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Assessing Farmers' Perception of Enclosures, Kewot District, Northeastern Ethiopia

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Abstract: The environmental and socioeconomic effects of land resources degradation are severe, especially in developing nations, where inappropriate land use and farming systems are practiced. Consequently, management options like enclosures are among rehabilitation strategies practiced in the degraded areas of Ethiopia. This study was conducted to assess the farmers' perception of enclosures in Kewot District, North Shoa, Ethiopia. Observation and questionnaire were used to collect data in the study sites. A total of 168 households were selected from two peasant associations using systematic sampling technique. Data were presented in descriptive statistics. The results indicated that the local farmers had perceived the existence of land degradation and its possible causes. Local farmers perceived enclosures positively and are optimistic to the performance of enclosures. However, the benefit sharing has satisfied the community moderately. As a result, participatory resource management strategy is recommended to ensure the sustainability of the enclosures.

Keywords: Enclosure, Local Community, Land Degradation, Rehabilitation

1. Introduction

Background

Land degradation is an indicator of under development resulted from amalgamation of social and economic factors such as poverty and inequitable distribution of land resources, inappropriate land use systems and farming practices in developing countries [31]. In developing countries, it causes a severe crisis to the livelihoods of the rural community and the environment [26].

In Ethiopia, due to the extreme dependence of the rural community on natural resources, particularly land, as a means of livelihood, the country is vulnerable for land resources degradation [10]. Land use land cover changes, mainly agricultural expansion in response to the demands of population growth, has caused accelerated erosion and loss of biodiversity in Ethiopia [15]. The country experiences a loss of nearly 1.9 billion tons of top soil per annum per year, especially from the highlands [11, 12]. Consequently, it has significantly declined agricultural production with an estimated cost ranging from 2 to 6.75% of the Agricultural Gross Domestic Productivity (AGDP) per annum [12, 29].

In response to the alarmingly degraded ecosystems, the practice of rehabilitation of degraded ecosystems is becoming an option to reclaim degraded sites globally [35, 18]. In Ethiopia, the trend of rehabilitation made in different watersheds has improved ecosystem health and land productivity [30]. However, the current rate and status of environmental degradation still calls for more extended and coordinated intervention actions to rehabilitate degraded lands [6, 20].

Enclosures (Area closures) are among various land management and rehabilitation strategies practiced to improve species diversity, soil quality and ecosystem productivity [22]. They are degraded lands that have been excluded from human and livestock interference and left to regenerate naturally [1]. The strategy has been instrumental to reclaim degraded lands in terms of cost, time of revival and the benefit it offers to the rural communities [20, 19].

Enclosures improve ecosystem conditions and enhance the provisioning services of ecosystem services that can improve the food access and economic wellbeing of the rural poor [13]. Enclosures in Ethiopia has been effective in maintaining vegetation resources for energy sources, on which 78-80% of the total household's energy supply of Ethiopian depend [7]. Rehabilitated mountains and fragile ecosystems reduce risk of flooding, improve biodiversity in a watershed. The

practice safeguards down streams from flood and siltation hazards and ensures infiltration resulting in replenishing of ground waters [25].

Although land resources management strategy through enclosures is becoming a common trend in Ethiopia, especially in the highlands, researches documents that evaluate local community' perception on socioeconomic and environmental contributions is lacking [9]. Therefore, this study was designed to assess local community' perception on the role of enclosures in Kewot district, Northeastern Ethiopia.

Perception of the local communities' is a base mark for their choice of land resource management practices and its sustainability. Assessment evaluation is a pre-requisite for the actual implementation of the rehabilitation strategy. This evoked the researcher to choose the issue as a research title so that the level of farmers' perception will be assessed and documented. The research findings will have significances for stakeholders by providing concrete scientific evidences about the local communities' perception of land management practices (enclosures) and become a basis for future studies in the field area.

