area.

4.3.1 Response of farmer's challenge of indigenous soil conservation

Table 12: Response of farmer's challenge of indigenous soil conservation

Challenges	Frequency	%
Ineffective use soil conservation	10	11.5%
Labor-intensive	30	34.5%
farming size	15	17.2%
Poor perception and attitude	12	13.8%
Lack of Resource	11	12.6%
Lack of Access to Extension Services	9	10.3%
total	87	100%

Source: our field survey result, 2025

Table 12 illustrated the challenges faced by farmers regarding indigenous soil conservation practices in the study area. The most significant barrier was the labor-intensive nature of traditional methods, reported by 34.5% of respondents. This high labor requirement made conservation practices difficult to sustain, particularly for smallholder farmers with limited household workforce. Many farmers struggled to balance these demanding techniques with other essential agricultural activities.

Farm size emerged as another major constraint, affecting 17.2% of respondents. Small landholdings, as previously documented in the study, rendered some traditional conservation methods impractical. Farmers often found these techniques occupied valuable cropping space or required disproportionate effort relative to their limited land area. Additionally, 13.8% of farmers cited poor perception and attitude toward indigenous methods as a significant challenge, with some community members viewing these practices as outdated or ineffective compared to modern alternatives.

Resource limitations further compounded these challenges, with 12.6% of farmers reporting insufficient access to necessary materials or financial means to properly implement conservation measures. This problem was exacerbated by limited access to extension services, mentioned by 10.3% of respondents, which left farmers without adequate technical support or guidance. Interestingly, 11.5% of farmers questioned the effectiveness of certain indigenous methods for their specific soil and slope conditions, suggesting that not all traditional practices were equally suitable for current environmental challenges.

These findings collectively highlight the complex interplay of physical, economic and social factors limiting the adoption of indigenous soil conservation. The study underscores the need for adaptive approaches that modify traditional methods to reduce labor requirements while maintaining their ecological benefits. Improved access to resources and extension services, coupled with community education to address negative perceptions, could enhance the viability of these practices. Such integrated solutions would help preserve valuable indigenous knowledge while addressing contemporary agricultural realities.

4.4 The role (benefits) of indigenous soil conservation practices

Indigenous soil conservation structures are not only to control run off and soil erosion in the cause of newly introduce measure, but also for production of high quality and quality yield for the community. Regarding to biological practice like application of dung, crop rotation, fallowing and strip cropping have greater opportunities for improving the fertility of the soil and as a result of improving yield quality and quantity. In addition to these measures, they have greater opportunities to enhance soil moisture and capacity to resist erosion hazards.

Table 13 Role of indigenous soil conservation practices

Role	Frequency	%
Improve soil moisture	30	12.44
Improve soil fertility	50	20.74
Increase crop yield	66	27.4
Increase Nutrient Retention	29	12.03
Reduce erosion	60	24.9
Total	241	100

Note: Totals over 100% are due to multiple responses, Source: own field survey result, 2025

The result indicate that in the study area about 100% of the respondents were said to increasing crop yield and reduce soil erosion are the major role of indigenous soil conservation practices. The percentage is greater than due to one respondents give multiple response. (20.74%) of the respondents were said to improve soil fertility, (12.44%) respondents were said to improve soil moisture and (12.03%) of the respondents were said to Increase Nutrient Retention, so in general the respondents said to the role of indigenous soil conservation method are increase yield, reduce erosion and runoff, improve soil fertility and moisture content.

4.5 The effectiveness of indigenous soil conservation practices

The effectiveness of indigenous soil conservation practices is demonstrated through enhanced soil quality, which improves agricultural productivity. These methods promote long-term sustainability, ensuring that land remains fertile for future generations. Farmers also benefit from practices that support permanent farming, allowing for consistent crop production. Additionally, these techniques significantly reduce flood risks, protecting crops from environmental challenges. Overall, indigenous practices provide a holistic approach to sustainable agriculture, integrating local knowledge with effective land management. Their adoption contributes to resilient farming systems in vulnerable regions.

Table 14. The effectiveness of indigenous soil conservation practices

Effectiveness	**Frequency**	**%**
Long term sustainability	54	23.6
Reduce risk of flood	52	22.7
Protecting land quality	66	28.8
Inducing permanent farming	57	24.9
Total	229	100

Note: Totals over 100% are due to multiple responses, Source: own field survey result, 2025

Based on the data presented in the table regarding the effectiveness of indigenous soil conservation practices in Ewane Kebele, the responses from farmers reveal several key insights into their perceptions and experiences.

The majority of farmers indicated that protecting land quality was the most effective aspect of indigenous soil conservation practices, with 66 responses (28.8%). This suggests that farmers recognized the importance of maintaining soil health as crucial for sustaining agricultural productivity. Many expressed that practices like crop rotation and organic fertilization had significantly enhanced the fertility and structure of their soils over time. Farmers noted that healthier soil led to better crop yields, which directly impacted their livelihoods. In terms of inducing permanent farming**,** 57 farmers (24.9%) acknowledged this as an effective practice. This reflects a collective understanding that integrating sustainable methods allows for continuous agricultural activities without degrading the land. Farmers shared that adopting practices such as agroforestry not only improved soil conservation but also provided additional benefits, such as timber and fruit production, further diversifying their income sources.

