International Journal of Research in Agriculture and Forestry
Volume 6, Issue 2, 2019, PP 8-17
ISSN 2394-5907 (Print) & ISSN 2394-5915 (Online)

Farmers Perception of Soil and Water Conservation Measures on Rehabilitation of Two Watersheds in Humbo District, Southern Ethiopia

[1]Meseret Melilo and [2]Dawit Dalga

[1]Humbo District Agricultural office, P O Box, 60, Wolaita Zone, Ethiopia
[2] Wolaita Soddo University, College of Agriculture, P O Box, 138, Wolaita Soddo, Ethiopia

***Corresponding Author:** Dawit Dalga , Wolaita Soddo University, College of Agriculture, P O Box, 138, Wolaita Soddo, Ethiopia. Email: dawitdalga9@gmail.com*

ABSTRACT

Land degradation in Ethiopia is a serious constraints and causes for soil fertility depletion and results low production of Agriculture. Hence, different SWC measures techniques were taken to rehabilitate degraded lands in the District of Humbo in Southern Ethiopia. However; the perception of community on Soil and Water Conservation Measures was not identified. Therefore, this study was conducted in Humbo District of two watersheds, southern Ethiopia to assess the farmer perception on SWC practices. A purposely sampling approach was selected for the survey and of the total number of households residing in the study area (PA), only 5% of 803 household heads was randomly selected for questioner survey. All survey data were analyzed by using SPSS soft-wares and discussed. The results of study showed that the perception of farmers on the soil-water conservation measures was mostly positive. Most of the interviewers (82.5%) had positive opinion on the impact of SWC measures. Therefore, it could be concluded that SWC practices were positively correlated with two watersheds in the study area and better soil-water potential rehabilitation.

Keywords: *Soil and water conservation, Soil bund, Faynajuu, Trench and perception*

INTRODUCTION

Degradation of land is a serious issue throughout the world, particularly in African countries. Land degradation in Ethiopia is impairing land contribution to food security and to provide other benefits such as fuel wood and fodder. Ethiopians are facing rapid deforestation and degradation of land resources. Population increases have resulted in extensive forest clearing for agricultural use, overgrazing, and exploitation of existing forests for fuel wood, fodder, and construction materials **(**Hurni, H. 1993). Forest areas have been reduced from 40 percent a century ago to an estimated less than 3 percent (Badege, 2009). Soil degradation can be described as a reduction of resource potential by combination of processes acting on the land, such as soil erosion by water and wind, bringing about deterioration of the physical, chemical and biological properties of soil (Maitma, 2001). Soil degradation in Ethiopia can be seen as a direct result of past agricultural practices in the highlands. The dissected terrain, the extensive areas with slopes above 16 percent, and the high intensity of rainfall lead to accelerated soil erosion once deforestation occurs. In addition, some of the farming practices within the highlands encourage erosion (Badege, 2009).

The severity of land degradation process makes large areas unsuitable for agricultural production, because the top soil and even part of the sub-soil in some areas has been removed, and stones or bare rocks are exposed at the surface. Land degradation problem in Ethiopia is manifested mainly in the form of soil erosion, gully formation, soil fertility loss, and crop yield reduction. The excessive dependence of the Ethiopian rural population on natural resources, particularly land, as a means of livelihood is an underlying cause for land and other natural resources degradation (EPA, 2004). Some forms of land degradation are the result of normal natural processes of physical shaping of the landscape and high intensity of rainfall. The scale of the problem, however, dramatically increased due to the increase in deforestation, overgrazing, over-cultivation, inappropriate farming practices, and increasing human population. Removing vegetative cover on steep slopes for agricultural expansion, firewood and other wood requirements as well as for grazing space has paved the way to massive soil erosion

(USAID, 2004).The economy of Ethiopia is mainly based on rain-fed agriculture which is the source of livelihood for the majority of its population (CSA, 2016).

Considering the background problems enumerated above on soil and water management in Ethiopia, proper soil conservation becomes imperative when considering issues regarding soil fertility improvement. The structures are designed to intercept and reduce runoff velocity, pond and store runoff water, convey runoff at non-erosive velocities, trap sediment and nutrients, promote formation of natural terraces over time, protect the land from erosion, improve water quality, enhance biodiversity of downstream water, prevent flooding of neighboring lands, reduce sedimentation of waterways, streams and rivers, improve land productivity and provide diverse ecosystem services (Blanco and Lal, 2008).