2. Materials and Methods

2.1. Description of the Study Area and Study Design

This study was conducted in Kewot District, 225 km northeast of Addis Ababa at Meriyena insirt (Merye) and Abomsana wuruba (Abomsa) peasant associations. These peasant associations were purposively selected due to long term experience in enclosure practices and availability of comparable adjacent grazing lands. The Meriye site has 23 years old enclosure and is located at 9^0 59′ 95″ N to 10^0 00′ 05″ N and 39^0 55′ 45″ E to 39^0 55′ 50″ E. The Abomsa site has 10 years old enclosure and is located at 10^0 00′ 98″ N to 10^0 01′ 475″ N and 39^0 55′ 54′ E to 39^0 56′ 15″ E. (Fig 1).The study sites receive a mean annual rain fall of 1071.4mm; with mean minimum and maximum temperature of 23.87 ^oC and 24.44^oC, respectively.

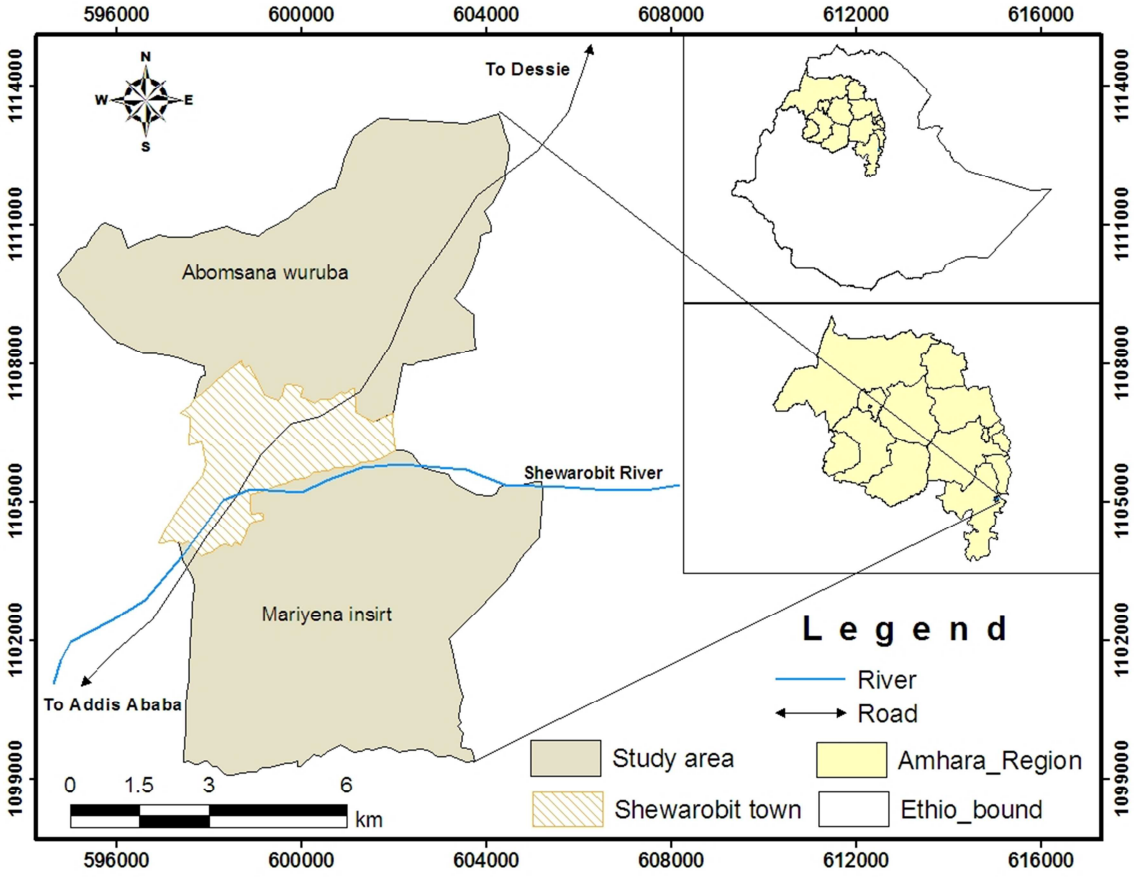

Figure 1. *Map of study area.*

Study Design

Reconnaissance field survey was made to obtain an overview of the study sites, followed by detailed preliminary survey, which was made between 4th weeks of January to the end of February, 2011. A cross-sectional survey research design was used to collect primary qualitative and quantitative data from the field.

2.2. Data Collection and Sampling Technique

Purposive and Systematic sampling technique methods were used to select study sites and households, respectively. Observation and semi-structured questionnaire were employed to collect information related to households' perception on the role of enclosures.

