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Awareness and Views of Farming Households Regarding Land Resource Degradation and Conservation- the Case of Bule Hora, Ethiopia (2013).

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Abstract
Identification of land degradation and its conservation techniques is of interest to and knowledge of land users. Hence, decisions to conserve land resources are largely determined by farmers' knowledge of the problems and perceived benefits of conservation intervention. However, these issues have received little attention in conservation planning. Hence, past efforts did not bring significant change. Pursuing participatory approach has been strongly recommended. The objective of this study is to assess awareness and views of farmers' regarding land resource degradation and conservation. Formal household survey questionnaires, key informants' interview, field observation, official records and informal interview were used to generate data. The results show that all interviewed farmers have reported the existence of soil erosion and deforestation problems and the majority prioritized conservation of these resources first among others. Unlike the causes of deforestation, majority of the farmers didn't aware most of the causes of soil erosion. Farmers also have noticed different consequences of soil erosion with Declining of soil fertility (64%) and farm land productivity (59%) were ranked from firs to second by the majority. 92% of the farmers believed that soil erosion could be reduced and they used a range of practices but not widespread due to some technological, institutional and household attributes. More than 66% of the respondents also aware increasing of fire wood price, frequency of drought, temperature and wind velocity, as well as land productivity decline and Loss of water sources as the consequence of deforestation. Also, respondents have favorable attitude towards land degradation and conservation in that the majority were agreed and disagreed to positive and negative likert type scale statements respectively. We believe our findings could have a profound implication on policy issues related to genuine participatory land conservation and to rehabilitate the degraded land.
Keywords: farmers' awareness, farmers' view, land resource degradation and conservation.

1. Introduction

Land degradation has been defined as a process of soil degradation through water erosion and loss of vegetation cover leading to reduced productivity of the land in densely settled or exploitatively used regions [1]. Ethiopia is one of the most severely affected countries where deforestation, soil erosion and degradation of agricultural land are very common and serious problems. It was estimated that 2 million hectares of lands have been severely degraded in Ethiopian highlands[2]. The country has lost over 1.5 billion tons of topsoil from these highlands by erosion annually[3].

Deforestation is also very series problem. Uncontrolled encroachment and clearing of forest land has been also on process and will continue until management plans are put in place which balance the conservation and sustainable production[4]. Ethiopia has lost 14 percent of its forest cover in between 1990 and 2005[5]. Forest in general has shrunk from covering 65 percent to 2.2 percent of the country and 90 percent to 5.6 percent of the highlands [6]. It was also estimated extent of deforestation from 80 000 to 200,000 hectares per year mainly due to expansion of rain fed agriculture [7].

Land degradation and the consequent productivity reduction, has reduced the once prosperous communities to poverty and food insecurity. More specifically, cost of land degrading in developing countries vary from less than1% to more than 9% of their respective GNP with estimate of Ethiopia being 6% to 9% GNP[8]. However, not all areas of the country are equally suffering. Both the extent and severity of the problem manifest spatial variations depending on difference in relief, ecology, rainfall, land use, land cover and soil types[1].

Effective control of soil erosion is a critical component of natural resource management when the aim is to achieve sustainable agriculture and acceptable ecosystem integrity [9, 10]. Soil conservation measures that have been used to date include the construction of terraces, soil bunds, micro-basins, the protection of regenerating natural vegetation, and tree planting. Despite the efforts that have been made to conserve as well as restore soil fertility of arable lands, soil degradation is proceeding so fast nowadays that it can constraint the hope of achieving sustainable agriculture and economic development strategy of Ethiopia in the foreseeable future. Farmers are rarely consulted about their specific circumstances and priority problems before applying large scale land resources conservation program [11]. However, Land degradation is closely aligned with the

interests of farmers so that early identification of risk-prone areas and land management techniques is of interest to land user [12]. Farmers' perception of land degradation by soil erosion is a key social factor that is important in deciding options for controlling soil losses [13]. Under the current conditions, soil and water conservation interventions should consider farmers' conservation knowledge and practices to improve the possibility of adoption of the recommendations [14]. Bottom-top approach by understanding local issues on the basis of local knowledge is a key component of successful SWC programs [15]. These literatures highlight the need to further investigation in different specific localities.

The general objective of this study is to assess awareness and views of farming households regarding land resource degradation and conservation. The specific objectives are:

1. To assess farmers' awareness of land resource degradation and conservation.
2. To assess farmers' attitude regarding land resource degradation and conservation.
3. To identify the barriers of land resource conservation.
4. To find out efforts made by the local authorities and Farmers in conserving land resource.

