

# Local People Perception on the Role of Area Enclosure in the Central Rift Valley of Ethiopia: a Case Study at Adami Tulu Jido Kombolcha District

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**Abstract-** Recurrent drought, the ultimate outcome of deforestation and degradation of resources, reduced access to grazing land and water, urbanization, and unwise mining affect the sustainability of enormous Dryland resources in Ethiopia. As a result, the Ethiopian government has initiated a number of projects including establishments of area enclosure and soil and water conservation. Therefore, this study investigated local people perception on the role of area enclosures in Adami Tulu Jido Kombolcha. A multistage sampling technique produced surveys from 92 households. The collected data showed that Adami Tulu Jido Kombolcha society were highly benefited from area enclosure and they have had a positive attitudes towards the area enclosure practices. However, various problems were also identified such as shortages of firewood (41.3%) and scarcity of pastureland (35.9%) and are associated with the establishment of the area enclosures in the study area. Whilst, unequal distribution of benefits from enclosures (notably grass) among communities is also identified as the major problem in the management of the enclosures. Whereas, about 80.4% of the respondents expressed their conviction that overall the area enclosures are properly managed by the local communities, and they are willing to expand the practices to other unprotected areas in their localities. The study concludes local community had got a positive attitude towards area enclosures practices. Therefore, close relationship among the local communities and other related bodies is essential for the success and amend management practices of area enclosures.

**Index Terms-** area enclosures; benefits; management practices; perceptions, problems

## I. INTRODUCTION

Ethiopia has a very vast area that can be classified as a dryland, it accounts 75 million ha or 66% of the total area of the country (Demel, *undated*). Of this, 25 million hectare (ha) is covered with woodlands and bush lands. This implies that the largest vegetation resource of the country is found in the dryland areas. These enormous areas of dryland vegetation resources are facing serious problems of degradation. This has been attributed to the fact that land has been used as a mine, rather than a renewable resource for centuries in the country (Tewolde, 1989). Vegetation resources, in dryland areas, particularly woody trees, are declining both in quantity and quality as a result of

deforestation and degradation (Stewart and William, 2003; Edinam, 2005). The main causes of dryland forest degradation could be categorized under natural, anthropogenic as well as social and policy-related factors, for instance unsustainable exploitation of forest products, overgrazing, and clearance of forest land by the ever-increasing human population for crop cultivation, poverty, unexpected diseases and pest appearances (Edinam, 2005; Emiru *et al.*, 2006; Muluberhan *et al.*, 2006; Shixiong, *et al.*, 2009)

To minimize/ avoid the current and potential undesirable consequences of deforestation and land degradation, proper attention should be given to the dryland areas in the country. The prolonged degradation of dryland areas continues to affect the productivity and genetic diversity of forest, woodland and bush land resources. Exacerbated by the recurrent drought, the ultimate outcome of deforestation and degradation of these resources may be desertification. Hence, sustainable conservation and utilization of the remaining dryland vegetation resources and rehabilitation of those that have already been degraded would provide economic, social and ecological benefits. This requires designing economically feasible, socially acceptable and ecologically viable management and conservation strategies of dryland vegetation. In this regard, the government of Ethiopia has initiated a number of projects including soil and water conservation and the establishment of area enclosures with the financial assistance of international donors, mainly the World Food Program to stop further land degradation (Betru, 2003).

Area enclosures is a process of restoration and rehabilitation of degraded lands by natural means. The context and definition of area enclosures vary from country to country, but Betru *et al.*, (2005); LeHoue'rou, (2000) stated area enclosures in the Ethiopian context is defined as a degraded land that has been excluded from human and livestock interference for rehabilitation. Primarily, human and animal interference is restricted in area under enclosures to encourage natural regeneration. In practice, however, controlled grazing of cattle is allowed in several of area enclosures especially five years later from its establishment (Emiru, 2002). Cutting grass and collection of fuel wood from dead trees and bee-keeping are also allowed. In some areas, soil and water conservation activities are being undertaken alongside establishing enclosures in the areas (Emiru, 2002; Tefera *et al.*, 2005a). Hence, area enclosures is one types of land management and a tool for restoration of natural resources such as soil fertility, vegetation biomass and composition, fauna, and water storage, biodiversity and generally

productivity of the area. It is usually applied on steep, eroded and degraded area and becoming pertinent strategies and planning in dryland areas where plantations are unsuccessful due to many reasons (Emiru, 2002; Descheemaeker, 2006; Wolde *et al.*, 2007).

In addition to this, area enclosures is a quick and cheap method for the rehabilitation of degraded lands (Bendz, 1986 as cited in Emiru, *et al.*, 2003). As a result, rehabilitation of degraded lands through area enclosures recently received attention in many parts of Ethiopian especially in northern and central highlands (Kibret, 2008). As a result, communities have started establishing area enclosures as a promising practice in different parts of the country with the aim of fighting against land degradation and promoting their re-vegetation to prevent further degradation (Emiru *et al.*, 2003). Nevertheless, in many cases success is obstructed by lack of clear management guide lines and consequently, communities did not benefit as expected. This is often manifested in communities' lack of decision making power in the management and utilization of the resources and limitation in the rights to use grass and wood produced in the area enclosures. This adversely affects the sense of ownership and community commitment for effective protection and sustainable management of the resources. It is argued that the problem is still not adequately addressed and communities are uncertain about the future of land tenure and land use policy. This, in turn, has restricted them in making decisions that are important for the sustainability of the area enclosures and resources within (Betru *et al.*, 2005). This indicated that, establishment of area enclosures on large scale can only be achieved through community participation. Hence, it is imperative to look at local peoples' perception and build awareness for its full adoption at different localities of the country.