A total of 168 households were systematically selected from the list of local community members received from the Village administration. Semi-structured questionnaire was provided to these households with language translator to collect their perception on area closure and benefits gained from it. Respondents were included using a statistical formula as follows.

$$\text{i.e. } n = \frac{Z2*p*q*N}{Nd2+Z2pq} \quad (1)$$

Where, n= sample size
N= total population of households in both sites
Z^2= confidence interval (1.96, constant)
d^2= margin of error
p= proportion of population (0.5, constant)
q= 1- p
Assumption: let d= 0.05 and q= 0.5

$$n = \frac{(1.96)^2(0.5)(0.5)(298)}{(289)(0.05)^2 + (1.96)^2(0.5)(0.5)}$$

$$n = 168$$

Hence the data was stratified in to two groups, the number of households in each site was calculated as:

$$n1 = \frac{n*N1}{N} \quad (2)$$

Where, n_1= sample size in the first site
n= number of households in the first site
N1= total number of households included in the study
N= total number of households in both sites

$$n1 = \frac{186 * 168}{298}$$

$$n1 = 105$$

Similarly,

$$n2 = \frac{n*N1}{N} \quad (3)$$

Where, n_2= sample size in the second site
n= number of households in the second site
N1= total number of households included in the study
N= total number of households in both sites (Daniel, 1995)

$$n2 = \frac{112 * 168}{298}$$

$$n2 = 63$$

Besides, the performances of area closures on biophysical qualities of the areas were noticed and recorded by observation.

2.3. Household Survey Data Analysis

The data from household survey were fed on Excel spread sheet and described in descriptive statistics.

3. Results and Discussion

3.1. Local Community Perception on Land Degradation

All the respondents perceived that land degradation, mainly soil erosion was a major challenge in their locality and its impact was very severe. Accordingly, soil erosion, deforestation and lack of fodder were the most common land degradation types (105 households (63.6%), 95 households (57.58%) and 118 households (71.52%)) in the area by their degree of severity (Table 1).

Table 1. *The degree of severity of land degradation as perceived by respondents.*

	Degree of severity					
	1st		2nd		3rd	
Land degradation types	**Frequency**	**Percent (%)**	**Frequency**	**Percent (%)**	**Frequency**	**Percent (%)**
Soil degradation	105	63.6	25	15.15	12	7.27
Deforestation	27	16.4	95	57.58	35	21.2
Lack of fodder	33	20	45	27.27	118	71.5

Table 2. *Possible causes of land degradation as perceived by local communities.*

Possible causes	Value	Percent (%)
Deforestation	82	50
Poor land management	42	25
Over grazing	21	13
Poverty	15	9
Topography	5	3
Population growth	0	0
Soil characteristics	0	0

Respondents explained various possible causes of land degradation and stressed that deforestation, poor land management and overgrazing were believed to be the most possible causes of land degradation (82 households (50%), 42 households (25%) and 21 households (13%)) in the site. However, none of the households pointed that population growth, drought, and soil characteristics as possible causes of land degradation (Table 2).

Communities' awareness about the possible causes and existence of land degradation may be a basis to alleviate the problem. However, it might be due to the perception of local community that considering large family size as an asset and labor force for agricultural activities in rural Ethiopia, respondents did not recognize population growth as possible cause to land degradation. This calls for continuous education to raise peoples' attitudes. Similarly, studies conducted in northern Ethiopia reported that a rapid population growth causes a negative impact on agricultural

land and in turn declines the carrying capacity of the environment [8].

3.2. Local Communities' Perception of Enclosures

Respondents stressed that enclosures are effective land management options that promote surface cover and mitigate soil degradation resulting in enhanced land value and productivity (Table 3). This positive attitude of local communities is fundamental for the sustainability of enclosures [17] and also for future rehabilitation projects [34].

Farmers' perception is supported by previous study that states irrespective of the increase in population size, soil and water conservation and land rehabilitation efforts such as enclosures resulted in decreased sheet and rill erosion [27] Besides, studies concluded that increased vegetation density in enclosures result in increased infiltration, that in turn triggers vegetation rehabilitation through superior biomass production thereby improved land productivity including spring discharge [28], [34].

