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Community Based Soil And Water Conservation Practice :In Case Of Haro Bakke Kebele,Yabello Woreda,Borana Zone

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Abstract

Land degradation is one of the major challenges in agricultural production in many parts of the world, especially in developing nations like Ethiopia. Even though a number of soil and water conservation method were introduced to combat land degradation.This study was conducted at Haro Bake kebele, Yabello woreda, Borana zone. The objective of the study was to assess the community based soil and water conservation practice and to evaluate how well implemented measures address to specification and to describe tradition and improved concentration measure. In the study *field survey, questionnaire an interviews were conducted to collect the necessary data from 35 sample households; which were selected via simple random sampling and purposively from Haro Bake kebeles. To address the stated objective both qualitative and quantitative data were collected. Data collection tools included questionnaire, focus group discussions,and field observation.The result shows that farmers of the study area were not participating on SWC activities by their interest (voluntary) but by the force of community leader, DAs, and district administrative order they are participate on the practices. The study revealed that factors such as; slope of the area, tenure status, age, gender, education status of households, land size, lack of information, level of contact with DA, lack of awareness, length of food secured months etc; are influence the practices of soil and water conservation structure. The farmer destruct the SWC method because of searching fertile soil, to join their plot of land, for need to avail more land, to destroy hiding places of rodent pests, removing a bund about to collapse etc. Soil bund, micro basin, terraces, water way and cut off drain are the soil and water conservation structure practiced by farmers and DAs on small farm land to conserve water and soil. As the result of the study indicates to decrease the challenges of SWC in the study area of Yabello district, the DAs, and experts of the natural resource of the area advice farmers as it is not important to destroy the terrace bench, soil bunds etc;. They advise, as it would be better to redevelop the existing terraces and supporting them with other soil fertility and SWC methods and train the farmers to change the low awareness they have on SWC practices.Therefore, the most important factors that require immediate consideration for SWC activities in the study area are participation of the household farmers has to be through their own conviction regarding the effectiveness and efficiency of the soil conservation structures.*

Key words:*Soil and water conservation structures; soil erosion; improve soil fertility*

1. INTRODUCTION

Agriculture is the major source of livelihood in Ethiopia. However, land degradation in the form of soil erosion has hampered agriculture productivity and economic growth of nation. There are different views about the reason of low soil productivity in Ethiopia context among these; attribute to drought,shortage of rainfall,insecurity of land tenure, population pressure, soil erosion, overgrazing, deforstation, lack of efficient rural organization and weak insitutional support [6].Land degradation, low agricultural productivity and poverty are critical and closely related problems in Ethiopian[9]. Soil erosion is not a new phenomenon, it has been a problem ever since human beings started cultivating the land; in other words, soil erosion is as old as human history. However, the critical problem in all cases is that processes of soil erosion usually undermine the soil resource and remain unobserved until the last stage. This is because erosion is noticed when crop production starts to decline and this usually happens at a very critical phase of soil erosion. Soil erosion is a global environmental problem causing the loss of fertile top soil and reducing the productive capacity of the land and thereby raises the risk of global food security.Both wind and water erosion selectively have removed the fine organic particles in the soil and left behind large particles and stone. It also negatively affect the natural water storage capacity of catchments areas, man-made reservoirs and dams, quality of surface water, the aesthetic value of the landscape and ecological balance in general[13].

In Ethiopia soil erosion by water significantly contributes to food insecurity among rural households and poses a real threat to the sustainability of existing subsistence agriculture [2,14]. Degradation resulting from soil erosion and nutrient depletion is one of the most challenging enviromental problem in Ethiopia. Soil erosion, poor SWC management practices and lack of effective planning and implementation approaches for soil conservation are responsible for accelerating degradation on agricultural lands and siltation of lakes and reservoirs downstream [5].Soil and water conservation measures have been carried out in different parts of the country that have been recommended for minimizing soil loss by erosion.In this regard, sustainable land management involves more than the use of physical soil conservation measures, it also includes the use of appropriate soil fertility management practices, agricultural water managment, forestry and agro forestry practices, forage and landmanagement, and the application of these measures in a more integrated way to satisfy community needs

while solving ecological problems [7].In this regard,one of the main reason conducting this research in Haro Bake kebele to access the awarness and root causes' of the participatory problem and effectiveness of existing soil and water conservation structure in reducing soil erosion.Therefore, this study is access community based soil and water conservation technologys and to identify the major problems associated with soil and water conservation and to come up with some alternative solution for soil erosion in Haro Bake kebele,Yabelo Woreda . The general objecive of the study is to access the community based soil and water conservation practice in Haro Bake Kebele,Yabelo Wored.The specific objecitive of the study is:

- ✓ To identify the soil and water conservation structure in Haro Bake Kebele.
- ✓ To identify the major challenges farmer faces in the implemantation of soil and water conservation practices on their farm land.

