

# Awareness of Agro Pastoralists about Land Degradation: A Case Study of JIJIGA Zone, AW-BARE Woreda in Ethiopian Somali Regional State

Alemtsehay Mokonen, R. Uttama Reddy and Awol Akmel

**Abstract**— Land degradation has been a major global issue during the 20<sup>th</sup> century and will remain high on the international agenda in the 21<sup>st</sup> century. This study is aimed at investigating agro pastoralist's awareness about land degradation. The subjects of this study were agro-pastoralists purposively selected from Aw-bare woreda. As tools of data collection, questionnaire, interviews and focus group discussion were employed. With the use of structured questionnaire and interview schedule, a total of 120 agro pastoralists were surveyed for the study. All the respondents are aware of soil erosion and deforestation. The assessment of agro pastoralist's awareness in the consequence of land degradation shows that majority of the agro pastoralists in the study area are aware of loss of agriculture production. They are also aware of increased requirement of fertilizers, difficulty of farming and loss in livestock productivity. In addition, landlessness, migration and poverty and economic backwardness were also considered as a consequence of land degradation. The awareness indicated organic manure, mixed cropping, closure of grazing land, terracing and crop rotation as land management practices to reduce land degradation. Based on the findings of this study, it is recommended that there is a need of modifying educational/training programs which was provided for agro pastoralists by considering the existing knowledge and practices in a particular area.

**Index Terms**— Land degradation, agro-pastoralists, awareness, land management practices, Ethiopia

## I. INTRODUCTION

In the drier parts of Africa, millions of hectares of grazing land and rangeland are threatened with degradation- in the arid north, the semi-arid south, and the Sudano-Sahelian countries and in the drier parts of Cameroon, Ethiopia, Kenya and Nigeria. Africa's forests and woodlands are also being depleted, threatening one of the continent's most important resources [1]. In view of the vast extent of grasslands and rangelands and the degraded nature of large areas of these

**Manuscript received March 29, 2014.**

**Alemtsehay Mokonnen**, Department of Geography and Environmental Studies, College of Social sciences and Humanities, Haramaya University, Dire dawa, Ethiopia

**R. Uttama Reddy**, Department of Geography and Environmental Studies, College of Social sciences and Humanities, Haramaya University, Dire dawa, Ethiopia

**Awol Akmel**, Department of Geography and Environmental Studies, College of Social sciences and Humanities, Haramaya University, Dire dawa, Ethiopia.

systems, the potential to sequester carbon through improved management is significant [2].

In Ethiopia, natural resource degradation has been going on for centuries in different parts of the country [3]. Land degradation processes such as land and soil degradation are as old as human settlements and land use history. However, population pressure in many areas has accelerated these processes. Pressure on arable land is growing forcing people to convert more marginal lands to arable land and this leads to further soil erosion. On the other hand, former areas used as grazing land are converted to arable lands. Because forest resources are very few and further decreasing, people are forced to use animal dung as a fuel wood substitute organic matter is thus not brought back to the soil [4].

The Somali Regional State (SRS) is one of the predominantly pastoral and agro-pastoral areas in Ethiopia. The production system of the Region is divided into three categories: large nomadic pastoralist, livestock-based mixed farming and crop-based agro-pastoralist [5]. According to [6], most of the population of the *Woreda* is agro-pastoralist from which about 60% of households' income is generated from crop-production and livestock rearing and the remaining 40% comes from livestock rearing. The present study was carried out to assess agro-pastoral's awareness towards land degradation and land management practices.

## II. RESEARCH METHODOLOGY

### A. Study Area

Awbare is one of the six *woredas* of Jijiga Zone of SRS. The *Woreda* is located in the Northeastern corner of the Region bordering Northern Somalia and lies from 9° 18' and 10° 12' N. Latitude and 42° 37' and 43° 26' E. Longitude. Awbare town, the administrative center of the *Woreda* and the fourth largest in the region, is located 74km Northeast of Jijiga just 5km of the international borderline. It is bounded by Shinile Zone in the Northwest, Jijiga *Woreda* in the South, Kebribeyah *Woreda* of Jijiga Zone in Southeast and Northern Somalia in the Northeast, East and Southeast [7].