Understanding farmer's perception on natural resource management is one of the important factors to have effective natural resource conservation intervention. Understanding also helps to suggest types of organizational and institutional settings that need to be established in order to achieve the objectives of area enclosures. Community participation on natural resources management helps to create a platform to enhance dialogues and negotiations among farmers and outsiders (Wegayehu, 2006). Any endeavor attempting to develop sustainable and effective soil conservation policies, rules, regulations, institutions and strategies need to take farmers' perception of resource management and use into account (Tefera, *et al.*, 2005a). On the basis of these premises, this study tries to understand the local people perceptions on area enclosures as an alternative strategy

for rehabilitation of degraded land in Adami Tulu Jido Kombolcha District, Central Rift-valley Region, Ethiopia. Around 25 area enclosure were existed in the study area, but most of which were established in late 2009 with the aim of rehabilitating/ restoring degraded lands. The study is conducted in two of the area enclosures (*Gallo Hiraphe* and *Qamo Gerbi*) which were established in 1995 and 2006, respectively. Therefore, the present study focused on the different objectives: (i) understand local people's perception on area enclosures in relation to socio-economic benefits. (ii) Assess the current management practices of area enclosures in the study area and (iii) Assess the problems and possible areas of improvement on the existing management practices of area enclosures in the study area.

## II. METHODS

### 2.1. Description of the study area

The study was conducted in Central Rift-valley Region in Adami Tulu Jido Kombolcha District. It is located in East Shewa Zone of Oromia Regional State and situated in the central at 163 km away from Addis Ababa in South direction. Elevation of the *woreda* ranges between 1600-1800m a.s.l., with fairly flat to gently sloping terrain. According to traditional agro climatic Zonation, its climate falls under semi-arid and classified as "Dry Weyna Dega." The annual rain fall varies from 600-800mm and it is characterized by bimodal rainfall. Very short and unreliable rain during the months April-May, while most of the rain occurs during three months (June-August) and sometimes up to September (*Adami Tulu Jido Kombolcha Bureau of agriculture and metrological station*). The natural vegetation in most areas of this Central part of the Rift Valley is sparse umbrella shaped woodland dominated by *Acacia etbaica* and *Balanite aegyptica*, and hence, the vegetation of the area can be classified as *Acacia-Balanites* woodland (Mohammed, 1993). The present population of the district is about 142,861 (71,883 male and 70,978 female) (Federal Democratic Republic of Ethiopia Population Censes Commission (FDREPC), 2008). The majority of the population belongs to the Oromo Nation and are predominantly Muslim. According to the district Agricultural Office much of the population depends on subsistence mixed farming of both livestock like, cow, sheep, goat, horse, mule, donkey and chicken and agricultural crop production like, maize, haricot bean, wheat, teff, barley and sorghum. There are also many rural households engaged in collecting and selling forest products from natural forest.