2. MATERIALS AND METHODS

2.1. Description of the study area

2.1.1. Location of study area

The study was conducted in Yabello Woreda, which is one of the Woredas in the Borena zone and lies 570 km south west of Addis Ababa. It is the largest Woreda in the zone with the total land mass of 5523 iskuer kilometer. It is bordered on the South by Dubluk, on the West by Eloye, on the North by Gomale, and on the East by Arero Woredas. The altitude of this Woreda ranges from 350 to 1800 meters above sea level at the latitude and longitudes of 4°53′N 38°5′E4.883°N 38.083°E , respectively and at an elevation of 1857 masl. The Bi-modal rainfall regime is prominent in most Yabello Woreda kebeles. Annual average rainfall ranges from 400mm to 600mm. The main rainy season March to May locally known as Ganna and the short rains from October to November called Hagaya are the two rainy seasons (Yabello Administrative Office, 2017).

2.2. Sampling size and technique

Two stage-sampling techniques were employed to select sample kebele and respondent farmers. The first stage is used to identify the sample study kebele from the large number of Yabello district association kebele while the second stage is used to identify sample households.Haro BakeKebele was selected purposively based on their involvement in different soil and water conservation activities, presence of severity of the problem of erosion and the existing soil and water conservation technologies and due to shortage of resource like time, budget, labour,etc and shortage of transportation facility. Households were purposively selected based on

their involvement in soil and water conservation activities. This is because of the fact that it could have been meaningless to interview non-participating on soil and water conservation farmers about soil & water conservation system in the area. Yabello Woreda has an estimated total population of 63,528 .The total population ofHaro Bake kebele is 2,323(1177 male and 1146 female).Because of time limitation lack of finance and large number of households 35households were selected by using simple random sampling techniques from 70 household of respondents.

2.3. Methods of data collectionand data analysis

Survey was conducted to assess community based soil and water conservation stutus in Haro Bake Kebele, Yabello Wereda, Borena Zone. To achieve the objective mentioned the above, data were collected through primary and secondary source. Primary data was collected from respondents by questionare, focus group discussion and personal and direct observation of the study area. Secondary data was collected from book, periodicals and seminar paper, research reports and project reports. The collected data were analyised by using descriptive stastics and it was presented by using figures, table, and percentages

3. RESULT AND DISCUSSION

3.1. Personal Data (household Characteristics)

3.1.1. Household Size

As shown in table1 the majority of the respondents (45.71%) were in the categories of 4-6 family members. The nature and size of family affects the degree of SWC. As clearly known soil and water conservation structure is labor intensive, households with larger household size make decision to retain structures. According to the respondents view with resource person, large family size is very important for soil conservation measures because having a small number of children requires additional labor from out of family to construct and maintain soil conservation structures.Having large family size could result in demands more land for agriculture. This might be affect soil erosion due to increases disturbance of land for agriculture.The existence of large number of family members with limited resource could affect soil degradation due to increasing demand for food with limited land resource.[1]also found out the significant negative effect of family size on farmers' conservation decision, which implies that households with large family size are not likely to continue using the SWC.

Table 1: Family size of respondents

Family size	Frequency	Percentage
<3	4	11.43
4-6	16	45.71
7-9	9	25.71
>10	6	17.14
Total	35	100

(Source: own field survey, 2017)

3.1.2. Age-Sex characteristics

Farmers of the study area are classified under different age group. According to the below table, most of the household heads (40%) were in the age category from 18-60 years. Farmers in this age group are to have a good understanding of the problem of soil erosion. Due to this they are more interested in soil and water conservation practices. As explored through interview, farmers of these age groups to have a good understanding on the problem of soil-water conservation, and usually interested in implementing soil and water conservation practices than the other age group. The proportion of elderly people (over 65 years) and young farmers (between ages 12-17 years) was an age group in which labor shortage can be a hindrance to practicing soil-water conservation measures.

Table 2.Age composition in the households

Age categories	Frequency	Percentage
<12	**3**	**8.57**
12-17	**11**	**31.43**
18 – 60		
>60	**7**	**20**
Total	**35**	**100**

Females were family headed when their husband have been died or migrates from their original residences. As the questionnaire survey indicates, most of the females‟ household heads manage their land through share cropping or renting to families with male household heads and contract with other men to plough for which service they had to pay.