Table 3. *Local communities' perception on the contribution of enclosures.*

Farmers' Opinion	Yes	Percent (%)	No	Percent (%)
Provide fodder access	137	83	28	17
Provide grass for sales	143	86.7	22	13.3
source of fuel wood	50	30.3	115	69.9
Means of finance	120	72.7	45	27.27
Ensure surface cover	154	93.3	11	6.67
Reduces land degradation	165	100	0	0
Reduces available grazing land	126	76.4	39	23.6
Limit free access of fuel wood	119	72.1	46	27.9
Restrict the use of common resources	117	70.91	48	29.09

The majorities of respondents are optimistic to the performance of enclosures and reported that enclosures are effective in rehabilitating degraded lands; hence they support vegetation growth on degraded lands. It was also noticed that the enclosed sites were completely covered with vegetation which were regenerated naturally; but open lands were bare sites. However, a few respondents explained that the performance of enclosures could be enhanced with integrated soil and water conservation mechanisms. This households' perception is in consistence with [33]) study that states enclosures are effective in controlling soil degradation [33] Similarly, [32] found that re-establishing natural vegetation is an option to reverse land degradation, rehabilitate landscape integrity, and realize the environmental and social benefits of natural resources; it is now widely practiced around the world [32].

Respondents reported that enclosures are among rehabilitation mechanisms mostly practiced in their locality to return degraded lands and improve agricultural productivity as well. It agrees with studies that state proper land management practice that maintains extensive ground cover is a guarantee to reduce soil erosion. Hence, run off and soil losses are inversely related to ground cover, vegetation cover increase surface roughness and reduce soil detachment and transport of soil particles [2]. As a result soil erosion rates in unprotected areas may be 100-1000 times higher than fields with permanent vegetation cover [4].

The majorities of respondents agreed that humans and livestock should be restricted from enclosed sites for effectiveness of enclosures. However, some disagree with complete restriction of human activities and livestock. According to the later assumption, selective grazing (goat and oxen) and cutting of construction materials (occasionally) could better be allowed to ensure the use of communal resources. However, studies reported that fencing involves restricting of damaging agents to maintain degraded lands [16] and it is a recommended practice to facilitate land rehabilitation [14]. Moreover, research result states that for overall vegetation rehabilitation, excluding of live stocks ensures the growth of woody vegetation which provides shelter for next generation of succession; as a result a better regeneration could be achieved by excluding of humans and animals from degraded sites [14].

3.3. Local Communities' Perception on Management of Enclosures

A total of 132 households (80%) had participated in onsite selection and the majorities of interviewed respondents agreed on selection criteria. As explained by respondents, the selection criteria were the extent of degradation (the more the degraded the area, it is likely to be abandoned for rehabilitation), which could be evaluated by its productivity history and sensitivity to hazards (like erosion); being marginal and communal lands to ensure common sharing of cost and benefits leading to sustainable management in the future.

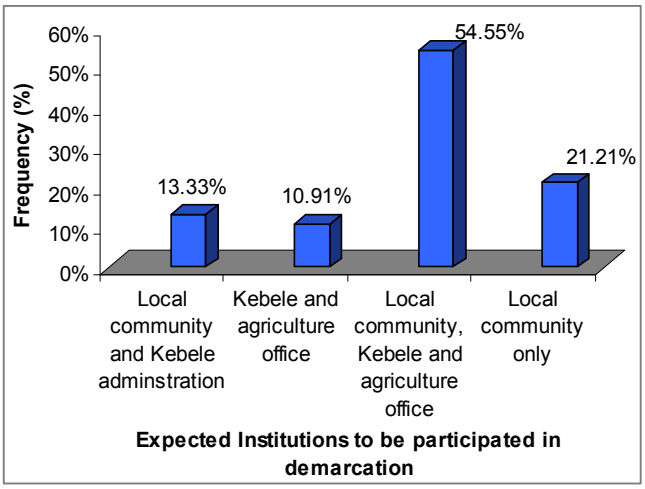

Figure 2. *Institutions expected to be involved in demarcation of Enclosures as perceived by local communities.*

Respondents pointed out that the local community should be involved in decision making and bottom up approach management of area closures develop sense of belongingness

among the community. Consequently, a total of 90 households (54.55%) responded that for future sustainability of enclosures, demarcation should be collaborative (Local community, Kebele (Village) officials and Agricultural office) (Fig. 2), and the majorities of the respondents concluded that sense of belongingness could be developed if the management is designated to the local community after demarcation.