### B. Research Design

The study followed quantitative and qualitative research design. Descriptive survey method becomes useful when the purpose of the research is to picture of the current

situations. Three steps procedures were used to select the sample households in the study *Woreda*. First, on the basis of the distance from the market, there are 55 agro-pastoral *kebeles* in the *woreda*. The 55 agro-pastoral *kebeles* were stratified into two: *kebeles* near to market (21) and those *kebeles* far from market (34). Secondly, using lottery method of simple random sampling technique, three *kebeles* were selected from the first category and five *kebeles* were selected from the second category (a total of eight *kebeles* having a total of 730HHs). Finally, 120 respondents were selected from eight *kebeles*. Households to be selected from each *kebele* were fixed by considering number of households in each *Kebele*. This means that probability proportional sampling technique was employed. So, that the sample size was fixed as 120 out of which eight *kebeles* chairperson and two extension workers were involved. Chairpersons and extension workers were selected by available sampling techniques. In this study, both, primary and secondary data were collected through questionnaire, interview and focus group discussion. The data were summarized and analyzed employing different methods.

### III. RESULTS AND DISCUSSION

#### *Awareness about the Causes of Land Degradation*

**Table 1** Percentage Distribution of Respondents Awareness in Causes of Land Degradation

S/N	Causes	Aware		Not aware	
		f	%	f	%
1	Soil erosion	120	100	–	–
2	Deforestation	120	100	–	–
3	Overgrazing	102	85.0	18	15.0
4	Poor farming practices	95	79.2	25	20.8
5	Over population	89	74.2	31	25.8
6	Over cultivation	86	71.7	34	28.3
7	Rugged topography	84	70.0	36	30.0
8	Lack of fertilizers	62	51.7	58	48.3
9	Planting eucalyptus tree	42	35.0	78	65.0
10	Absence of crop rotation	38	31.7	82	68.3

*Source:- Field Survey, 2013*

Table 1 shows respondents' awareness of the causes for land degradation problems. The result indicates that all of the respondents were aware of soil erosion and deforestation as causes of land degradation. Majority of the agro-pastoralist responded that overgrazing (85%) is among the cause of land degradation. These finding is supported by the view of [8] i.e., livestock density and grazing patterns lead to overgrazing, which is one of the major causes of land degradation. The

impacts of overgrazing include loss of vegetative cover and associated soil erosion in the most extreme cases, with negative impacts on wild grassland species as well as inland waterways, which can suffer from sedimentation.

The result also indicated that other important causes of land degradation are poor farming practice (79.2%), over population (74.2%), and over cultivation (71.7%). This finding supported by the view of [9] indicated that continuous cultivation of the land without any improvement in land management and farming practice has led to severe soil erosion. It is widely believed that land degradation is mainly caused by over cultivation and rugged topography (70%) as causes of land degradation. Half of the respondents (51.7%) indicate that lack of fertilizers causes land degradation. Planting of eucalyptus tree and absence of crop rotation were considered by one third of the respondents as causes of land degradation problems.

#### *Awareness about the Consequences of Land Degradation*

**Table 2** Percentage Distribution of Respondents Awareness as the Consequence of land degradation

S/N	Consequences	Aware		Not aware	
		f	%	f	%
1	Loss of agricultural production	118	98.3	2	1.7
2	Decline in soil fertility	112	93.3	8	6.7
3	Difficulty for farming	110	91.7	10	8.3
4	Loss in livestock productivity	101	84.2	19	15.8
5	Desertification	67	55.8	53	44.2
6	Drought & famine	61	50.8	59	49.2
7	Landlessness	14	11.7	106	88.3
8	Migration	12	10	108	90
9	Poverty & economic backwardness	11	9.2	109	90.8

*Source:- Field Survey, 2013*

Table 2 shows the respondents awareness about the consequence of land degradation. The results indicate that 98.3% of the respondents were aware of loss of agricultural productivity results from land degradation. This finding is supported by [10] which state that land degradation effects on agricultural productivity are manifested through their impacts on both, the average and variance of yield, as well as the total factor productivity of agricultural production.