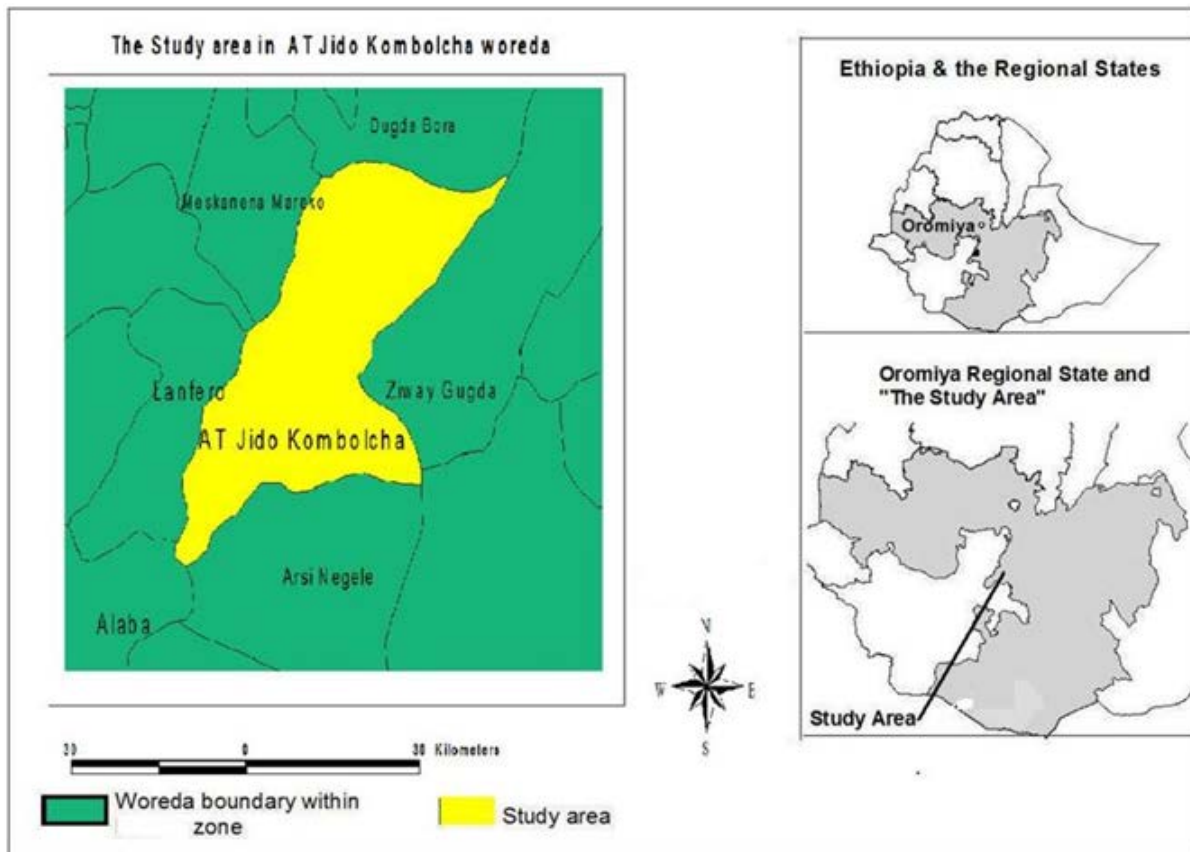


Figure 1- The district study area Map

**2.2. Research site selection**

In the district around 25 area enclosure were exist and they cover 2252.5ha (1.6%) of the district total areas. Of the 25 area enclosure in the district, two area enclosure namely, *Gallo Hiraphe* and *Qamo Gerbi*, were identified by purposive sampling with the assistance of local extension officers in the district for the research. Since socio-economic and environmental viability, different management activities such as physical soil and water conservation practices, (success or failures) are assumed to be influenced by the duration of area enclosures (Betru *et al.*, 2005). Thus, the selection was based on age of area enclosures, which is *Gallo Hiraphe* 16 years and *Qamo Gerbi* 6 years after establishment and the rest are established in late 2009.

**2.3. Survey and analysis methods**

Multistage sampling technique was employed to select sample households and collect the necessary data for the study. In the first stage, two representative areas (*Gallo Hiraphe* and *Qamo Gerbi* peasant association (PA) were selected purposively; the selection of the peasant association was made on the account

that the two PA areas were old aged as mention on site selection section 2.2. In the second stage, as it was assumed that local people’s perception about area enclosures is significantly influenced by the economic condition of the farmers, wealth status was used as a criteria to stratify households into different economic categories for the survey. Accordingly, the lists of the total households living in the Pas were obtained from the respective Pas Administrations. Then, the 776 and 375 household heads of *Gallo Hiraphe* and *Qamo Gerbi* PAs were stratified respectively as ‘poor’, ‘medium’ and ‘rich’ wealth categories by assistance of key informants. The criteria for the wealth categories were made by information gained from PAs Administration (Table-1). In the third stage, based on this premises, eight percent of the households from each wealth category in each PAs were randomly selected for the survey. Accordingly, 62 from *Gallo Hiraphe* and 30 households from *Qamo Gerbi*: in total, 92 household respondents were randomly selected (Table-2)

**Table-1: Wealth ranking criteria of the two peasant associations**

Criteria	Wealth status					
	Gallo Hiraphe			Qamo Gerbi		
	Poor	Medium	Rich	Poor	Medium	Rich
Farm land	<1.5ha	1.5-3ha	3-5.5ha	<1ha	1-2ha	2-3ha
Home in the town	x	x	✓	x	x	x
Cattles	1-2	4-15	>15	1 milk cow	2-5	5-10

Goats	3-5	5-13	>13	x	<7	7-12
Sheep	1-5	5-15	>15	x	x	5
Donkeys	x	1-4	4-6	x	1-2	2-4
Employers	x	x	3-5	x	x	x

**Table-2: Total population and sample size of the selected peasant associations**

Kebele	Rich		Medium		Poor		Total	
	Total	Sample	Total	Sample	Total	Sample	Total	Sample
<i>Gallo Hiraphe</i>	88	7	388	31	300	24	776	62
<i>Qamo Gerbi</i>	50	4	100	8	225	18	375	30
<b>Total</b>	<i>138</i>	<i>11</i>	<i>488</i>	<i>39</i>	<i>525</i>	<i>42</i>	<i>1151</i>	<i>92</i>

Once the sample size was determined, a household survey method was used to collect the primary data for the study. Accordingly, a semi-structured questionnaire were prepared and translated into local language (*Afan Oromo*). A questionnaire was pre-tested in 2 households from each PA, accounting a total of 4 households. The questionnaire frequently amended based on the feedbacks from pre-test. A total of 2 data enumerators were trained on the purpose of the study and appropriate data collection methods and respondent approaching norms. Finally, the survey was administered through face-to-face interview. In order to understand the whole picture of the role of area enclosure and view of local people in relation to the research problem and complement the data from the household survey, a separate focus group discussions (FGDs), review of secondary sources and participatory observation were made. For that purpose a total of 2FGDs, which was 1FGDs in each PA with a member of 6-8 participants were participated, which representing all socio-economic classes, gender, Ministry of Agriculture, and local NGOs were included in each of the FGDs.

The data gathered by household survey were analyzed using SPSS 16.0 software to understand socioeconomic characteristics of the local community, causes of land degradation before enclosures established, involvements of the community on the role of site demarcation, benefits of area enclosures for the community, management practices, current condition of area enclosures, the effectiveness of community by-laws, problems they faced due to enclosures, involvements of government and local NGOs on the practices, attitudes and feelings of community members towards area enclosures. Correlation analysis was also used to determine whether there is a significant variation on the attitude among different wealth categories (poor, medium and rich) about future expansion of area enclosures practices in their locality. Data obtained from FGDs, key informants, and field observations were used as supplementary information for the formal survey. Finally, results were presented in descriptive statistics which includes: tables, percentages graph, diagrams/charts as needed to show the number of households corresponding to their responses towards area enclosures.