To counter this productivity decline caused by erosion crop cultivation should be accompanied by appropriate conservation based on development strategies and land use plan. A number of constraints could hinder the adoption of land modifying practices that farmers are unaware or be less than totally convinced of the benefits. The present study was conducted by superimposing the treatments on one of the few successful SWC structures to investigate the effects of integrating physical on some soil physical and chemical properties it is hypothesized that SWC measures help to control erosion and improve soil physical and chemical properties when compared to non-conserved land (Awulachew, 2007).

In addition to that, the area is selected as the area characterized by high severity of soil erosion, high soil degradation and a lot of effort has been under taken by different stakeholders/MERET, World vision Ethiopia, PSNP and Government Initiatives/to reduce soil erosion. Moreover, the area is food insecure and recurrent drought occurrence is a common phenomenon (Mihrete,2014). In addition to that high population pressure in highland areas`, shortage of farmland, low soil fertility and productivity. There were different soil-water conservation measures practiced in Humbo district but farmers were not engaged in the strategy for sustainability. Therefore, this study was initiated with the objective of: to assess the farmers perception towards SWC measures and know a better SWC measures in the watersheds.

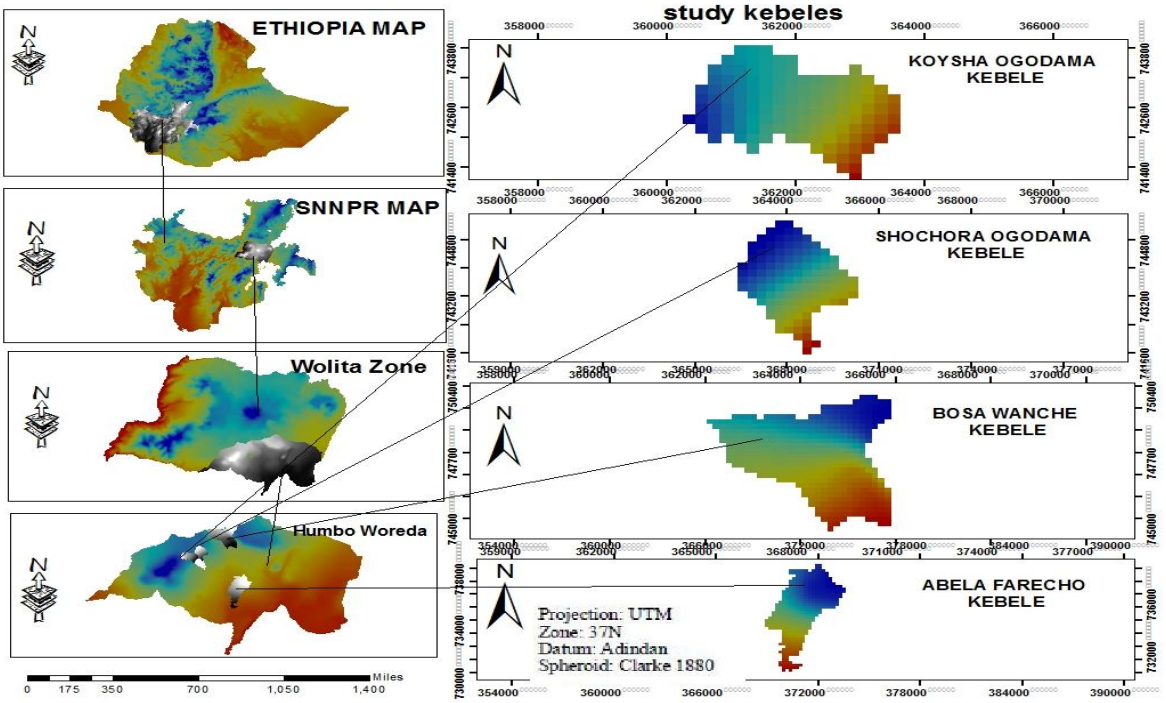

Figure1. *Map of the Study Area (source: DEM DATA)*

RESEARCH METHODOLOGY

Description of the Study Area

The study was conducted in SNNPR State Wolaita Zone at Humbo District. It is located in an elevation lowest point at Abaya lake range from 1100 meter peak 2335 at Solko mountain meters above sea level and temperatures vary according to the season and elevation, but mean maximum range from 18 to 24^{o}c and mean

minimum from 12 to 15°c (Humbo District Agricultural office, 2017) .

Sampling Design and Layout

This particular study was conducted in Four Kebele's in Hamusse and Hamassa 250-500 Sub-watershed in Humbo district two kebele from each watershed respectively. The criteria was availability of different-aged, well maintained and established cropland soil bunds, Fayna Juu and Trench in low land and mid high land areas and with a view to accessibility of the site for frequent visits.