The term land resource and land resource conservation is a wide concept that includes different aspects of the environment, social, economic, political and cultural aspects of society. Thus, by considering the broad aspect of the concept, the researcher tries to focus on farmers' awareness and views regarding degradation and conservation of one abiotic resources i.e. soil and one biotic resources i.e. forest.

2. Methodology

2.1. Description of the Study Area

Bule Hora woreda is located at 5°35′ N Latitude and 38°15′E Longitude. It is located at the north direction of Borena Zone. The capital center of the woreda is found at 467 Km from Addis Ababa to the south direction being crossed by Addis Ababa Moyale international road. Area of the woreda is 132,703.19 ha. Topography of the woreda is undulating with plain, mountain, valley and low plateaus. Agro – climatically, about 55% of the total area of the district falls under Wayina dega. The remaining 11% & 34% falls under dega & kola Agro-climatic zones respectively. There are two major rainy seasons namely Spring & Autumn in which spring is the major crop season. Red and Brown soil are covering the largest part of the woreda. The district has varieties of vegetation ranging from high forest to totally uncovered Areas. Natural and plantation forest covers 18,413ha and 1567 ha respectively. Regarding the energy source, Firewood, Crop residue, Charcoal, Kerosene and Dung are 1st, 2nd, 3rd, 4th and 5th source of energy respectively in order of their Supply both in rural and urban part of the woreda.

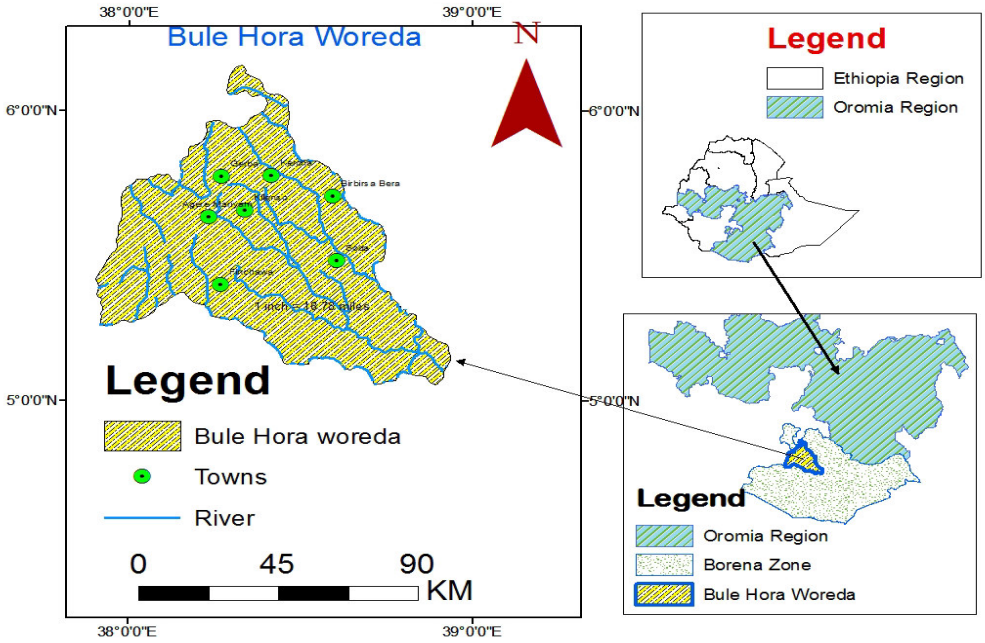

Figure-1 Map of the study area , Source: Ethio-GIS and CSA, 2007

2.2. Research design, Data Source, data gathering tools.

To describe and summarize responses of the sample farmers, descriptive statistical analysis was used. Among 45 peasant associations (PAs), Buleqagna, Denbelahara and Cherigololcha were selected for the samples. The totals of 100 sample households were selected proportionally on the basis of place of residence and gender using

stratified and purposive sampling. Data was collected from both primary and secondary source. Primary data source were farmers. woreda's land resource conservation experts and development agents. Secondary data source includes official records and project reports. Questionnaires survey, Key informants interview and Field observation were methods of data gathering. To increase validity and reliability of questionnaire, its initial version was reviewed by colleagues, Care was given to avoid sequential bias in responses, questionnaire was Pre-tested and interview began with a brief overview of the purpose.