### III. RESULT AND DISCUSSION

#### 3.1. Area enclosures development in the study areas

Most of the respondent verified that the areas now under area enclosures once had a good cover of *acacia* woodland vegetation; and currently most of the vegetation is deforested and the remnant patch in the hillsides increasingly faces serious damage. They also said that the sites were seriously degraded before a decision was taken to protect it from human and animal intervention. Respondents were asked to identify the major causes for the massive deforestation of the woodland vegetation, trees and shrubs in the area. The main causes of vegetation degradation are presented in table 3. As a result of these factors, vegetation cover of the area has decreased which indirectly results in severe soil and water erosion. This erosion leads to smothering of crop lands adjacent to the hillside by sediments and washing of the crop field by floods. Due to this the productivity of the hillside as well as adjacent farm lands becoming decreased. To rehabilitate/restore the degraded areas notably hillside areas as well as increasing the productivity of adjacent farm lands were becoming the main headache for local communities, Office of Agriculture, Local Administration and NGO working in the area called Sustainable Environmental and Development Action (SEDA). Therefore, they were jointly discussed the problems and alternative rehabilitation methods (like area enclosures, reforestation and soil and water conservation measures). Finally they have reached a consensus to establish area enclosures as it is economically feasible, and accepted by most of the local community members than other alternative methods. The stakeholders reached agreement to contribute according to their respective deeds. The Office of Agriculture and Local Administration and SEDA, agreed to provide training and awareness creation seminars to the local communities about the managements activities and overall importance of area enclosures and they are still providing these services for the local communities. Among the activities, they provided training for the local community about management practices of natural resources. Furthermore, they provide training for women how to make energy saving stoves from locally available materials, for instance, concrete stove and mud stove. It also provides local communities with training about individual

woodlot establishment by providing different tree species in order to decrease deforestation pressure as well as over exploitation of natural resources. The *Gallo Hiraphe* area exclosures, relatively the oldest one in the district, was established in 1995 with the help of the government, SEDA and the communities. The area is located 17 km northwestern of Batu town along the road to Butajira Town. The exclosures was established in hillside area and covers 260 ha. On the other hand, the area exclosures in *Qamo Gerbi* was established in 2006 with

the help of government, SEDA and the communities. The area is located 14 km north of Batu town and established in hillside area and covers 150 ha of lands. Both exclosures were established with the aim of achieving sustainable conservation and utilization of the remaining vegetation resources and rehabilitating the already degraded lands in order to provide economic, social and ecological benefits for the local communities.

**Table 1-The major causes of woodland degradation as cited by respondents (N=92)**

Causes	Gallo-hiraphe								Qamo-gerbi								Total (n=92)	
	Poor		Medium		Rich		Total (n=62)		Poor		Medium		Rich		Total		F	%
	F	%	F	%	F	%	F	%	F	%	F	%	F	%	F	%	F	%
Fuel wood	24	38.7	31	50	7	11.3	62	100	18	60	8	26.7	4	13.3	30	100	92	100
Construction material	24	38.7	28	45.2	2	3.2	54	87.1	18	60	8	26.7	2	6.7	28	93.4	82	89.1
Uncontrolled fire	21	33.9	22	35.5	7	11.3	50	80.7	18	60	7	23.3	4	13.3	29	96.6	79	85.9
Farm tools	23	37.1	14	22.6	2	3.2	39	62.9	3		--	--	10	3	10		42	45.7
Overgrazing	4	6.5	8	12.9	5	8.1	17	27.5	6	20	5	16.7	4	13.3	15	50	32	34.8

F: Frequency

### 3.2. Local community by-law over area exclosures

The local communities in both study sites have rules and regulations (by-law) on area exclosures in order to assist the administration and utilization of the resources gained from exclosures. The by-law formulated up on the agreement of local community members through discussion. As a result they decided to protect exclosed sites from illegal activities. Based on this, as key informants, participants of focus group discussions and most of the farmers indicated, if someone among the community violates the rules and regulations (by-law), he/she would be punished. For instance, it is stated that no one is allowed to cut a tree, or harvest grass from area exclosures or grazing their cattle's inside the exclosures area illegally. Any person who violated the rule and graze cattle in area exclosures will pay 10 *birr* and 5 *birr* fine per animal in *Gallo Hiraphe* and *Qamo Gerbi* respectively. Similarly, the fine for cutting a tree from area exclosures is 50-100 *birr*. The money collected from such fines is used for the purpose of the exclosures themselves such as to pay the monthly salary of the guard. In addition to the fine, the tools and materials used for cutting trees such as axes, ropes and hammers would be confiscated. And if the person who violated the rule refuses to pay, the communities will refer him/her to the local government administration for punishment. Controlled grazing, honey production and wild fruit collection activities by the local communities are incorporated in of by-laws. The by-laws also allow poor people of the communities to use the area exclosures in special circumstances such as mourning and wedding ceremonies through collecting of woods. In both case studies, there are guards recruited from the communities themselves to protect the area exclosures. A person

who can read and write, who has interest in activity, and who is accepted by the majority of community members will be selected for the job. The month salary of the guard gained from the contribution made by the local people and collected from fines. In *Qamo Gerbi*, in addition to the monthly salary, guards are allowed to graze very limited number of (3-4 cattle) livestock in the area exclosures for specific times as incentive.

### 3.3. Benefits of area exclosures

As development agents and key informants forwarded, initially the main purposes of exclosures were meant for environmental rehabilitation and as a strategy for soil erosion reduction from farmlands but later on the communities decided to harvest and share the grasses. But through a time the local people becoming aspire to get more benefits from area exclosures. They also said that there is a difference between the two sites in *Gallo Hiraphe* and *Qamo Gerbi* respectively, on the amount of benefits gained from the exclosures. For instance, as presented in figure 2 honey production, different wild fruit and medicinal tree species availability are higher in *Gallo Hiraphe* as compare to *Qamo Gerbi*. This may be attributed to the difference in the year of exclosures for the two sites and the different productivity potential of the sites. Overall, key informants, participants of FGDs and majority (96.7%) of the respondents confirmed that they had benefited from the nearby hillside area exclosures through different ways (Table 6) even though the benefits of exclosures assessed by most respondents but about 34.8% of the respondents complained that there is unequal distribution of benefits particularly grass which gained from exclosures among local communities. They also said that this issue has not been solved to date (Table 6).