A purposely sampling approach was selected for the survey and of the total number of households residing in the study area (PA), only 5% of 803 household heads was randomly selected for questioner survey. All survey data were analyzed by using SPSS soft-wares and discussed.

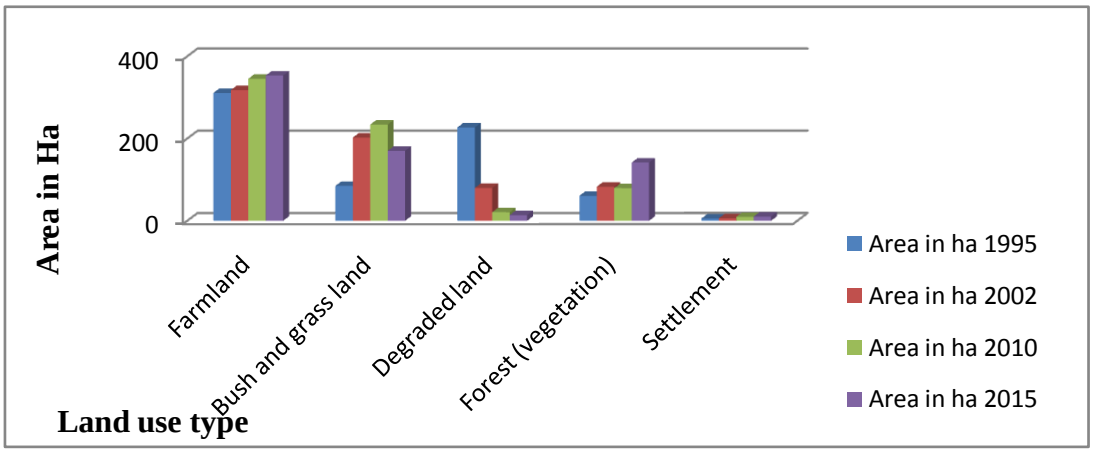

Figure 2. *Land Use of Humbo district LULC types in 1995, 2002, 2010 and 2015(MERET 2011)*

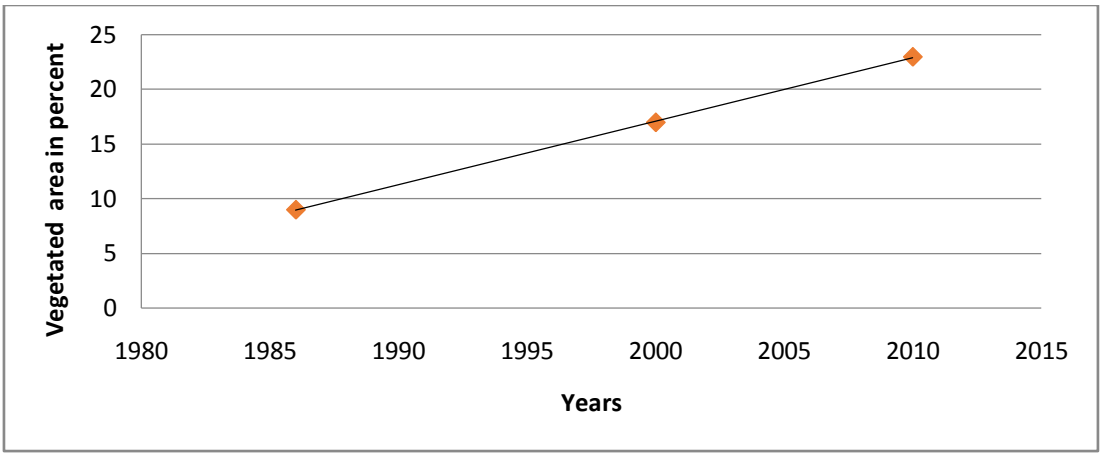

Figure 3. *Vegetation and biomass improvement over time in Hamusse watershed satellite remote sensing image (source; MERET 2011, Annual Report)*

Data Analysis

Soil and water conservation measures and adjacent control farm plots and slope gradient was used as independent variables and the data was collected in the HH survey was analyzed using Statistical Package of Social Science (SPSS) Software and data was organized, results was presented in descriptive statistics (frequency tables showing the number of households corresponding to their responses usually expressed in percentages).