Households' conclusion is supported by studies that state although establishment of enclosures in Ethiopia have considerable economic and ecological significances, it might be due to top-to-down implementation and limited participation of local community in decision making and utilization of resources during the Derg regime, the community denied the contribution of enclosures [5]. This has significantly affected the sense of ownership and community's commitment for effective protection and sustainable management of land resources [26].

3.4. Local Communities' Perception on the Role of Enclosures

Respondents replied that cut-and-carry mode of using grass and beekeeping is activities allowed in enclosures. However, the use of common resources in the enclosures was negatively assessed by the majorities of the respondents (117 households (70.91%)) (Table 3). Besides, though half of the respondents replied that the befit sharing has moderately satisfied the community (84 households (51%)), a quarter of respondents (42 households (25.5%)) explained that the benefit sharing has satisfied the community poorly. This might be due to an assumption that enclosures will be permanently owned and no possibility to share benefits to youth in the future and those who were not accepted the establishments of enclosures at the beginning are not benefited from the resources. In line with assumption, the Abomsa Village administration has initiated to partition enclosures for youth associations which will ensure benefit sharing considering the landless youth.

The local communities disclose that enclosures provide three fundamental benefits to the local community. These include (i) Social value: accordingly, they were asking for resettlement due to accelerated soil erosion. However, nowadays the practices of enclosures have enabled them to control soil erosion and have increased land productivity. (ii) Economic value: respondents replied that enclosures provide considerable fodder access for live stocks and are efficient to increase financial income for households (137 households (83%) and 120 households (72.7%), respectively) (Table 3). This has helped them to save the cost of grass purchase for fodder and thatching. Besides, more than 1200 Ethiopian Birr could be gained from grass sales on annual basis.

This optimistic perception of the local community is supported by studies that state enclosed sites provide grass and wood access for local community beyond their aim of establishment [24] and are also attractive in financial terms, as people could had to purchase grass from other areas [14]. Respondents' view of economic benefits of enclosures also agrees with Lovejoy's (1985) research result that states resources from area closures contribute to the households' economy, suggesting that economic and social wellbeing is enhanced by focusing on rehabilitation of degraded lands [23]. Moreover, biophysical composition increased by 50% after enclosure leading to economic development of the community [24].

(iii) Environmental value: respondents explained that area closures are effective strategies in controlling accelerated soil erosion and agricultural lands below area closures become more productive than lands below grazing. This agrees with studies that state agricultural lands below free grazing were strongly affected by water erosion than below enclosed sites [33]. In addition, studies concluded that enclosures facilitate natural regeneration thereby reducing surface runoff. This will promote accumulation of soil organic matter and other plant nutrients that excel soil quality and capable of support diverse communities [14].

Although some claim enclosures due to their restriction of free access of resources, the majorities of the respondents are optimist towards enclosures as they promote surface cover, reduce surface erosion and provide grass access for fodder and sale. The majorities developed sense of belongingness and ready to expand the practice in the future, as they are involved in decision making and management of enclosures. Households' conclusion is supported by studies that state although establishment of enclosures in Ethiopia have considerable economic and ecological significances, it might be due to top-to-down implementation and limited participation of local community in decision making and utilization of resources during the Derg regime, the community denied the contribution of enclosures [5]. This has significantly affected the sense of ownership and community's commitment for effective protection and sustainable management of land resources [26].

4. Conclusion

The results in this study revealed that enclosures have significant contributions to the socioeconomic and ecological systems; as they generate ecological and socioeconomic benefits. The majorities of the local communities developed sense of belongingness and developed positive attitude to the performance of enclosures. Such perception is a base mark for future sustainability of the practice. Enclosures often restrict use of communal resources. Particularly in Ethiopia, having large number of cattle with free grazing habit is a common tradition in Ethiopia. As a result, respective governmental organizations are required to work on education. Thus, agroforestry strategies like animal fattening and apiculture activities need to be practiced to ensure the socioeconomic wellbeing of the society while maintaining natural resources.

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