**Table 6- Attitude of local people towards exclosures**

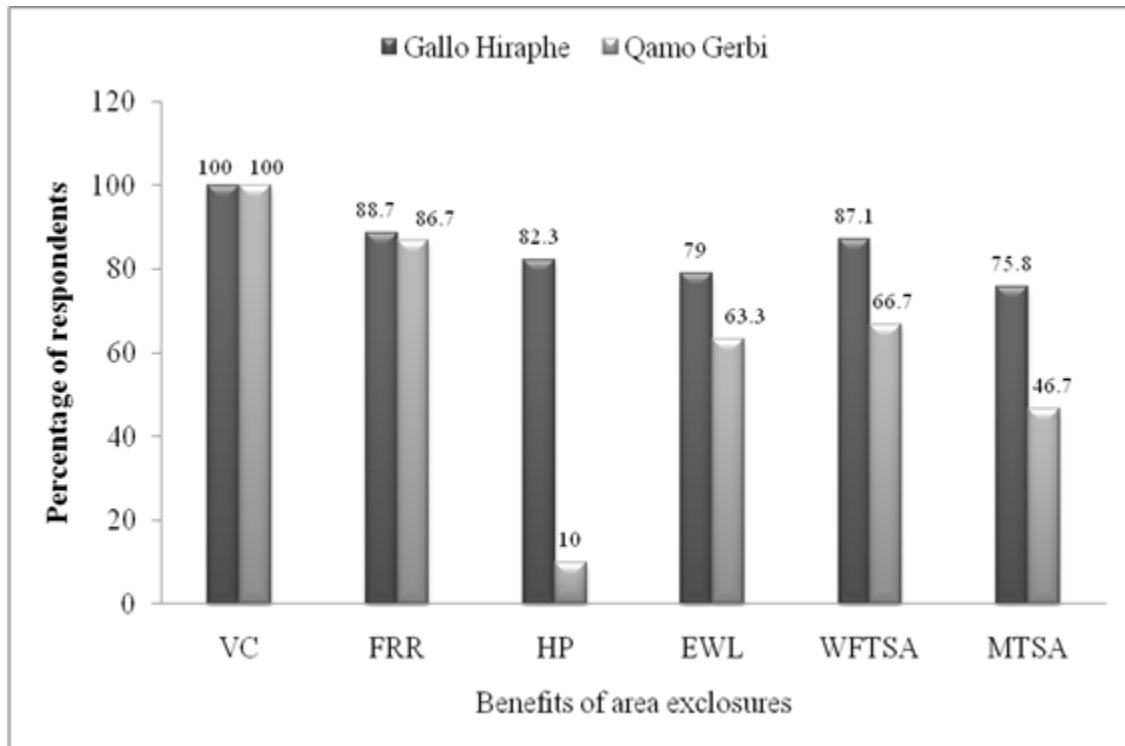
Questions	Gallo Hiraphe		Qamo Gerbi		Total	
	Yes (N=62)	%	Yes (N=30)	%	Yes (N=92)	%
Are there any benefits you gained from area exclosures?	59	95.2	30	100	89	96.7
Is there any problem in sharing the benefits?	23	37.1	9	30	32	34.8

The first benefit identified by all respondents in both PAs was the vegetation coverage of the land exponentially increased (Figure 2). Grass availability of the area for the livestock notably for oxen used for ploughing has significantly increased following establishment of area exclosures. A similar opinion was expressed by key informants and participants of FGDs. When they were asked about the observed changes after hillside were exclosed, many informants responded that native woody tree species that disappeared long time ago have been restored following the establishment of exclosures. For instance, *Acacia etbaica* (Dodoti), *Balanite aegyptica* (Bedenna) and *Pappaea capensis* (Wilicha) species reappeared (Hedberg *et al.*, 2006), and densities as well as diversities of the flora, particularly of grasses, and fauna increased. These indicate that area exclosures maintain and increases biodiversity by restoring of degraded lands. This thought supported by Emiru *et al.*, (2003), who studied area exclosures around Eastern Zone of the Tigray, Wukro district and stated that species that could not be observed for many years in some parts of eastern Tigray, namely *Olea europaea subsp. cuspidata* and *Juniperus procera*, reappeared, densities and diversities of the flora, particularly of grasses, and fauna increased following exclosures establishment. About 88.7% and 90% of the interviewees from Gallo Hiraphe and Qamo Gerbi respectively, identified reduction of flooding risk and changes in local weather as other benefits of the establishment of the area exclosures (Figure 2). Participants of FGDs also indicated that exclosures increase the productivity of adjacent hillside farmlands by reducing risk of soil erosion which comes from the upper hillsides by acting as a physical barrier. This idea agreed with the conclusion of other similar works in different parts of the country that argue exclosures can be used as a strategy for reduction of soil erosion, and minimizing high flooding hazards through increased roughness of the land because the regenerated vegetation inside exclosures can effectively disconnect the coarse sediment transfer by encouraging deposition and preventing sediment supply. For instance, Emiru (2002) works around Wukro district, Descheemaeker (2006) works in Tigray Highlands and Kibret (2008) works in Kallu district, Southern Wello. Consequently, exclosures also increases the productivity of adjacent hillside farm lands by reducing flooding risk which comes from upper hillside. As key informants in study sites indicated that exclosures improves soil quality and productivity by fallen plant parts decomposing, which leads to accumulation of organic matters of the exclosures. This finding is similar with that of Emiru, (2002), in Wukro district, who stated that area exclosures could be used as a strategy for biodiversity conservation,