Results And Discussion

Descriptive Analysis

Farmers Perception on the Impact of SWC Measures on Physiochemical Properties of Soil

Farmers were asked the positive and negative impact of SWC on soil physiochemical properties implemented on their land. Most of the farmers perceived the positive impact of SWC structure on their farm land. Out of the selected farmers more than 82.5% (Yes) as

showed at (Fig. 13) address that SWC structures improve their land through preventing erosion, increasing in land productivity and increase in fertility. Additionally, increase soil depth, moisture conservation and source of income were also addressed. Only 17.5 % (No) as showed at (Fig.4) of farmers recognize SWC structure development has negative impact through loss of land, difficulty during plowing and the need for additional time. This indicates that farmers has good awareness of SWC structure even the structure is time taking in maintaining soil through protecting soil from different degrading factor. Address that farmers have the positive attitude toward soil and water conservation structures has improved crop yield when compared to non-conserved land. Perception of soil erosion as a hazard to agricultural production and sustainable agriculture is the most important determinant of effort at adoption of conservation measures. This finding was in agreement with (Semgalawe and Folmer, 2000) those farmers who perceive soil erosion as a problem having negative impacts on productivity and who expect positive returns from conservation are likely to decide in favor of adopting available conservation technologies

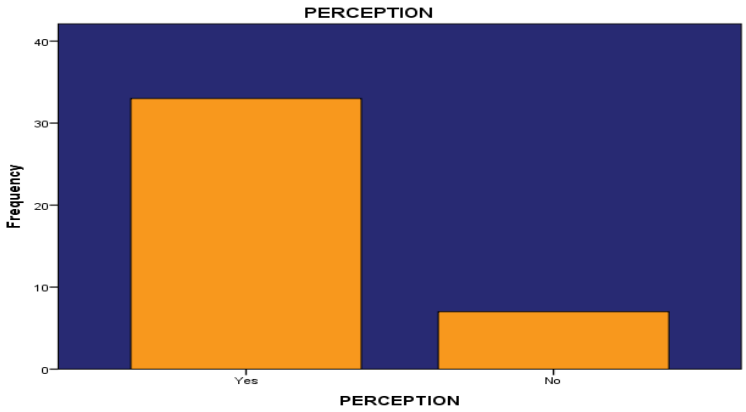

Figure 4. *Perception of sampled HHs towards on the effect of SWC Measures on soil Physiochemical properties*

Source: Own Survey (2018)

Age of the Respondents

Age is one of the personal characteristics that is important to describe about the respondent situations and can give a clue about the condition of those farmers in the area. It is believed that it has a direct relationship with the farmers' perception on the impact of SWC measures on soil physiochemical properties of the farmers. Most of the HH heads are in the age from 30-60 years. Farmers in this age group are assumed to have a good understanding and as a result, usually more interested in soil and water conservation practices.

Table1. *Relationship between age and perception towards SWC*

Perception category	E Mean	Std. deviation	F-value	P-value
Positive	46.24	8.419	1.159	0.376
Negative	44.86	8.454		
Total	46	8.3		

Source: Own survey (2018)

Elders are more respected in the area. Generally, the age situations of farmers 'respondents were given in the following way: The age structure of sample households' showed that, the mean age of farmers was 46 with the minimum and maximum 31 and 61 respectively. The age structure of sample households showed that the average age of positive and negative perception towards to the impact of SWC on soil physiochemical properties was 46.24 and 44.86 years respectively. The mean age difference among the three group respondents was statistically insignificant (F=1.159, P=0.379) at 1 per cent probability level. This result did not agree with (Fikiru A., 2009) an elderly age category group in which labor shortage could be a hindrance to practicing soil and water conservation measures.

Family Size of the Respondents

The size of the family is one factor expected to have a relationship with farmer's perception

towards SWC. The mean family size of the respondents was 6.05 (Table 2). The mean value of family size indicated that it was better than lower sized family for SWC practices. In addition to size, the number is greater than other world's mean value. This finding was in agreement to 4.9 (CSA, 2017).which is greater than the mean family size of the region in which the study Woreda belongs that minimum and maximum size of the family was 3 and 9 respectively. The mean family size for positive perception towards was 5.91 and for negative perception was 6.71 in number. The percentage difference between the two sample groups is significant.

Table2. *Relationship of family size and perception towards SWC*

Participation categories	Mean	Std. deviation	F-value	P-value
Positive	5.91	1.359	2.640	0.033
Negative	6.71	1.442		
Total	6.05	1.568		

Source: Own survey (2018)

Sex of the Farmer

Sex of the respondents represents the characteristics of the farmers in terms masculine and feminine. It is expected that male-headed households have more experience and access in participating in SWC activities. The proportion of female and male respondents was 22.5 and 77.5% respectively.

The proportion of female from the total 9 sampled female Positive and Negative perception towards to the impact of SWC Measures was 88.9% and 11.1% respectively. On the contrary, in Positive and Negative perception towards to the impact of SWC Measures male respondents was 80.64% and 19.36% of the male respondents respectively. When the researcher compares the number of male headed households with the total, the share was only 77.5 per cent while the remaining 22.5 per cent belongs to the female headed households. Similarly, Tadesse (2001) reported as SWC measures was positive relation. The percentage difference in between the two groups in the Chi-square test shows sex was statistically insignificant variable (Chi-Square=0.640, p=0.545).