The majority of the respondents (93.3%) were aware of an increase for the requirement of fertilizer (93.3%), difficulty for farming (91.7%) and loss in livestock productivity (84.2%). Desertification and drought and famine also supported by 55.8% and 50.8% of the respondents as a consequence of land degradation, respectively. However, landlessness, migration and, poverty and economic backwardness were not indicated by most of the farmers as it result from land degradation.

Awareness of Land Management Practices

**Table 3** Percentage Distribution of Respondents in their Awareness of Land Management Practices

S/N	Practices	Aware		Not aware	
		f	%	f	%
1	Mixed cropping	110	91.7	10	8.3
2	Organic manure application	113	94.2	7	5.8
3	Closure of grazing land	111	92.5	9	7.5
4	Terracing	109	90.8	11	9.2
5	Crop rotation	103	85.8	17	14.2
6	Making waterways	101	84.2	19	15.8
7	Mulching	100	83.3	20	16.7
8	Tree planting	100	83.3	20	16.7
9	Rotational grazing	97	80.8	23	19.2
10	Contour plowing	53	44.2	67	55.8
11	Fallowing	49	40.8	71	59.2

Source:- Field Survey ,2013

Table 3 shows the respondents awareness of land management practices. The result indicates that 94.2% of the respondents' were aware of the application of organic manure. Most of the respondents were aware of the importance of mixed cropping, closure of grazing land, terracing, crop rotation, making water ways, mulching, tree planting and rotational grazing, which accounts 91.7%, 92.5%, 90.8%, 87.8%, 84.2%, 83.3%, 83.3%, and 80.8% respectively. This finding supported by the view of [11]first of all they are not mutually exclusive, as they often

complement each other, and also some of the measures might have several features from the different types of soil and water conservation. Contour plowing, fallowing, crop rotation; sowing date, sowing rate, manuring, mixed and strip cropping, trash line, hoe practice, construction of bunds and control of grazing can be considered as agronomic measures. On the other hand grass strips, stone bunds, and traditional ditches, cut off drains and check dams can also be considered as structural measures.

Respondents' Use of Land Management Practices

**Table 4** Respondents' Identification land management practices in the study area and their extent of use of these practices

S/No	Items	Responses								Mean
		Very often		Often		Rarely		Never		
		f	%	f	%	f	%	f	%	
1	Mixed cropping	107	89.2	9	7.5	4	3.3	-	-	3.86
2	Organic manure application	82	68.3	12	10	17	14.2	9	7.5	3.39
3	Closure of grazing land	82	68.3	15	12.5	-	-	23	19.2	3.30
4	Rotational grazing	79	65.8	6	5	3	2.5	32	26.7	3.10
5	Tree planting	75	62.5	11	9.2	21	17.5	13	10.8	3.23
6	Making waterways	69	57.5	20	16.7	17	14.2	14	11.7	3.20
7	Mulching	62	51.7	10	8.3	29	24.2	19	18.3	2.96
8	Crop rotation	60	50	29	24.2	16	13.3	15	12.5	3.12
9	Fallowing	54	45	13	10.8	3	2.5	50	41.7	2.59
10	Terracing	42	35	14	11.7	12	10	52	43.3	2.38
11	Contour plowing	11	9.2	10	8.3	14	11.7	85	70.8	1.56

Source:- Field Survey, 2013 Likert-type scale:- 4-Very often 3-Often 2-Rarely 1-Never

Table 4 shows the extent of use of different land management practices by the respondents. The result shows that mixed cropping (mean =3.86), organic manure application (mean=3.39), closure of grazing land (mean =3.30), rotational grazing (mean=3.10), tree planting (mean=3.23), making water ways (mean =3.20), mulching (mean =2.96) and crop rotation (mean=3.12) were most widely used land management practices by the respondents in the study area. While the practices like Fallowing (mean =2.59), terracing

(mean=2.38) and contour plowing (mean=1.5) were not much used land management practices.