minimizing flooding hazards, improving soil quality and productivity by enriching soil nutrients through nutrient recycling, built soil organic matter and reducing loss of nutrients from a site. About 83.3% and 10% of the respondents for Gallo Hiraphe and Qamo Gerbi respectively, indicated that promotion of hillside exclosures enhanced their honey production due to increase in a number of different flowering trees and shrub species. Furthermore, key informants said that currently a significant number of farmers in Gallo Hiraphe are participating in honey production inside area exclosures and they get considerable products. Whereas, in Qamo Gerbi even though the local communities participated on honey production the product is not as good as that of Gallo Hiraphe as the currently flowering plants species of the area at present are not much divers. However, as the vegetation coverage and diversity of flowering plants increase in future, area exclosures could become a highly suitable for sustaining large numbers of bee colonies and promoting beekeeping practices in a large scale in the PA. Increases insects in area exclosures may also enhance the pollination of crops which indirectly increases productivity of area as explained in the group discussions with focus groups and experts in the Agricultural Bureau. This finding also agreed with that of Descheemaeker (2006), works in Dogu'aTembien districtin central Tigray, states that some insects and wild bees residing in exclosures may increase the pollination of crops. In contrast Descheemaeker (2006), also stated that there may be some possibilities that area exclosures may contribute negatively to the nearby land use types, such as harboring rodents and pests that can damage crops and increase pressure on the remaining pasture. But from the practical point of view exclosures can be considered as effective means of soil and water conservation measure. In both case studies most interviewees (77.4% and 63.3% for Gallo Hiraphe and Qamo Gerbi respectively) and participants of FGDs, notably the elders, mentioned that different wild animals have returned back to the area after the exclosures were established. These include hyenas, foxes, rabbits, leopards, civets, monkeys and different bird species. Likewise, in study sites, interviewees explained that different medicinal and wild fruit trees and shrub species were observed following the establishment of area exclosures. This is also agreed with Tefera *et al.*, (2005) who stated that exclosures improve access of local people to wood like firewood, fodder, construction materials and non-timber forest products such as gum and resin. Generally, key informants also explained that exclosures are providing many social, economic and environmental products and services. In area of steep slopes, exclosures become better amendments for soil and nutrient conservation. Furthermore, their effect to

conserve the biological diversity of flora and fauna is paramount importance. Likewise, area exclosures create suitable habitat for

the wild fauna as well as esthetic landscape for the local communities by restoring/rehabilitation the degraded lands.



Where; VC = Vegetation coverage of the exclosed area, FRR = Flood risk reduction, HP = Honey production, EWL = Existences of Wildlife, WFTSA = Wild fruit tree species availability and MTSA = Medicinal tree species availability.

Figure 2- Types of benefits the local community gained from area exclosures

### 3.4. Management practices of area exclosures

Management activities as being indicated by the most respondents and participants of FGDs would be necessary for the attainment of the objectives of area exclosures. They also pointed out that a completely exclosed and untouched area exclosures could not be sustainable. The conservation of biological diversity in protected areas could be successful through the intervention of the communities on the management practices. This idea was supported by Gadegesin (2000); conservation of biological diversity in protected areas will be successful through the intervention of local communities through management activities. The new environmental policy of the region is trying to reverse the situation by supporting local people to organize, plan to execute decisions that concern land management and the conservation and sustainable use of biodiversity. Concerning the current management status of the exclosures, most of the respondents are very much interested for the protection of the hillside exclosures in both case studies. About 78.3% of the respondents said that the area exclosures are properly managed by the local communities. However, the remaining 5.4% of the respondents had no detail information about the proper management practices of the hillside exclosures (Table 7). Majority of interviewees responded their happiness on the current management activities. But the rich farmers in the communities were highly participated in management practices. This is because, the richer farmers need to harvest more grass in order to feed for more animals than the poorest farmers.

Consequently, development agents of the Agricultural Bureau and most of respondents explained that different management activities are applied by the local communities on area exclosures including excluding livestock and different human activities which cause severe land degradation, in order to prevent further degradation of ecosystems. Moreover, enrichment plantings took place to advance restoration of the overall ecological conditions of the areas. This finding coincides with Abiy (2008) works at Kelala Dalacha, Central Rift Valley of Ethiopia and Wolde (2007) works at Douga Tembein, Central Tigray and the authors stated that even though, restoration/rehabilitation in area exclosures is natural regeneration, in some cases exclosures management in Ethiopia involves enrichment plantings of native and/or exotic species as well as soil and water conservation activities as supplementary rehabilitation efforts to foster the restoration processes. In study sites soil and water conservation activities, such as soil bund, micro basin and trench, are practiced by the local communities so as to increase the water holding capacity of the area. This finding in line with Betru *et al.*, (2005) who stated that in some parts of the country soil and water conservation activities are also being undertaken. The purposes are to prevent further degradation of the ecosystems, and to advance restoration of the overall ecological conditions of the degraded areas. As most participants of FGDs mentioned that the community themselves are the responsible body for the current management practices of the protected areas because of their belief that area exclosures are their own common properties.