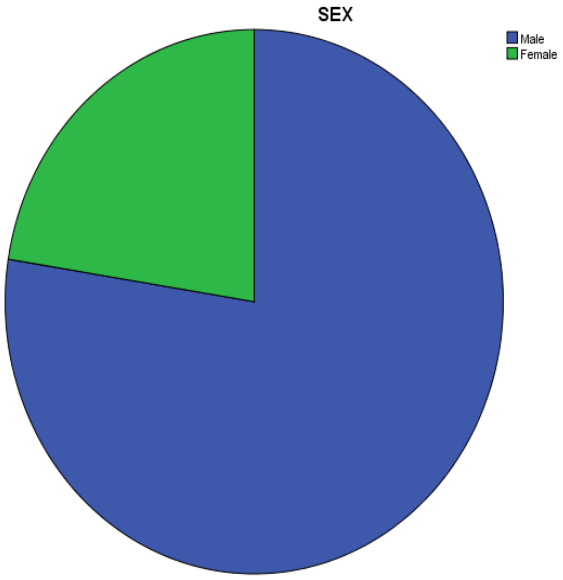

Figure5. *Sex of sampled HHs towards on the effect of SWC Measures on soil Physiochemical properties*

Educational Level

Most researchers agree on role of education to motivate and let the farmers have positive perception towards SWC measures impact. This is so because farmers who are literate have an opportunity to be acquainted with the positive perception towards SWC measures impact. The educational levels of the respondents are categorized in to different levels. Those are illiterate, read and write, grade 1-4, grade 5-8 and grade 9 and above. This is to observe the educational differences among the farmers of the respondents. Therefore, respondents who

were not educate were15% , 17.5%, of them are those who can read and write, 25% of them completed from grade 1-4, 25% of the respondents completed grade 5-8 and 17.5% of the respondents are completed grade 9 and above. Similarly, Mesfin (2004) reported as SWC measures was positive relation From the survey results, better-educated households have more realistic perceptions about more knowledge related to SWC and hence can more easily be involved in conservation activities.

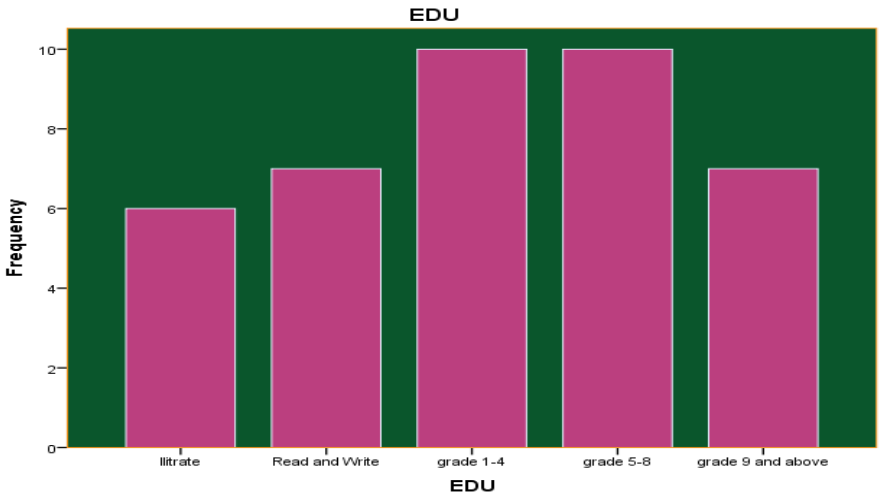

Figure6. *The educational level of the sample respondents (Source Own survey (2018).*

As it was showed from the positive perception towards to SWC measures group 18.2 % of the respondents were illiterate. Within this group, only 18.2% those who could read and write, 24.2% completed grade 1-4, 27.3 % completed grade 5-8 and 12.1% completed grade 9 and above. From the negative perception towards to SWC measures group, 0% of the respondents were illiterate, 14.3% are those who can read and write, 28.6% of them are those completed grade 1-4, 14.3% are those who completed grade 5-8 and 42.9% of them are those who completed grade 9 and above. The chi-square value in the table (χ^2 = 17.056 and P = .03) shows that, there is a significant relationship between education and the perception towards to SWC measures in at less than 5% probability level. From this it is possible to conclude that education contributes significantly for perception towards to SWC measures. This result is agree with(Fikru A.,2009) better-educated households have more realistic perceptions about soil erosion problems and more knowledge related to SWC and hence can more easily be involved in conservation activities.

