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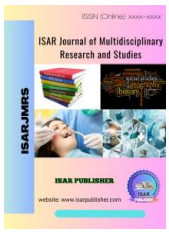

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Original Research Article

Existing soil and water conservation practices and their constraints: A case of Hiruy Abargay kebele, South Gonder Zone, Ethiopia

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Abstract: *Soil erosion has been a big issue for humans on a global scale, which has a negative impact on food yield. In order to understand the limitations of soil and water conservation in the study region, this study sought to identify the current soil and water conservation techniques. Hiruy Abargay kebele is located in the Amhara region, specifically in Farta woreda, which is 4.6 kilometers from Debre Tabor Town and 670.6 kilometers from Addis Ababa. The data for this study were gathered from 42 sample houses and from both primary and secondary data sources; the primary data came from field observations, questionnaires, and interviews, while the secondary data came from various written materials. The acquired data were examined with SPSS version 21 and displayed in a table of descriptive statistics. The study's findings indicated that the SWC was composed primarily of terraces (31%), stone bunds (23.8%), and soil burns (21.4%). This research demonstrates that terracing, followed by stone bunds and soil burning, was the most prevalent method of soil and water conservation in the studied area. These demonstrate their significance at p. < 001. Similarly, the research on the limitations of current SWC reveals that, in the study area, lack of awareness (23.8%) and technological limitations (19.1%) were the most significant variables at p.<001. The findings indicate that one of the main factors limiting SWC in the research area was a lack of awareness. Finally, this research draws the conclusion that farmers must concentrate on current SWC practices to reduce soil erosion and increase crop output while also being aware of the limitations of SWC in their region.*

Keywords: *Existing soil and water conservation, Farmer, Constraints, Crop productivity, Soil erosion.*

INTRODUCTION

The stripping away of the land's surface by natural forces such as thunderstorms, running water, wind power, snow, temperature changes, the forces of gravity, or other natural or anthropogenically-caused agents that abrade, disconnect, and remove soil or geological material from one point on the earth's surface to be deposited elsewhere is referred to as soil erosion (Gashaw T, 2015). It is responsible for around 80% of the present global degradation of agricultural land (Angima S *et al*, 2003). The International Soil Reference and Information Center (ISRLC) estimated that 9 million hectares of land worldwide are degraded; 1.2 billion hectares, or 10% of the earth's vegetative surface, are at least moderately degraded, with their original biotic function completely disappearing. Around the world, unsuitable agricultural practices account for 28% of soil degradation. Nearly two-thirds of the deteriorated soil in North America is located there, and about one-fourth of it is located there (Gashaw T, 2015).

Ethiopia served as a fantastic illustration of how severely soil resources are being depleted (Tesfa A and Mekuriaw S, 2014). Ethiopia, one of the most severely degraded nations in the world, is dominated by small-scale agricultural producers. According to estimates, Ethiopia loses 12 ha of soil every year on average, with some steep slopes losing much more soil at a rate of more than 300 tons per ha per year (Shiferaw A, 2011).

Bunds check dams, micro-basins, and hillside buildings are among the main mechanical measures. Enclosing degraded land to protect it from human and animal interference is one of the biological measures. Production of tree seedlings and planting of tree seedlings on agricultural lands (agroforestry) The natural regeneration is enriched by forestation, tree planting, and tree planting in closures around the homesteads (Mekuria, W and Aynekulu E, 2011). The results of these initiatives fell far short of expectations, and land degradation remained a significant issue (Blaikie, P and Brookfield H, 2015).

Farmers regard the SWC constraint as a hindrance because they do not see an instant return from it (Foguesatto C *et al*, 2020). Farmers list mechanical buildings terraced on farmlands as one of the limitations of soil and water conservation structures, along with the fact that they can harbor rodents and require a lot of labor (Amsalu, A and De Graaff J, 2007).

In the research area, soil erosion was a significant issue for agricultural output and productivity. The primary methods for improving soil productivity and agricultural production were soil and water conservation and management practices. However, because soil and water conservation measures required a lot of labor and a small amount of land, they were still not widely practiced in the study area.

MATERIALS AND METHODS

Description of the study area

Hiruy Abargay kebele was found in the Amhara region, especially in Farta woreda, 670.6km from Addis Ababa and 4.6km from Debre Tabor town. The study area was located in the south direction of Kanat, in the north direction of Lemado, in the west direction of Debre Tabor Town, and in the east direction of Wawamegara Kebele. This study area is geographically located between 0392632-0399059, East to west, and 1305363-1306495, North to south. Also, the altitudinal range of the study area was between 2233 and 2761m above sea level (HAKAO, 2009).

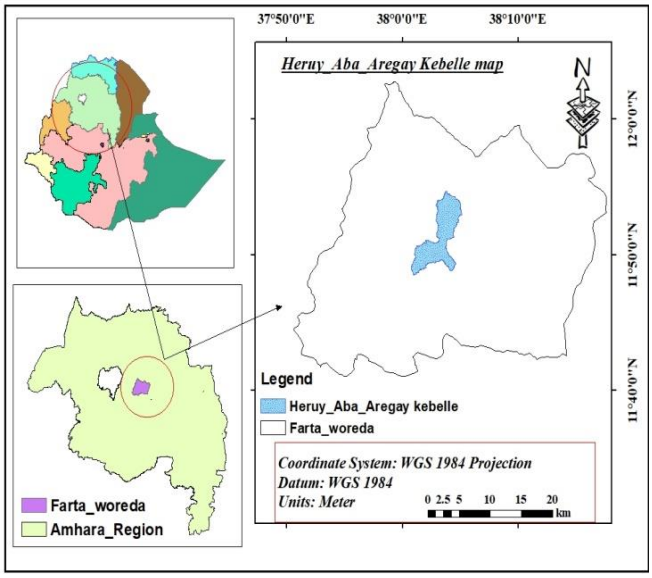

Figure 1: Map of study area

Sampling technique and sampling size

Hiruy Abaragay kebele had 1641 households from these 42 households were selected using a simple random sampling method. The reason why simple random sampling was selected was due to time and money and to give the household equal chances also Abaregay kebele had a homogeneous population group.