Respondents Attitude towards Land Management Practices

A Likert – type attitude scale was used to measure the attitude of agro-pastoralist' about land management practices. The scale goes from 1 (unfavorable attitude) to 5 (favorable attitude). Table5 presents the statement making up attitude scale by code.

**Table 5 Summary of attitude towards land management practices**

S/No	Items	Responses										Mean
		Strongly Agree		Agree		Undecided		Disagree		Strongly Disagree		
		f	%	f	%	f	%	f	%	f	%	
1	X1	68	56.7	40	33.3	7	5.8	5	4.2	—	—	4.42
2	X2	73	60.8	36	30	2	1.7	8	6.7	1	0.8	4.43
3	X3	49	40.8	61	50.8	—	—	6	5	4	3.3	4.21
4	X4	23	19.2	27	22.5	5	4.2	40	33.3	25	20.8	2.86
5	X5	6	5.0	7	5.8	9	7.5	44	36.7	54	45	1.89
6	X6	53	41.2	59	49.2	6	5	2	1.7	—	—	4.36
7	X7	25	20.8	11	9.2	22	18.3	42	35	20	16.7	2.83
8	X8	17	14.2	24	20	28	23.3	29	24.2	22	18.3	2.88
9	X9	36	30.0	43	35.8	8	6.7	19	15.8	14	11.7	3.57
10	X10	28	23.3	49	40.8	—	—	32	26.7	11	9.2	3.43
11	X11	40	33.3	69	57.5	11	9.2	—	—	—	—	4.24
12	X12	31	25.8	65	54.2	7	5.8	10	8.3	7	5.8	3.86
13	X13	37	30.8	59	42.2	4	3.3	18	15	2	1.7	3.93
14	X14	36	30	53	41.2	7	5.8	16	13.3	8	6.7	3.78

**Source:-** Field Survey ,2013

(N.B. 5 = Strongly Agree, 4 = Agree, 3 = Undecided, 2= Disagree, 1= Strongly Disagree)

*Items: X1=The livestock populations pressure/overgrazing/ can changes a fertile land to useless deserts. X2= Tree planting is good for proper land use. X3= Growing two or more crops in the same piece of land can reduce land degradation problem. X4= Quick growing crops are soil conserving crops. X5= It is not necessary to use composting since farmers still use fertilizers to replenish the soil. X6= Covering the surface with grass or crop residues reduce soil loss.X7= It is important to use animal dung and crop residue as fuels rather than using it as compost.X8= Contour plowing is important in sloppy areas because it reduces the rate of soil erosion. X9= It is preferable to keep the land under forest cover rather than securing an additional piece of farmland by deforestation.X10= Tree should be in the forest not on the farm.X11= It is possible to manage grazing land by moving the stock from one pasture to another.X12= Closure of grazing land is essential since it helps the grass to recover. X13= Crop rotation maintains soil fertility. X14= Terracing helps us to reduce run-off and rate of erosion.*

Table 5 shows the agro-pastoralist attitude towards agricultural land management. A great degree of similarity is observed in the responses of the agro-pastoralist. The majority of the respondents agree on statements X1 (90%), X2 (90.8%), X3 (91.6%) and X6 (90.4%). And X4 and X7 were not agreed by 42.2% and 30.0% of the respondents respectively. While X5 is an attitude statement which states ‘it is not necessary to use compost since agro-pastoralist’ still use fertilizers to replenish the soil’ has got disagreement by 81.7% of the respondents. Moreover, the calculated mean above 3.6 (on a seven items) for the fourteen statements are indicators of the favorable attitude hold on agricultural land management by the respondents.