Respondents' Farm Landholding Size

Obviously, land in rural areas is a very important means of production. It plays a central role in producing crops and raring livestock. Moreover, access to land offers a privilege to get access to agricultural extension services and new agricultural technologies. Land is the valuable property in rural areas in which most people need to have it. This is because; it is the main source of income and increases the status of the people in the community.

Table4. *Relationship of farm landholding size and perception towards SWC*

Perception category	Mean land holding in ha	Std. deviation	F-value	P-value
Positive	0.99545	0.39	8.994	-
Negative	0.64288	0.49		
Total	0.9375	0.49		

Source: Own survey (2018)

It was clearly indicated that there is a significant mean difference in land holdings among the three perception categories of the respondents. The total mean land holding of respondents was 0.9375. The mean land size holdings of those farmers who were under the positive and negative were 0.99545 and 0.64288 hectares respectively. From this it could be conclude that, those farmers' respondents who have more land holdings in the society have positive perception towards to SWC measures in the community. Similarly, Franzlrebbers (2010) reported as SWC measures was positive relation The spearman correlation shows that there is a positive relationship between land holding size and perception towards to SWC measures. The result of the one-way ANOVA (F= 8.994 and

P=.0000) indicates that there is a significant mean difference at 1% level in land holdings among the different perception groups in the community.

Respondents' Livestock Ownership

Livestock provide milk, meat, traction power, income and transport. Moreover, farmers send livestock to market as one of coping mechanisms during food shortage. Livestock owned by the sample households include cattle, sheep and goat, equine and poultry. The total number of livestock population owned by the sample respondents was284 (Table 5). The type and total number of livestock owned across all sample households is given in Table 5. The main sources of feed for livestock in the study area include peagon pea (Ye,ergbe ater) straw, grazing land and hole (maize stalk during its vegetative stage). Similarly, ATA (2014) reported as SWC measures was positive relation. The availability of grazing land according to the respondent is limited in all watersheds. The majorities of the watershed inhabitants were used local pastures and free grazing systems.

Table5. *Type and number of livestock owned by the sample households*

Types of Livestock	No. of animals	Proportion of farmers own Livestock
Oxen	21	52.5
Cows	16	40
Calves	9	22.5
Heifer	11	27.5
Horses	2	5
Mules	-	-
Donkeys	-	-
Goats	33	82.5
Sheep	14	35
Chicken	178	100

Source: Own survey (2018).

Number of Years That the Farmer Used the Farmland

The respondents' average number of year that the farmer used the farmland was 26 years with standard deviation of 4.4820. Furthermore, the average number of year for positive perception towards to SWC measures was 27.5 years with standard deviation of 3.9889, while for the Negative perception towards to SWC measures was 23 with standard deviation of 5.5159 The mean difference in number of year that the farmer used the farmland was statistically tested and there was no significant difference between the three sample groups.

Table6.*Relationship between number of year that the farmer used the farmland and their perception level*

Perception categories	Mean	Std. deviation	F-value	P-value
Positive	27.5	3.9889	0.851	0.613
Negative	23	5.5159		
Total	6.9	4.5		

Source: Own survey (2018).

Farmer's Perception on Soil Erosion and Its Extent before and after Introducing SWC

Perceptions of Farmers on the Physical SWC Measures and Soil Erosion Problem: Soil erosion is widespread, but there is considerable variation in the degree of erosion from place to place in the study area. The majority of the farmers (82.5% Table 6) reported that they perceive soil erosion problem in their farm land. But, the severity of the erosion was varied from place to pace based on different factors mainly slope steepness and soil conservation measures practiced.

Generally, perception of soil erosion problem is an important factor to suggest possible solutions for farmers and makes decisions on conservation investments. The perception of farmers in hamessa and hamusse watershed showed that soil erosion was perceived as a problem by more than 82 % of the farmers to identify indicators of the problem to include reduced soil depth(62.5%), 45% reported soil loss through mass movement, and 32.5% mentioned difficulty during plowing as indicators of soil erosion. Reduced productivity of land, declining soil fertility, formation of gully, and soil deposition river bank were also indicated during focus group discussion. In individual interviews and focus group discussions, farmers commonly indicated that they have witnessed the loss of soil from cultivated fields and the reduction of the depth

of the topsoil through time which resulted in increasing the proportion of stones in their farmlands overtime. They also revealed that, two decades ago, the soil in the area was generally fertile in nature and more productive but currently; it does not provide yields without the application of fertilizers. The main causes of soil erosion mentioned by farmers included cultivation of steep slope without SWC measures, over cultivation, improper tillage practices plowing across or diagonal to the slope and poor drainage of excess water Table 6