2.3. Method of data Analysis

Both quantitative and qualitative methods of data analysis were employed. Qualitative data which was generated through secondary sources, interview and field observation was analyzed qualitatively throughout the analysis. Quantitative data was interred in to Statistical package for Social Sciences (SPSS, version 16) and analyzed by using descriptive statistics.

3. Results and Discussion

3.1. Demographic and Socio-Economic Characteristics of Sample farmers

Sample farmers were found in adulthood age as their mean age is about 40. They are characterized by large family size with the average size is 10.4 and standard deviation is 5.025. Their activities were associated with occupations such as farming, animal husbandry, and mining with limited education. Their average land holding size is 2.3 hectare. Their average holding of cattle, sheep and goat, and Pack animal are 7, 3.03 and 0.97 respectively which were reliant on heavily overgrazed lands. As illustrated in figure 2, the area was generally food insecured. Due to food insecurity, farmers could be forced to mine soils and to get rid of trees.

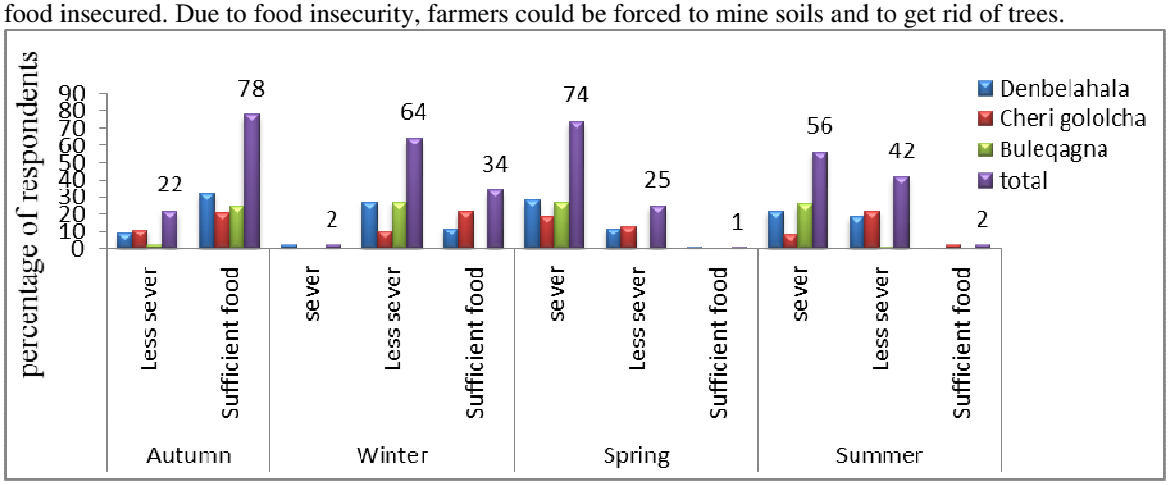

Figure- 2. Level of food shortage across sample PAs

3.2. Farmers' priority

Five environmental issues were presented to farmers to identify their priority of the issue that need relatively more attentions by the Government at present time. As indicated in figure 3, the majority (51%) replied that Land resource conservation needs relatively much attention over others.