Methods of data collection

The data were collected from primary and secondary data sources. The primary data was collected from a field observation questionnaire and interview and secondary data was collected from a different written document that gives relevant information, a public book, the internet, and the kebele agricultural office.

Methods of data analysis

The collected data were analyzed using SPSS version 21 and presented as descriptive statistics in a table.

RESULTS AND DISCUSSION

Tale 1: General background information of respondents

Distribution of Respondents by Sex		
Respondent	№ of respondents	Percent%
Female	15	35.71
Male	27	64.29
Total	42	100
Distribution of Respondents by Age		
Respondents	№ of respondents	Percent%
Age 16-50	37	88.1
Age >50	5	11.9
Total	42	100
Educational Level of Respondents		
Education level	№ of respondents	Percent%
Illiterate	30	71.4
Grade 1-4	8	19.1
Grade 5-8	3	7.1
Diploma	1	2.4
Total	42	100

Source: Own field survey, 2023

Based on the distribution of respondents by sex, about 35.71% of the respondents during the study were female, while 64.29% were male. This indicates that the majority of the respondents were male. Also based on the distribution of the respondents by age, about 88.1% of the respondents were aged between 16 and 50 years old, and the remaining 11.9% were over 50 years old. Moreover, according to the educational level of the respondent, about 71.4% of the respondents were illiterate, 19.1% were in grades 1-4, 7.1% were in grades 5-8, and the remaining 2.4% were diploma holders. Therefore, this indicates that a higher population in the study area was illiterate.

Existing soil and water conservation practice

Table 2: existing soil and water conservation measures from the respondent

What are best existing SWC Practiced in study area?			
Variable	Counts	Proportion	P. value
Contour ploughing	3	7.1	< .001
Terrace	13	31	
Soil burn	9	21.4	
Cutoff Drain	2	4.8	
Drainage ditch	3	7.1	
Stone burn	10	23.8	
Inter cropping and Crop rotation	2	4.8	
Total	42	100	

Source: Own field survey (2023), *Binomial Test: Note. Proportions tested against value: 0.5.*

From table **2**, the majority of respondents' point out that the existing soil and water conservation practices that are practiced in the study area are dominated by terrace (31%), followed by stone burn (23.8%), Soil burn (21.4%), Contour ploughing, and Drainage ditches (7.1%), likewise the cut-off drain, intercropping, and crop rotation (4.8%). Therefore, these variables were significant at p.<001. Moreover, this finding shows us that terracing, stone burn, and soil burn were the best SWC practices in the study area. So, this finding agrees with Teshome A *et al*, (2014), who state that the stone bunds were the best SWC alternative on steep slopes in all watersheds based on their study.

Constraints of the existing soil and water conservation practices

Table 3: The constraints of the existing soil and water conservation practices

What are Constraints of existing SWC in the study area?			
Variable	*Counts*	*Proportion*	*P. value*
Technological Constraints	8	19.1	< .001
Harboring Rodent	4	9.5	
Property Right	2	4.8	
Lack of Awareness	10	23.8	
Lack of Capital	3	7.1	
Small Farm Size	6	14.3	
Lack of Tillage Tool	3	7.1	
Lack of Labor	6	14.3	
Total	42	100	

Source: own field survey (2023), Binomial Test:

Note. Proportions tested against value: 0.5.

According to Table 3, the constraints of existing soil and water conservation practices were identified. The majority of respondents said that lack of awareness was the most important factor that affects existing SWC practices (23.8%), followed by technological constraints (19.1%), small farm size and lack of labour (14.3%), harbouring rodents (9.5%), lack of tillage tools and lack of capital both (7.1%), and property rights (4.8%), which were common constraints of the existing SWC practices in the study area. Based on this result, the variable was significant at p. <001. So, lack of awareness was the biggest constraint on SWC, followed by technological constraints in the study area. Therefore, this finding shows us that the majority of farmers were not aware of existing SWC and were not able to use it technologically. Therefore, this finding is in minor agreement with Kumar S *et al*, (2021).

Conclusion

In general, one of the major environmental issues facing the planet is soil erosion. The use of agricultural land sustainably is severely constrained by soil erosion, which also lowers farm soil production and contributes to food scarcity. To understand the limitations of soil and water conservation in Hiruy Abargay Kebele, this study sought to identify the current soil and water conservation strategies. For this study, the 42 farmers' primary data were gathered. Terracing, a stone burn, and a soil burn were the next most prevalent current soil and water conservation techniques in the research area, and all existing SWC methods were significant at p< .001. Based on the constraints of SWC the major constraints of SWC were the lack of awareness and technological constraints and the variable were significant at p< .001.

Based on the finding of this research, it has been recommended that: Concerned bodies should focus more on creating awareness and sharing experiences regarding the existing soil and water conservation measures. There has to be an effort in which the community can develop a sense of ownership of the nature of conservation. Government and non-governmental organizations should closely support the local community to holistically protect the risk of soil erosion.

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