The farmers' perception on the indicators and causes of soil erosion reflect that farmers had understood the problem and able to evaluate if their actions are mitigating the right causes. Thus, farmers who declared soil erosion as a key problem were asked to list and rank the main causes of soil erosion. This might be the reason why farmers need short-term benefit and less awareness of the effectiveness of SWC measures. Similarly, Amsalu (2007) reported as SWC measures was positive relation. Additionally, lack of proper design of structures and selection of structures that best fit with the weather condition of the area may also reduce the effectiveness of SWC measure and leads to unconditional perception toward the structure by farmers. The result of the questionnaire survey indicated that most of respondent staggered with the presence of soil erosion problem under their field now treated with soil bund, fanyjuu and other SWC structures.

Table7. *Perception of respondents for soil erosion as a problem*

Issues	Response	Frequency	Percent(%) (n=40)
Occurrence of soil erosion	Yes	33	82.5
	No	7	17.5
Extents of soil erosion before you use SWC	Severe	37	92.5
	Moderate	3	7.5
	Slight	-	-
Extent of soil erosion After SWC measure	Severe	-	-
	Moderate	9	22.5
	Slight	31	77.5
Indicator of erosion observed by respondent	Reduction Soil depth	25	62.5
	Mass movement of soil	18	45
	Difficulty during plowing	13	32.5
	Fertility decline	27	67.5
	Gully formation	19	47.5
Cause suggested	Steepness of the slope	24	60
	Inappropriate tillage	21	52.5
	lack of diversion ditch	27	68.75
	Damage of conservation structure	16	40
	Increasing of livestock	12	30

Source: Own survey (2018).

Farmers Perception on the Impact of SWC and Factors Limit Their Use

Farmers were asked the positive and negative impact of SWC implemented on their land as showed in Table 8. Most of the farmers perceived the positive impact of SWC structure on their farm land.

Out of the selected farmers more than 82.5% of them address that SWC structures improve their land through preventing erosion, increasing in land productivity and increase in fertility. Additionally, increase soil depth, moisture conservation and source of income were also addressed (Table 8). Only 50 % of farmers recognize SWC structure development has negative impact through loss of land, difficulty during plowing and the need for additional time. While more than 70 % have believed SWC structure do not have negative impact. This indicates that Farmers has good awareness of SWC structure even the structure is time taking in maintaining soil through protecting soil from different degrading factor.

Address that farmers have the positive attitude toward soil and water conservation structures has improved crop yield when compared to non-conserved land.

All the interviewed farmers perceived soil erosion, as a problem constraining crop Production (Table 8). The problems may be by reduction of farm size, change types of crop grown and soil fertility loss as a result yield

reduction was observed. Based on finding of this study, In the Hamessa and Hamusse watershed the severity of soil erosion and yield reduction facilitate the introduction of most physical SWC structures.

Perception of soil erosion as a hazard to agricultural production and sustainable agriculture is the most important determinant of effort at adoption of conservation measures. Understanding and recognition of soil erosion as a problem in their farm plots and its causes and impacts on crop yields is the first step towards searching for and adoption of remedial measures. However, this finding was consistent with findings in the Worku Hailu (2009).

Table8. *Farmers' reasons for not to use the newly introduced SWC measure*

Issues	Response	Frequency	Percent (%) (n=40)
What are the positive impact of SWC you observe	Preventing erosion	31	77.5
	Increasing in land productivity	29	72.5
	Increase in fertility	34	85
	Increase soil depth	36	90
	Moisture conservation	27	67.5
	Source of income	18	45
Negative impact of SWC	No negative impact	28	70
	Lose of land	13	32.5
	Difficulty during plowing	9	22.5
	Take more time and labor	5	12.5
The limiting factor not to use SWC	Shortage of labor	18	45
	It reduces land	7	17.5
	No problem of soil erosion	3	7.5
	complexity of the technology	6	15

Source: Own survey (2018).

CONCLUSION

The use of SWC structure is promising in protecting the cultivated land from erosion and the associated nutrient depletion. 82.5% of sampled Farmers seem to have a positive perception of the use of SWC to combat soil erosion and are generally aware of the problem. Farmers' opinion indicated that the soil condition in relation to productivity is relatively better on conserved farm plots than on the non-conserved ones.

This indicates that good agreement between assessment of soil fertility by farmers in the study area and scientific indicators of soil fertility.

The study's recommendations centers around the importance of enhancing participation in soil conservation measures and the need to explore further conservation strategies and methods.