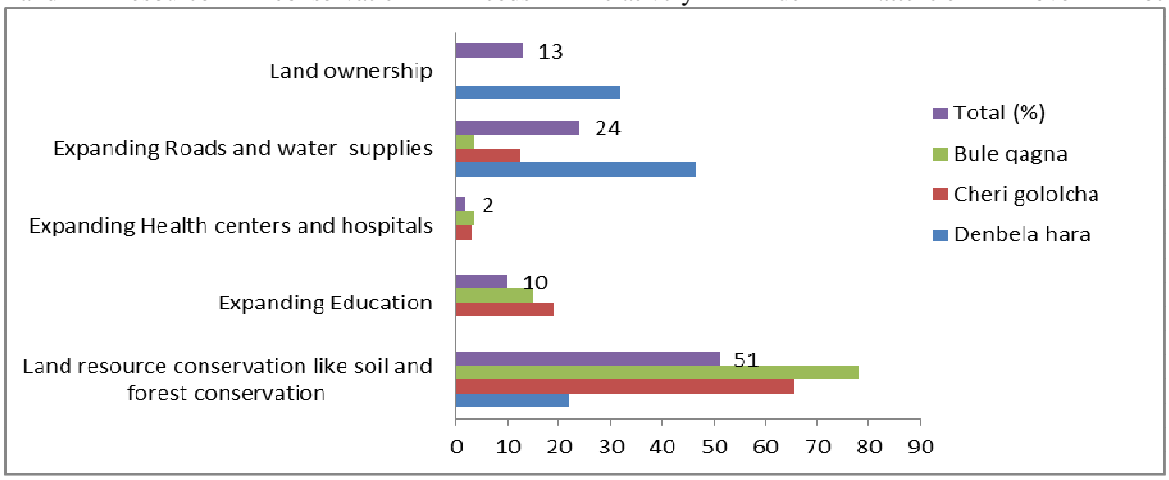

Figure 3 -Households'' response on issue which need relatively more attention by Government at the current time.

3.3. Farmers' awareness of soil erosion and conservation practices

3.3.1. Farmers' familiarity of soil erosion, its trend and level.

All of the interviewed farmers have noticed the existence of soil erosion. Some farmers also mentioned that they perceived soil erosion mostly when rills and gullies were appeared. But, Soil erosion can also exist without visible signs. Hence, education concerning different indicators of soil erosion existence and its impact would benefit farmers much to perceive and reverse the problem. The majority of respondents rated level of soil erosion from medium to high and as it has increasing trend over the last five years.

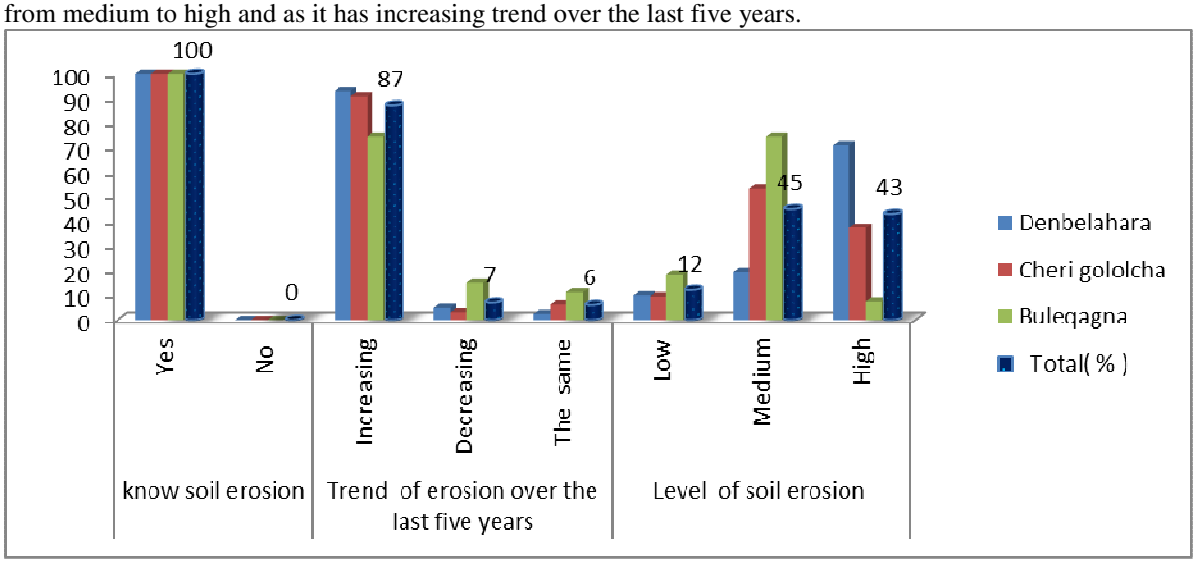

Figure- 4 Distribution of farming households by their perception to existence of soil erosion, its trend and level

3.3.2. Causes of soil erosion

There are combinations of human and natural causes of soil erosion which results in a lowering of the capability of the land for a set of possible uses. With the exception of over grazing (53%), rugged topography (63%), deforestation (100%) and absence of soil conservation measures (82%), most of the causes were not recognized by the majority of the respondents which suggests the need for awareness creation among them.