It was surprising that only 34.2 percent of the respondents agree on the statement which states ‘contour plowing is important in sloppy area because it reduce the rate of soil

erosion’ (X8). 65.8% of the respondents agreed with the statement, which states ‘It is preferable to keep the land under forest cover rather than securing an additional piece of farmland by deforestation’ (X9). This response can be supported by the average score of 2.88 and 3.57 respectively for X8 and X9.

64.1% of the respondents have the mind that ‘trees should be in the forest not on the farm’ (X10). 90.8 percent of the respondents agree the statement ‘It is possible to manage grazing land by moving a stock from one pasture to another’ and also agreed with the statement that ‘the essential of closure of grazing land makes grass to recover’ (X11). 80% of the respondents also seem to be favorable that “closure of grazing land is essential since it helps the grass to recover” (X12). The calculated mean score 4.24 and 3.86 (X11 and X12) respectively for the statements is an indicator of a favorable attitude of agro-pastoralists’ in the study area towards grazing land management. 70% of the respondents agree the statement “Crop rotation maintains soil fertility” (X13). 71.2 % of the respondents agreed with the statement that “terracing helps us to reduce run-off and rate of erosion” (X14).

#### IV. SUMMARY AND CONCLUSION

This study was aimed to assess agro-pastoralists’ awareness about the land degradation and their attitude towards land management practices. Regarding to the causes and consequence of land degradation, most agro-pastoralists’ are aware, that land degradation leads to loss of agricultural production, increase the requirement of fertilizers and difficulty of farming. The result of the study showed that significant and positive association between educational background and awareness about causes, consequence and management practice about land degradation. This means agro-pastoralists’ who attend formal education have better

awareness than those who did not attend formal education for the causes and consequence of land degradation. Therefore, the educational/training programme which was provided for agro-pastoralists' should be modified by considering the existing knowledge and practices in a particular area. There is a need for more publicity on land management practices which should be done mostly on mass media especially in radio and television so as to create more awareness and favorable attitude of agro-pastoralists' towards land management practices. Awareness raising programme should include family planning education as well.

#### REFERENCES

- [1] USAID, Livestock Production. In *Environmental Guidelines for Small-Scale Activities in Africa*, 2009.
- [2] M. Mortimore, *Dryland Opportunities: New paradigm for people, ecosystems and development*. New York/Gland, Switzerland/London: UNDP/IUCN/IIED, 2009.
- [3] Shibru Tedla and Kifle Lemma, Environmental Management in Ethiopia. Have the National conservation plans worked?. Environmental forum publication series No.1. Organization for Social Science Research in Eastern and Southern Africa (OSSREA), Addis Ababa, 1998.
- [4] E. Ludi, Economic Analysis of Soil and Water Conservation: case studies for the highlands of Amhara Region. Ethiopian African Studies series A18, Universty of Berne, Switzerland, 2002.
- [5] ERA. Awbare *Woreda* integrated development programme (WIDP), Somali Region. Vol. I, Final Report, Pan African Consultants Plc & Afro-Consult and Trading Plc; Addis Ababa, 2003.
- [6] Beruk Yemane, 2003. Food security situation in the pastoral areas of Ethiopia. Oxfam, GB.
- [7] Tilahun Amede, 2002. Opportunities and challenges in reversing land degradation: The Regional Experience. pp. 173-183. Proceedings of a conference on: Natural Resources Degradation and Environmental Concerns in the Amhara National Regional State, Ethiopia: Impact on Food Security. Bahir Dar, Ethiopia, 24-26 July 2002, ESSS.
- [8] H. Humi, (1988) "Degradation and Conservation of Resources in the Ethiopian Highlands". *Mountain Research and Development*, 8(2/3): 123-130p
- [9] FAO (Food and Agricultural Organization), Fertility management in support of food soil security in Sub-Saharan Africa. Rome. 2001pp. 6-12.
- [10] Yohanes GebreMichael and Mebratu Kifle, Local innovation in climatechange adaptation by Ethiopian pastoralists. PROLINNOVA-Ethiopia and Pastoralist Forum Ethiopia (PFE) Final report, Addis Ababa, 2009.