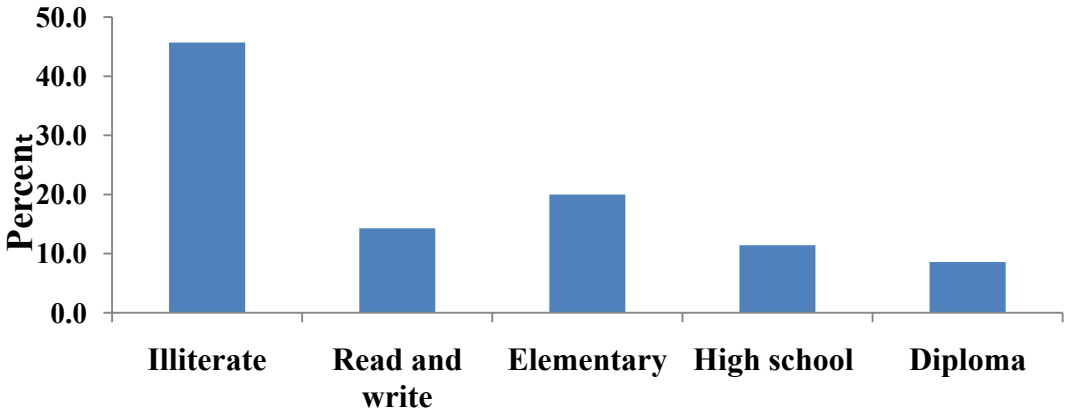
Table 3. Sex composition of the household

Sex	Frequency	Percentage
Male	23	65.71
Female	12	34.29
Total	35	100

(Source: own survey, 2017)

3.1.3 Education Status

The study has identified five educational levels in the study district: illiterate, can read and write, elementary schooling, secondary schooling, and diploma. From the survey result, most of the farmer household heads in the study area were not educated; because of this, they have little information about newly introduced SWC practice.Level of education is one of the demographic features of households which has crucial role to increase information about environmental problems such as causes and consequences of soil erosion and conservation practices in particular. Better educated households have more realistic perception about soil erosion problem and knowledge related to SWC and can easily get involved in conservation activity. Similarly, [2]reported that education enables farmers to tackle SWC using various ways of soil fertility improving practices.



(Source: own survey, 2017)

Figure1. Sampled household educational level

3.2. Agriculture systems in the study area

Livestock rearing is one of the economic activities and indispensible part of agriculture in the study area. The major types of animals reared by the farmers were Cattle 37.14%, Goats 22.86%, Sheep14.29%, Camel 17.16%, and

Donkeys 8.57%. Livestock increase at the village level has an important implication on degradation of communal grazing lands. This is negative impact on SWC because of overgrazing of land, destroying conservation structure such as water ways, soil bunds, and macro basins. This is in line with the finding of [13] who found that over grazing is believed to result in land degradation and also low animal productivity. Finally both livestock production and soil need proper care to support livelihood of the people

Table 4 Type of livestock production in study area

Livestock type	Frequency	Percentage
Cattle	13	37.14
Goats	8	22.86
Sheep	5	14.29
Camel	6	17.14
Donkey	3	8.57
Total	35	100

(Source : own field survey, 2017)

The Crops grown in the study area include maize, wheat, Teff, Corn, Sorghum ,Barley and Haricotbean. The type of crop grown has important implication on Soil degradation [13]. These studies indicated that Cultivation of cereal crops such as Teff and Wheat which requires fine-tilled soil bed and single cropping of fields encouraged soil erosion in the study area.

3.3. Practices of soil and water conservation

3.3.1. Physical soil and water conservation practice

To decrease the problem of SWC in the study area of Haro Bake Kebele, the development agents, and experts of the natural resource of the area advice farmers as it is not important to destroy the terrace bench. They also advise farmers, as it would be better to redevelop the existing terraces and supporting them with other soil fertility and SWC measures such as use of soil bund, macro basin, cutoff drains, waterway and terracing.Relatively, soil and water conservationsstructure are widely used in arresting soil erosion by water in the area. Soil bund was constructed by public participation in the study area. Soil bund is effective in controlling soil loss, retaining moisture, and ultimately enhancing productivity of land.Cut off drains are one of the physical structure constructed by digging the soil deep in order to divert the runoff before reaching the farmland. The farmer constructed cut off drains to prevent loss of seeds, fertilizer and soil due to excessive run– off coming from uplands and dispose the

excess water for the field. Waterwayis a common practice in the study area also to protect crop fields from being damaged by run-off that comes from certain direction. By doing so, they protect their farm plots from the damaging effect of runoff.

Figure 2.Soil bund and Micro basin in the study area

3.3.2. Biological/agronomic soil and water conservation practice

According to the idea of the respondent there are different biological/agronomical soil and water conservation in the study area (Table 6).The most biological/agronomical practiced in the study area are counter farming, fallowing and area closure.