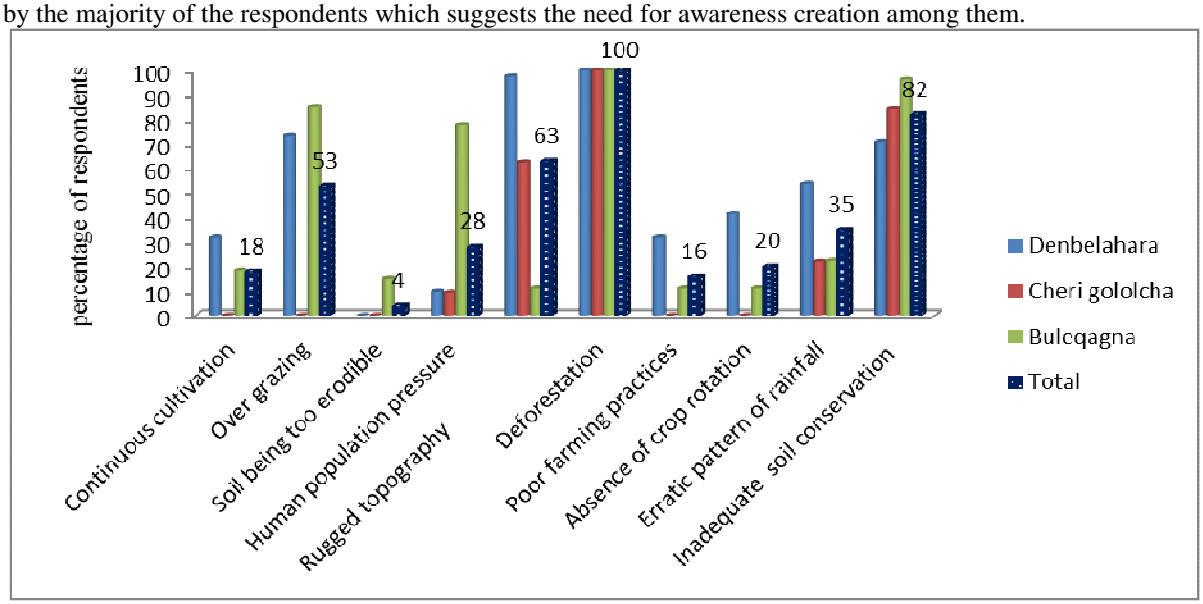

Figure-5. Distribution of farming households by their awareness about causes of soil erosion

3.3.3. Consequence of soil erosion

Cultivation of land without adequate soil conservation measures has resulted in soil impoverishment in many parts of Ethiopia through soil erosion and, in some cases, total loss of agricultural land. As indicated in table 1, declining of soil fertility, declining of farm land productivity, gully formation, increase the requirement for fertilizers, difficulty for farming, landlessness and migration were listed in their order of perceived severity by the interviewee with mean rank of 2.59, 2.77, 3.15, 4.04, 4.61, 4.64 and 6.17 respectively. Generally, all of the respondents had good consciousness about effect of soil erosion but with varied priorities.

Table-1. Farmers' perception about Consequence of soil erosion

Consequences	Rank							Mean rank
	1st	2nd	3rd	4th	5th	6th	7th	
Declining of soil fertility	35.0	29.0	9.0	7.0	11.0	7.0	2.0	2.59
Increase fertilizers requirement	4.0	8.0	47.0	6.0	9.0	8.0	18.0	4.04
Declining of farm land productivity	26.0	33.0	12.0	10.	10.	4.0	5.0	2.77
Gully formation	23.0	11.0	10.0	45.0	8.0	1.0	2.0	3.15
Landlessness due to soil removal	10.0	6.0	8.0	16.	12.	42.0	6.0	4.64
Difficulty for farming	1.0	12.0	6.0	14.	44.	19.0	4.0	4.61
Migration	1.0	1.0	9.0	2.0	6.0	18.0	63.0	6.17

3. 4. Farmers' familiarity of deforestation, its intensity, causes and consequences

Deforestation is a serious problem in Ethiopia which has led to a decline in vegetation cover over time, soil erosion, destruction of wildlife and their habitat. All the interviewed farmers aware deforestation as the problem in their locality. Even though, differences were observed among farmers' perception to the level of deforestation across sample PAs, 42% and 40% of the respondents rated the level of the problem as high and medium respectively (see Table 2). Land covered with a closed and open stand of trees were deforested due to Cutting and Burning of forest land to expand agricultural land (82%), consumption of fuel wood for local use and charcoal for urban use and other necessities(97%); Expansion of Settlements(77%) and Expansion of grazing land (73%). On the whole, respondents aware drivers of deforestation very well perhaps because one cause seldom act independently of other causes and in many cases follow a progression. Decreased land productivity, increased soil erosion, increase in money to fire wood, increase in frequency of drought, loss of water sources, increase in temperature and increase in wind velocity were replied as the consequence of deforestation by 88%, 93%, 72%, 95%, 67% , 87% and 67% of the respondents respectively(see figure-6 next).