Clearly, a continuous awareness raising efforts through farmers' participation and a follow up process on the proper management (maintenance) of the structures is necessary. On the other hand, suitable conservation structures to climatic condition and slope gradient need to be implemented. Finally, it could be concluded that SWC practices were positively correlated with two watersheds in the study area and better soil-water potential rehabilitation.

ACKNOWLEDGEMENTS

The authors thank the Humbo District Agricultural office for providing the budget for this research work and Wolaita Soddo University for providing research materials and necessary facilities.

REFERENCES

[1] Amsalu, A., and De Graaff, J. 2007. Determinants of adoption and continued use of stone terraces for soil and water conservation in an Ethiopian highland watershed. Ecological Economics. 61:294-302

[2] ATA, (Agricultural Transformation Agency) (2014). Soil Fertility Status and Fertilizer Recommendation Atlas for Tigray Regional State, Ethiopia. Addis Abeba

[3] Awulachew, S.B., Yilma, A.D., Loulseged, M., Loiskandl, W., Ayana M. and Alamirew, T. 2008. Water resource and irrigation development in Ethiopia. International Water Management Institute, Working Paper No. 123, pp 4-9

[4] Badege Bishaw,2009. Deforestation and land degradation in the Ethiopian highlands: A strategy for physical recovery. Northeast African Studies, ISSN 0740-9133, 8(1):7-26

[5] Blanco, R. and Lal,R., 2008. Principles of Soil Conservation and Management, Springer, New York, 2008, p. 285.

[6] CSA (Central Statistics Authority, 2016). Agricultural sample survey 1999/2000. Report on area and production for major crops (private peasant holdings, main season). Statistical Bulletin Vlo.1. Addis Ababa, Ethiopia.

[7] CSA (Central Statistics Authority, 2017). Agricultural sample survey 1999/2000. Report on area and production for major crops (private peasant holdings, main season). Statistical Bulletin Vlo.1. Addis Ababa, Ethiopia.

[8] Franzluebbers, A.J. (2010). Principles of Soil Conservation and Management. *Vadose Zone Journal*, *9* (1):, 199-200

[9] Fikre, G. A Multi Method Approach to Study Landslide Hazard. A case study in Ada Berga Woreda, Western ShowaZone, Oromiya Region, Ethiopia. MSc Thesis, Addis Ababa University, 2010.

[10] Hurni, H. 1993. Land degradation, famine, and land resource scenarios in Ethiopia, Cambridge University Press, Cambridge, pp. 27-62IPMS Ethiopia. 2010. Improved Productivity and Market Success of Ethiopian farmers.

[11] Maitima, J.M., 2001. Guide to field methods for comparative site analysis for the land use hange, impacts and dynamics (LUCID), Project Working Paper Series Number15, International Livestock Research Institute, Nairobi, Kenya,

[12] Mesfin Abera. 2004. The Effect of different Soil Conservation Structures on some properties of Soil and Crop Yield in Dalocha Woreda of Southen Nations Nationaltities and Peoples Region, M. Sc. Thesis. School of Graduate Studies, Alemaya University, Ethiopia.

[13] Mihrete Getnet. 2014. Effect of Soil Conservation Structures on some Physico-Chemical properties of Soil and Crop Yield in Simada District, South Gonder Zone, M. Sc. Thesis. School of Graduate Studies, Haramaya University, Ethiopia.

[14] Sahelemedhin, S. and Taye, B. 2000. Procedures for soil and plant analysis, Technical Paper No. 74, National Soil Research Center, Ethiopia Agricultural Research Organization, Addi Ababa, Ethiopia, p. 110

[15] SPSS Inc (2003) SPSS for Window Brief Guide. Stoorvogel, J.J and Smalling, E.M.A. 1990. Assessment of soil Nutrient depletion in Sub-Saharan Africa: 1983-2000.Vol.1. Main Report, 2nd ed. Wageningen, the Winand Staring

[16] Tadesse, G. 2001. Land degradation: A challenge to Ethiopia. Journal of Environmental Management, 27(6):815-824 Tan HK (1996). Soil Sampling, Preparation and Analysis. MarcelDekker, Inc., New York.

[17] Worku Hailu,2009. Effects of agro-ecological land use succession on soil properties in the Chemoga watershed, Blue Nile basin, Ethiopia. *Geoderma.* 111: 85-98.

Citation: *Meseret Melilo and Dawit Dalga "Farmers` Perception of Soil and Water Conservation Measures on Rehabilitation of Two Watersheds in Humbo District, Southern Ethiopia" International Journal of Research in Agriculture and Forestry, 6(2),pp 8-17*

Copyright: *©2019 Dawit Dalga . This is an open-access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.*