Table 5 .Different type of biological/agronomical soil and water conservation practice

Biological/agronomic SWC.	Frequency	Percentage
Counter plowing	10	28.57
Fallowing	7	20
Crop rotation	4	11.43
Area closure	5	14.29

Planting	3	8.57
Mulching	2	5.71
Mixed cropping	4	11.43
Total	**35**	**100**

(Own survey, 2017)

3.4. Community Based SWC Measures in the study area

The farmers in the study area were involved in soil and water conservation method in their kebele and individual farming land. The study area also practices management system in form of a campaign for one month in which some community member participates. While many of the farmers' refuse of this practice because of they have small land holding size and off farm activity. According to study area, some farmers perceived SWC measures increased crop yield and some of the farmers perceived that it prevents soil erosion and improved soil water retention capacity of the soil. But many number of farmers believed that SWC measures cannot increase productivity. These farmers suggested things that are expected from the government such as financial and material support, continuous training, experience sharing and incentives that should be given for the community to understand and implement the SWC measures.

Farmers in study area used different types of improved soil conservation practice like: improved soil bund, micro basin, improved cut off drain and area closure. In most cases in order to make the structural soil conservation measures effective, farmers used to plant, grasses, temporary crops and make periodical maintenance. In the lands of many farmers, the conservation measures are combination of structural soil conservation measures and agronomic measures, yet biological soil conservation is used to control erosion and as source for forage. As noted by respondents, agronomic soil conservation measures are cheap in terms of cost and labor; easy to construct, maintain and change through time than structural one

3.5 Benefits and constraint of adopting method of SWC

About 45.71% of the respondents identify for major problems is it require large labor to implement soil & water conservation structure. The respondent replies that about 22.86% of the respondent mentioned soil bund conservation reduce farm land size,31.43%

replied that it is technically difficult to implement. As noted by farmers, structural soil conservation measures, it requires large labor, reduce farmland, difficult to implement and obstacle oxen plough. Accordingly, they preferred to practice traditionally known SWC measures such as cutoff drains, waterways, and other fertility enhancing methods like leaving crop residues on field, because these are less expensive and demands few labor, might not obstacle oxen plough and make movement easier. The other series challenge in the study area was destruction of constructed physical soil and water conservation by different farmers. Most farmers destruct physical soil and water conservation to destroy hiding places of rodent pests, for destroying bad weed, to search fertile soil etc.In addition, lack of information on benefit and cost of structural soil-water conservation measures, lack of technical knowledge in designing SWC related activities, level of contact with DA, lack of technical support, size of expert, training on soil erosion and soil-water conservation techniques and length of food secured months have significant influences on practicing structural soil-water conservation measures.

Soil Conservation structural such as stone/soil bund, micro basin, cut off drain and modify terrain through changing slope length and angel, which in turn reduces runoff velocity, enhances water infiltration and traps sediments washed down the terrain [8]. The result of study by [4] also confirms that soil conservation can improve moisture retention during low-rainfall periods and thereby reduce moisture stress and enhance plant growth. This implies that farmers were likely to invest in simple and cheap short-term benefit measures rather than to go for the recommended mechanical structures such as terraces and soil bunds.

4. CONCLUSSION

Similar to other parts of Ethiopia, the livelihood of the farmer of study area is totally dependent on subsistent agriculture that includes rearing of livestock and cultivation of crops. Farmers well understood the results of severe soil erosion on their farms and recognized as loss of topsoil and loss of vegetation cover and grasses. Structural soil conservation measures practiced in the study area included cutoff drains, soil bunds, waterways, check dams. Yet farmers have been using biological and agronomic soil conservation measures either separately or in combination with structural soil conservation measures. Practices of structural soil conservation measures have been influenced by many factors such as farmers'

experience, educational, gender, lack of training, income of house hold, government policies and strategies and physical factors were observed.

The major causes of soil erosion were found Human population, poor farming practice, over cultivation and improper utilization of land which could result from deforestation and small land holding size. The most important constraints to adopt SWC were decrease in farm size and its inconvenience during farm operations especially for free movement of oxen plough followed by lack of capital and tools, labor shortage and construction know how. Water conservation and utilization works particularly for crop irrigation purpose require more investment and awareness of the community. The alternatives in this case should be cost effective, technically sound and economically viable and, as far as possible.The concerned body like government should support in this regard technical support from experts to design the SW measures is mandatory, though farmers have awareness to soil erosion problem continuous training and experience sharing and incentives should be given for the community to understand and implement the new SWC measure.

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