Table 2. Farmers' familiarity of deforestation, its intensity and causes.

Items	category	Percentage of respondents(N=100)			Total (%)
		Denbela hara	Cheri gololcha	Bule qagna	
level	High	75.6	21.9	14.8	42.0
	medium	14.6	62.5	51.9	40.0
	low	9.8	15.6	33.3	18.0
	Total	100.0	100.0	100.0	100.0
Causes	Cutting and Burning of forest land to expand agricultural land	97.6	53.1	92.6	82.0
	Human consumption for fuel and other necessities	100.0	96.9	92.6	97.0
	Expansion of grazing land and fodder	97.6	31.2	85.2	73.0
	Expansion Settlements	97.6	37.5	92.6	77.0

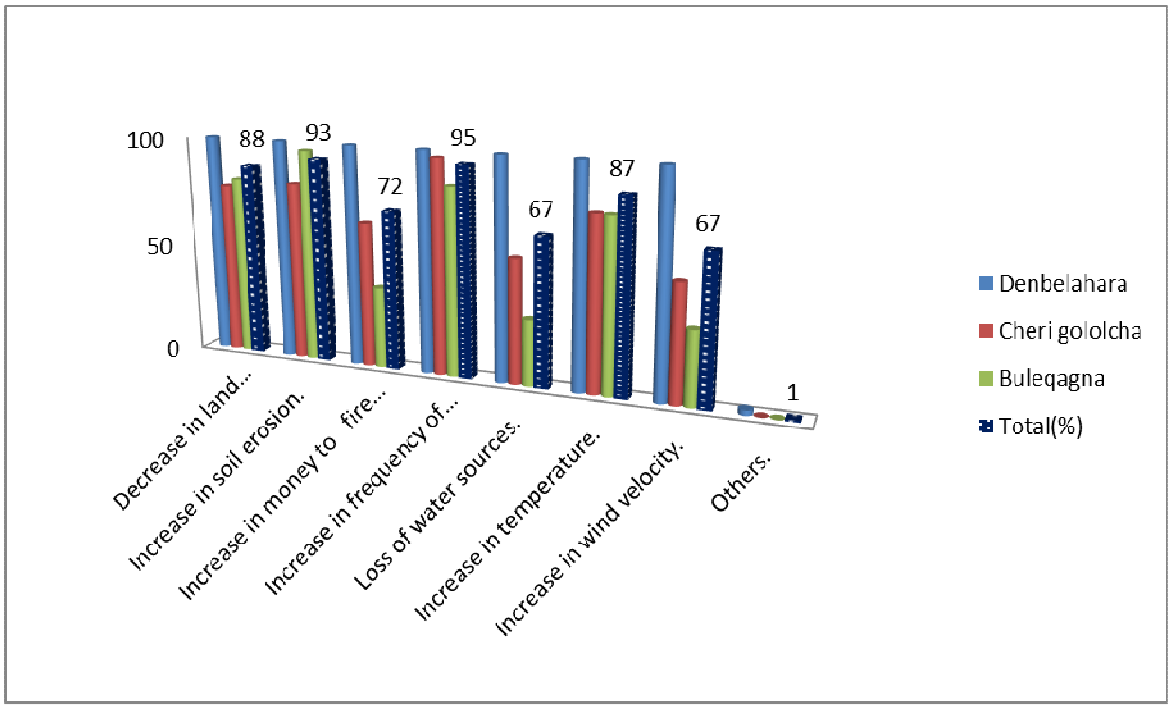

Figure-6. Farmers' awareness on consequence of deforestation

3.5. Land resource conservation measures

Cropland and rangeland in the study area have undergone degradation. Traditional ways of farming can no longer fulfill the increased demand for food of the growing population. Soil also can simply not sustain farming with short or no fallow period. Inadequate land management is one of the main causes for land degradation which is contributing to decline of productivity and sustainability of agriculture. Even though unsustainable situation must be changed with Sound SWC practices and the majority of respondents (92%) believed that soil erosion could be reduced, most SWC measures were not implemented at a great to a fair extent (see table 3). Contour plowing, organic manure/dung and mixed cropping were practiced by 85%, 72% and 53% of respondents from a great to a fair extent. Among different conservation techniques mentioned in table 6, tree planting, making water ways, check dam, grass planting on water ways, micro basin and terraces are the newly introduced measures in the study area and were not practiced widely as compared with indigenous techniques. This may be because, the target of introduced practice was directed to districts with different erosion intensity rather than areas with the greatest need (see figure 7&8).