Only few were saying that the protected areas are the properties of government and community and both are responsible for the management of the exclosures. Participants of FGDs stated that in both study sites the use of grass in cut-and-carry system is not yet practiced by the local community rather they used controlled grazing system particularly for oxen used for ploughing. This may affects the diversity of herbaceous species and natural regeneration of newly growing species through animal trampling. This idea was supported by Betru *et al.*, (2005), who indicated that grazing lands with specific animals have a negative impact on diversity of herbaceous species and natural regeneration of

newly growing species through animal trampling and also by creating competition between regenerating woody plants and grasses. Since only oxen are allowed grazing inside area exclosures, the effects of this single-species controlled grazing on biodiversity is an important issue to examine, not only in terms of ecological impact, but in terms of the specific management practices. As indicated by development agents during FGDs fire lines are not developed in both case studies. This is due to the fact that the practice takes high cost which may not be affordable by local farmers.

**Table 7- The degree of local farmer’s participation in the management of area exclosures**

Degree of local farmers participation on management activities	Responses of respondents (N= 92)							
	Poor		Medium		Rich		Total	
	Yes	%	Yes	%	Yes	%	Yes	%
Low	5	5.4	--	--	--	--	5	5.4
Moderate	6	6.5	6	6.5	3	3.3	15	16.3
High	31	33.7	33	35.9	8	8.7	72	78.3

**3.5. Challenges associated with area exclosures practices**

In the study area there is a shortage of fuel wood and grazing land after area exclosures were established. Accordingly, 41.3% of the respondents identified shortage of fuel wood as a major problem of area exclosures. Similarly 35.9% of the respondents indicated problems of scarcity of pasture land as a result of the establishment of the area exclosures (Table 8). Some participants of FGDs notably in *Gallo Hiraphe* stated that increasing the

number of wild animals associated with area exclosures is another problem they face. While it is often considered as a positive outcome, it also has a negative implication on the safety of cattle and crop. Furthermore, in both sites they also stated that shortage of house construction (wood) materials also assessed in negative way followed area exclosures establishment.

**Table 8- Problems due to exclosure and its alternative sources and strategies to cope with the problems**

Problem associated with area exclosures establishment	Responses of interviewees	
	Yes (N=92)	Percentage
Scarcity of fuel wood	38	41.3
Shortage of grazing land	33	35.9

The local communities use alternative energy sources like animal dung and crop residue to overcome fuel wood shortage. Respondents who use these alternative energy sources accounts, 97.8%. About 60.9% of the respondents bought fuel wood, kerosene from the market and the remainder used private woodlot which accounts 47.5% (Table 9). Whereas, to overcome grazing land shortage about 95.7% of the respondents were used open site which found around their homestead for grazing. Likewise, 75% of the respondents were uses other animal feed

sources like crop residue and maize straw. Some respondents travel far distances with their cattle in search of pasture as indicated in table 8 below. Furthermore, about 17.4% of the respondents in both study area practiced controlled grazing in side area exclosures in order to cope up the shortage of grazing land in the area (Table 9). Likewise, participants of FGDs said that some farmers use locally made mud brick for house construction material in order to cope up the shortage of construction wood.

**Table 2- Alternative sources and strategies to cope with shortage of fuel wood and grazing lands**

Alternative strategies to cope up problems of area exclosures	Responses of respondents	
	Frequency (N=92)	%
<b>Related to shortage of fuel wood</b>		



Using animal dung and crop residue	90	97.8
Buying fuel wood	56	60.9
Collect from private woodlots	42	45.7
<b>Related to shortage of grazing land</b>		
Using open site around their homestead	88	95.7
Travel to other distant area	18	19.6
Obtained feed sources from crop residues	69	75
Use of controlled grazing inside area exclosures	16	17.4

### 3.6. Community attitude to future expansion

Even if there was shortage of grazing land and fuel wood in the study sites following exclosures, respondents who accounted for 72.8% has got a positive opinion for further expansion of the practice and to amend the management practices of area exclosures in the future in order to rehabilitate other degraded lands in their localities (Table 10). This implies that large numbers of the communities have got a constructive outlook towards the hillside exclosures practice as means of rehabilitation intervention of seriously degraded hillsides in their localities. During FGDs with focus groups, they raised one major idea. One of the issues they identified as area of future improvement for the new area exclosures is the need to amend the management activities like developing fire line, construct soil and water conservation in a better way and protecting illegal hunting from exclosures and around it and constructing of water points (reservoirs) for wild animals in order to keep them in side area exclosures. This is because animals go away from exclosures in order to seek drinking water. Additionally, they mentioned that for the success of all this the communities, governments and local NGOs work together. About 27.2% of the respondents wish to protect and maintain area exclosures using

the current practice. The reason is that they are afraid of some wild animals which have a negative impact on the crop and livestock (Table 10). When they were asked whether they are happy or not by the current administration body, the majority of the respondents in both sites supported the current community ownership of the exclosures. In fact 88% of the respondents opposed the idea of shifting the ownership of area exclosures from the community to individual ownership. One of the reasons for opposing individual ownership of area exclosures is they argue the cost of management activities will increase under individual ownership. For instance, the cost allocated for hire guard is minimal when performed by members of the whole PA than individuals. Moreover, differences in individual priorities regarding land use, including the need for planting different (enrichment) tree species, constructing different physical soil and water conservation activities would also increase the cost of individuals. The remaining 6.5% of the respondents have a view that ownership of the closed area should go to the Ministry of Agriculture. The reason is that they fear conflict may arise among community members on the process of benefit sharing if area exclosures ownership hold by the communities (Table 10).