The response regarding the long-term sustainability of these practices garnered 54 responses (23.6%). Many farmers emphasized the importance of implementing conservation strategies that would ensure their lands remain productive for future generations. They highlighted their commitment to passing down these practices to their children, showcasing a deep-rooted belief in the sustainability of their agricultural methods. Lastly, the reduction of flood risk was acknowledged by 52 farmers (22.7%). This response indicated a growing awareness of the impact of climate variability on agriculture. Farmers pointed out that implementing soil conservation measures, such as terracing and contour farming, significantly mitigated flood risks, protecting their crops and livelihoods during heavy rainfall events. They recounted specific instances where these practices had prevented soil erosion and crop loss, reinforcing their value in the face of changing weather patterns.

Overall, the feedback from farmers in Ewane Kebele illustrates a strong appreciation for indigenous soil conservation practices. Their experiences highlight the multifaceted benefits these methods provide, from enhancing soil quality and ensuring long-term sustainability to reducing flood risks and supporting permanent farming. This collective recognition underscores the importance of integrating traditional knowledge with modern agricultural techniques to foster resilience in the face of environmental challenges.

5. CONCLUSION AND RECOMMENDATION

5.1 CONCLUSION

The study conducted in Ewane Kebele, Chahe Wereda, reveals that indigenous soil conservation practices such as terracing, contour farming; stone bunds, crop rotation, and agroforestry play a vital role in managing soil erosion, improving fertility, and enhancing resilience to climate variability. Farmers' awareness of soil degradation is rooted in traditional knowledge passed down through generations. However, despite the proven benefits, the sustainability and broader application of these methods face several challenges. These include limited arable land due to population pressure and inheritance practices, labor-intensive nature of the techniques, financial constraints, and limited access to extension services. Furthermore, varying perceptions about the relevance and effectiveness of indigenous methods, especially among younger farmers, pose additional barriers. Overall, while traditional practices have significant potential, addressing these socio-economic and institutional challenges is essential to ensure their continued relevance and integration into sustainable land management strategies.

5.2 RECOMMENDATIONS

To enhance the effectiveness and sustainability of indigenous soil conservation practices in Ewane Kebele, several key actions are recommended. First, awareness and knowledge gaps among farmers should be addressed through targeted training programs and demonstrations of successful local practices. Second, improving access to financial resources and tools—through support from government and NGOs—can help overcome economic barriers. Strengthening agricultural extension services is also vital, with a focus on integrating indigenous and modern knowledge. Furthermore, incorporating traditional practices into national agricultural policies will promote inclusive and sustainable land management. Lastly, establishing monitoring and feedback systems will ensure continuous improvement and adaptation of these practices. Implementing these measures can significantly support soil conservation efforts and improve agricultural resilience in the area.

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7. APPENDIX

QUESTIONNIRE

The main purpose these questioner surveys are to collect reliable information about indigenous soil conservation practices from farmers. The data you provided is very crucial to achieve the intended objective.

Thank you for giving your real information

Keble---------------------------------

Village---------------------------------

Date-----------------------------------

Part 1

General back ground respondent

1. Age--------------------------
2. Sex males---------------
   Female--------------
3. Marital status:1, single; 2, married ;3, divorced; 4, window
4. Educational status of the house hold 1, Illiterate
   2, Read and write only
   3, Grade 1-4
   4, Grade 5-8
   5, Grade 9-12
   6, Above 12
5. What is your family size: Male---------------;female---------------------total
6. Do you have your own farm land? 1, Yes 2, No
7. What is the size of your farm land in hectare ?
8. Do you have your own live stock? 1, Yes 2, No
9. Write the kind and number of live stock you have?

Part 2 Perception of perception of the farmers about soil erosion

1. Have you observed soil erosion in your farm lands? 1, Yes 2,No
2. If you have the answer for the question “1” is yes what do you think the main cause of erosion?

   A, high rainfall B, extensive cultivation C, over grazing D, others----------------------------
3. What do you believe about the extent of soil erosion on your farm land ?

   A, Very high C, Moderate E, very low

   B, high D, low
4. What do you think about the trend of the soil erosion?

   A, increasing B, Decreasing C, Same D, I don’t know
5. What are the fertility levels of your farm land? A, High fertilizer B, fertile C, Moderate D, Not fertile
6. What are the common soil fertility improvement mechanisms you have implemented on your farm land? ---

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7. Have you practiced indigenous soil conservation method to minimize soil erosion on you farm land? A, Yes B, No
8. If your answer is yes for question “7” what kinds of indigenous soil erosion practice you have used on your farm land?

   A, Stone bund B, planting C, Adding animal manure D, Cut off drain E, Crop rotation

   F, Living crop residue G, Water way H, Fallowing
9. From the above measures which one is more effective to increase soil fertility?

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10. Do you believe that indigenous soil conservation methods are effective to prevent soil erosion?

    A, Yes B, No
11. If you answer is yes for question ”10” what are the indicator?---------------------------------

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12. If your answer is no for question "10" what is the reason?------------------------------------
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13. What are the advantage of indigenous soil conservation methods for soil fertility management?--
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14. What are the major limitations of indigenous soil conservation method?--------------------
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15. What are the major factors that influence indigenous soil conservation practices?-----------
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