Figure-7. Bad land but without conservation structure

Figure-8. Good land but with conservation structure

Table-3. Farmers' perception to soil erosion minimization and conservation practices

Item	Option	Percentage of respondents within PAs			Total	
		Denbela hara	Cheri gololcha	Buleqagna	Freq	Percent
Soil erosion could be minimized	Yes	87.8	93.8	96.3	92	92.0
	No	12.2	6.2	3.7	8	8.0
	Total	100.0	100.0	100.0	100	100.0

SWC Practices	A great extent♯	A fair extent♯	Not much♯	Never♯	Mean Score	Rank By score
Fallowing	5.0	33.0	31.0	31.0	2.12	5
Terracing	00	12.0	23.0	65.0	1.27	13
Check dam	1.0	16.0	15.0	68.0	1.5	10
Micro bansine	00	13.0	13.0	74.0	1.39	12
Mulching	5.0	17.0	19.0	59.0	1.68	8
Contour plowing	58.0	27.0	12.0	3.0	3.4	1
Rotation grazing	3.0	31.0	31.0	35.0	2.02	7
Tree planting	00	27.0	56.0	17.0	2.1	6
Crop rotation	19.0	33.0	34.0	14.0	2.57	3
Making water ways	3.0	18.0	16.0	63.0	1.61	9
Organic manure/dung	19.0	53.0	20.0	8.0	2.83	2
Mixed cropping	11.0	42.0	23.0	24.0	2.4	4
Grass planting on water ways	3.0	8.0	18.0	71	1.43	11

♯ represents Scale: A great extent =4, A fair Amount=3, Not much=2 and Never=1.

The woreda officials' were also asked their roles in conserving land resources. The following roles were mentioned.

- ✓ Developing plan of natural resource conservation mainly soil, water and plants
- ✓ Assign three DAs in each PAs
- ✓ Organizing farmers in different teams for the purpose of conserving land. The common farmers' teams organized by woreda officials were two. The first teams was the one to five teams in which one role model farmer was coordinating the other five farmers in each groups for conserving land recourses. The second teams were formed by taking the leaders from the first teams and has 25 to 30 members who were participating jointly to conserve their land.
- ✓ Assigning regular contact person from the role model farmers to reinforce communication.
- ✓ They provide training on soil, forest and water conservation.
- ✓ Reporting works done in area of land conservation for the concerned body.

3.6. Factors affecting land resource conservation

There are different factors affecting farmers' soil and water conservation practices. Major barrier related to households' attributes was Lack of awareness about amount of soil loss per year (38%) followed by Shortage of labor (25%). Among institutional factors, low credit availability (78%) and applying new SWC technologies before consulting farmers (82%) were mentioned by the majority. In addition, Presence of different drawback associated with introduced SWC measures such as narrowing land, inconvenient for tillage and damage of structures by rain or livestock were the other limiting factor explained by the majority (51%). It was also observed that infrastructure and access to markets were not good. If a good road system and competitively priced transport provide access to urban markets with high demand crops, crop values will increase, resulting in higher incentives to conserve land for long-term gain.

Table- 4. Households' perception about factors affecting land resource conservation practices

Item	Options	Percentage of respondents			Total %
		Denbela hara	Cheri gololcha	Bule qagna	
Main barrier related to households' attributes	Shortage of labor force	4.9	46.9	29.6	25.0
	Lack of time	00	15.6	3.7	6.0
	Lack of interest	2.4	3.1	3.7	3.0
	Lack of awareness about amount of soil loss per year	53.7	3.1	55.6	38.0
	There is no hindrance factor	14.6	31.2	00	16.0
Institutional attributes	Land tenure insecurity	24.4	00	7.4	12.0
	Unavailability of DA when farmers seek advice	12.2	50.0	7.4	23.0
	Low Credit availability	97.6	71.9	55.6	78.0
	Introduce new technology before consulting farmers	97.6	53.1	92.6	82.0
SWC technological attributes	Presence of different problems associated with introduced SWC measures	26.8	65.6	70.4	49.0

3.7. Farmers' attitude towards land degradation and conservation

To assess the attitude of farmers about land degradation and conservation, likert type items were provided to nominate whether they agreed, undecided or disagreed. The scale goes from 1 (unfavorable attitude) to 3 (favorable attitude) for a positive statement and vice versa for negative statement. Majority of the respondents agreed and disagreed to positive and negative statements respectively. With the exception of two items (4&5) in table 5 below, the mean score of respondents to the rest of the items are between 2.55 and 2.78 which are approaching to the highest scale (3) and hence most of respondents have favorable attitude to their land.