**Table 3- Local people’s attitude to future expansion and ownership of area exclosures**

Attitudes of farmers about future expansion of exclosures practices	Responses of respondents	
	Positive (N=92)	Percentage
Protect and maintain using current practices	25	27.2
Expand the practices to new areas	67	72.8
<b>Tenure preference</b>		
Continue with communities ownership	81	88
Pass to individual	10	10.9
Pass to Ministry of Agriculture	6	6.5

A correlation analysis ( $p < 0.01$ ) showed that there is a positive attitude among the three categories of farmers (poor, medium and rich) and attitudes regarding future expansion of area exclosures in both case studies (Table 11). The result indicated that all of the respondents in the study area had a positive attitude towards the existing practice of area exclosures

and planned to expand the practice in the future. But richer farmers agreed more easily as compared to the poor farmers to rehabilitate the remaining degraded lands through area exclosures. This is due to the fact that the richer farmers have more animals as compare to the poorest one and more benefited

by the grass gained from enclosures as compare to the poorest one.

**Table 4- Correlations of the household’s wealth status with their perception for future expansion of the practices**

Household characteristics	Pearson Correlation
Wealth status of the respondents for Qamo Gerbi	.494**
Wealth status of the respondents for Gallo Hiraphe	.819**

\*\* . Correlation is significant at the 0.01 level (2-tailed).

Independent variables: Local people’s perception for future area enclosures expansion

**IV. CONCLUSION AND RECOMMENDATIONS**

This study has revealed local people’s perception on area enclosures practices. The area enclosures in the study area are established in the largely hillside communal lands that are highly affected by deforestation and resulting resource degradation. The study indicated that about 72.8% of the respondents showed a positive attitude towards the establishment of the area enclosures and supported the idea of expanding the experience further in their respective localities. Most of the respondents (96.7%) also confirmed that they had obtained socio-economic and environmental benefits from the establishment of the area enclosures through control of soil erosion, better availability of grass for animal feed, increase in honey production and biological diversity of the area, increase in productivity of adjacent hillside farmlands, increase the aesthetic value of the land as well as create conducive environmental condition for the local communities. Economically, the area enclosures have increased agricultural productivity of the farmlands, particularly those located adjacently, through control of flooding from the hillsides to the farms. Consequently, farmers are less exposed to soil erosion and resulted problem of loss of productivity. Farmers are able to have better quality and quantity of grass from the enclosures as the areas are protected from free human and animal interference. In fact, harvesting grass from enclosures for animal feed is a highly appreciated benefit of the enclosures by the communities. Similarly, the enclosures and the regeneration of the natural vegetation have increased the esthetic value of the land and create conducive environmental condition for the local communities. In terms of ecological services, the area enclosures significantly reduced the flooding problem from the hillsides and helped for the better environmental protection and management of natural resources in the enclosures as well as in the nearby farmlands. Overall local farmers have a positive attitude towards area enclosures practices in both sites.

The research also identified some negative consequences associated with the establishment of the area enclosures. Shortage of firewood is the major problem identified by the 41.3% of the respondents. Previously people were collecting firewood from the areas now enclosed freely both for household consumption as well as for sale. The enclosures of the areas restricted farmers’ access to firewood and, consequently, forced them to use other often economically and/or environmentally expensive options. Use of other alternative sources of energy

(mainly animal dung and crop residues) and firewood bought from market and own farms are the major responses to the problem of source of firewood due to the establish of the area enclosures. Similarly, the establishment of the area enclosures has created scarcity of pastureland in the areas. Although it was very poor in quality, farmers used the areas now under area enclosures as one of their major pasturelands. Now, they use different mechanisms to address this problem. Use small open sites around their Homestead, more use of other feed sources (such as crop residue) and travel to other distant area with their cattle are the major alternative solutions people adopt to address the shortage of pasture. Moreover, the use of grass from the area enclosures in controlled grazing system inside enclosures has limited contribution to minimize the problem of animal feed created due to the establishment of the enclosures.

Management wise, the area enclosures are managed by the community themselves. The management activities include guarding, constructing different soil and water conservation practices (such as soil bund, micro basin and trench to increase water holding capacity of the area as well as to reduce severe erosion), and enrichment planting. They have locally formulated rules and regulations (by-law) on area enclosures to assist the administration and utilization of resources found inside the enclosures. However, unequal distribution of the benefits (notably grass gained from enclosures) among all members of the communities is indicated as the major management problem of the enclosures which may affect future expansion of enclosures. Even if there was shortage of grazing land and fuel wood following enclosures establishment, as well as unequal distribution of benefits from enclosures among the local communities in both case studies majority of the communities has got a positive opinion for the further expansion of the practice to other unprotected areas and amend the current management practices.

Based on the findings of the study, the following points are recommended, which can be helpful for the success of area enclosures as a means of rehabilitating the degraded lands in the study area.

- ✦ In the study area overall local communities have a positive attitude towards the practice of area enclosures. However, there is a need to increase its productivity, having more area enclosures and amend their management practices. Therefore, providing training and creating awareness for

the communities about different management practices that can enhance productivity are essential.

✚ The optimistic view of the local community to rehabilitate degraded lands through exclosures and make them productive is a very important aspect for the success of the area exclosures in the study area. Therefore, close collaboration of the Agricultural Office and existing local NGO with the local people is indispensable in order to maintain the positive attitude, amend the management practices and to address constraints associated with area exclosures.

✚ The cut-and-carry mode of using grass is not put in to practices in the study area which are entitled to rights of use. This activity may have facilitated the natural regeneration process of the area exclosures by avoiding competition between regenerating woody plants and grasses. It can also help as a means to insure equal distribution of the benefits of the exclosures among all members of the community. Thus, the cut-and-carry mode of grass use should be put into practice.

✚ The current study was conducted on local people's perceptions of area exclosures in relation to socio-economic and environmental benefits, current management practices, and problems associated to the practices and possible area of amendment by the existing management practices. Therefore, research is recommended if further studies conducted on the diversity of fauna and flora and their functional relationships with the development of woody vegetation in the exclosures.

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