Table-5. Percentage and mean score of respondents' attitude about land degradation and conservation.

Statements making up the attitude scale	Total Percentage of respondents			
	A	UD	DA	Mean score
1. Soil erosion is not the threat in Bule Hora.	13.0	4.0	83.0	2.70
2. The community should not be concerned about deforestation as far as firewood is needed.	11.0	11.0	78.0	2.67
3. It is unnecessary to think for the coming generation if utilization of soil and forest satisfies the present generation.	12.0	9.0	79.0	2.67
4. Energy uses of forest are important than its aesthetic value.	28.3	14.1	57.6	2.29
5. Protecting forest is preferable than expanding farmlands.	54.0	14.0	32.0	2.22
6. There is no problem of water shortage in Bule Hora woreda.	14.0	10.0	76.0	2.62
7. It is wastage of time to control soil erosion.	9.0	10.0	81	2.72
8. Cash or food should be given to individuals if they are participating in SWC activities.	16.0	13.0	71	2.55
9. Land resource conservation doesn't concern me.	5.0	12.0	83	2.78
10. The community should not be accountable to conserve their land as they have less capability.	14.0	11.0	75	2.61
11. Government is more responsible to manage forest than local communities.	7.0	13.0	80	2.73
12.There is no need to plant trees as it is time consuming	9.0	10.0	81	2.72
13. Mixed cropping can reduce soil erosion.	78.0	12.0	10	2.68

Key: A-Agree, UD-undecided and D-Disagree

3.8. Contribution and weaknesses of the study

3.8. 1. Contribution

Since unwise utilization of land resource and many other factors related with human activities causes environmental problems like soil erosion, deforestation and water loss. Sustainability of human life, economy and development will face some critical challenges in the near future unless and other wise human beings have aware of and positive attitude in conserving resources.

The findings of this study will have some contributions in narrowing the knowledge gap. Some of them includes: It helps agricultural experts of the woreda to see farmers' knowledge and views on land degradation and to act accordingly. It also helps policy makers to develop evidence based extension and development programs. It will contribute to the body of literature in the field of land degradation and conservation as well as to make good use of farmers' knowledge in the area. Finally, It provides base line information regarding farmers' awareness and views towards soil and forest degradation as well as conservation in the study area that would be useful for future management planning.

3.8.2. Weaknesses

Any research could not be free from limitations but the degree of limitations could varies. Statistical techniques, regression model, is not used in this study to see significance of different factors affecting land resource conservation

4. Conclusion

This paper addresses the issue of land resource degradation and conservation with the aim of assessing farmers' awareness and views. To attain this intention, descriptive statistical analysis was used. The results show that all interviewed farmers have noticed the existence of soil erosion and deforestation problems and the majority prioritized conservation of these resources first among others. The majority of farmers said that land degradation in the form of soil erosion and deforestation is increasing and the levels of these problems were rated from medium to high. Farmers had relatively better awareness of the causes and consequences of deforestation than soil erosion. Different land resource conservation measures were practice in the area but not widespread. Particularly, introduced conservation measures were not common and there were no result show sites before disseminating new technologies to the farmers. It was also found that some technological, institutional and household factors were limiting farmers' active participation in land resource conservation. The analysis also shows that the respondents have favorable attitude towards land degradation and conservation in that the majority were generally agreed and disagreed to positive and negative Likert type scale statements respectively. We believe that this study could contribute to policy interventions for land conservation that take into account farmer awareness and views of the problem, their priorities and the conditions that influence their decisions. This analysis also contributes to the body of literature in the field of land degradation and conservation as well as to make good use of farmers' knowledge in the area. The findings could be extended to other areas with similar agro-ecological and socio-economic settings. As it is obvious that land degradation and conservation is complex that is linked to different physical, social, economic and institutional systems, further studies on the issue should continue to bring the magnitude of the problem to the community and high level policy makers in order to rehabilitate the degraded natural resources.

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