

ORIGINAL ARTICLE

## Assessment of constraints, opportunities and farmers perception to area closure in siltie zone, SNNPR

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The environmental and socioeconomic effects of land resources degradation are severe, especially in developing nations including our country Ethiopia, 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 including the study area. This study was carried out in Silte zone, specifically within Hulbareg and Silti woreda from Southern Nations, Nationalities and Peoples' Region in Ethiopian. The objective of the study was to assess Assessment of Constraints, Opportunities and Farmers Perception to Area closure. Multi stage sampling technic were used first the zones and woreda was selected purposively based on availability of enclosure, second two kebele from each woreda was selected using systematic random sampling and respondents were selected randomly and a total of 80 sample respondents were selected from the two districts for the household survey. Both primary and secondary sources were used for data collection by using semi-structured questionnaires, direct observation, focus group discussions and key informant interviews. SPSS software was used to analysis the data by using descriptive statistics. The study results indicate soil and water conservation was the major mechanisms to rehabilitate the degraded. And more than half of the respondents said the type of enclosure exist were exclude from human and livestock interference, Soil erosion, deforestation and lack of fodder were major land degradation types in the area. The most common causes of land degradation were flooding topography deforestation, overgrazing, and poor land management and population growth. And 53.8% of the respondents perceived enclosures positively and optimistic to the performance of enclosures. Besides more than half of the respondents were assured that the benefit sharing have been satisfied the community. Enclosure improves the livelihood of the local community by providing animal feed, fodder, beekeeping activity and other non-wood forest products. But more than half the respondents were not getting training and experience sharing this indicates the community should be supported by training and experience sharing to increase the awareness of farmers to the importance and functions of enclosure.

**Keywords:** Enclosure, Land degradation, Perception, Rehabilitation, Hulbarga and silti districts.

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### Introduction

Land degradation includes all process that diminishes the capacity of land resources to perform essential functions and services in ecosystems (Hurni et al., 2010). It is caused by two interlocking complex systems: the natural ecosystem and the human social system. 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 (Hadgu et al., 2008). Consequently, it has significantly declined agricultural production with an estimated cost ranging from 2 to 6.75% of the AGDP per annum (Sonneveld, 2002). The impact of water erosion on food production in Ethiopia in response to the alarmingly degraded ecosystems, the practice of rehabilitation of degraded ecosystems is becoming an option to reclaim degraded sites globally (Young, 2000).

In Ethiopia, the trend of rehabilitation made in different watersheds has improved ecosystem health and land productivity (Sonneveld and Keyzer, 2003). They are degraded lands that have been excluded from human and livestock interference and left to regenerate naturally (Betru, 2003). 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 (FAO, 2001). 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 in the study area.

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 was 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 and become a basis for future studies in the field area. So the objective of this study was to identify the purpose and benefits derived from the area closure, to assess the perception of local community of area closure and finally to identify the constraints and opportunities of area closure in Siltie zone, SNNPR and Ethiopia.

## **Methodology**

### **Description of the study area**

This research study was conducted in Siltie zone. The zone town is worabe which is found 169.91 km far from capital city of the country. From this zone Silti and Hulbareg wereda were selected. Silti woreda is bordered on south by Lanfro and Dalocha, southwest by Hulbareg, west by Alichu Werero, north by the Gurage Zone and east by the Oromia Region. In this woreda the total population is about 207,152 (101,460 male and 105,695 female) of which 191,765 rural and 19,211 are urban residents. The total area of the woreda is about 53,112 ha of which, 25,635 ha has Annual cultivated land, 11,221 ha perennial, 6,365 ha grazing land, forest and 6,904 ha bush land.

The *woreda* agro-ecology has totally w/Dega (77% moist W/Dega, 23% dry woina dega). The soil type has 73% clay loam, 27% silt soil. Majority of farming system practiced is mixed farming. Major annual crops are wheat, teff, maize and major perennial crops are enset and chat. The *woreda* receives 1,012 mm average rainfall annually. In this woreda the size of Area closed by community is about 13,500 ha it was from 2001. Presently 10 kebeles are exercising area enclosure activity. In this woreda have 157,304 cattle, 111,636 small ruminant and 32,636 equines animal resources.

Second Hulbareg woreda which is border on southwest by Hadiya Zone, west by Misraq Azernet, north by Alichu, northeast by Silti, east by Dalocha, and south by Sankurra woreda. The distance 188 km far from capital city of Ethiopia, from regional city 215 km, from zone town 15 km. Number of urban kebeles are 1 and rural 10, the total populations are 81,905, from those populations 37,732 Male 40,816 female. The total size of area closed by the community was around 14,200 ha. Totally 10 number of kebeles were experiencing area closure. In this woreda experience by area closure was 14 years which starting from 2007. The area gaining average annual rain fall was 1012 mm. and 73% of the soil type were clay loam, 27% silt soil. More than half of the area farming system was mixed farming. The traditional agro-ecology was totally woina dega (moist woina dega 77%, dry woina dega 23%). And latitude: 7°54'59.99" N and Longitude: 38°19'60.00" E. Annual cultivated land 13,500 ha, perennial land 3,840 ha, grazing land 2,943 ha. Major annual crops were wheat, teff, maize and major perennial crops Enset and Chat.

### **Sampling size and procedure**

Multi-stage sampling technique was used to select sample districts and respondents. In the first stage, two districts were selected purposively from Siltie zone based on enclosure practices. In the second stage, from each district two kebeles were selected randomly. In the third stage, the sample respondents were selected by using systematic random sampling technique proportion to each kebele population. Finally, a total of 80 sample respondents were selected from the two districts for the household survey.

### **Data types and sources**

Both qualitative and quantitative data were collected from primary and secondary data sources. The primary data was collected directly from sampled households. Secondary data sources used for this study were journals, relevant text books, district agricultural and development office reports.

### **Methods of data collection**

Different methods of data collection tools were used to acquire primary data. Among the data collection tools key informant interviews and focus group discussions with pre-defined social groups (elders, model farmers, women's, Das and experts) were conducted before formal survey to collect general information about enclosure. A checklist was also used to guide the discussion. The required households' data were collected from selected sample households with the help of pre-tested structured and semi-structured questionnaires.

### **Method of data analysis**

Descriptive statistics data analysis methods were applied to analyze the data collected from smallholder respondents using structured questionnaire. The analysis was done by using SPSS version 25.

## **Results and Discussion**

### **Demographic and socioeconomic characteristic of respondents**

This study show that around 76% of the household was male headed and the rest 24% was female headed. The average age of sampled household was 41.29 whereas the mean education level of the household was 3.29 grades. About 98.8% of the respondent was married and only 1.2% was single. The average family size per household was 6.21. The average landholding by sampled household was 1.15 ha while the mean livestock holding per household was 2.25 TLU. Farming system of study area was commonly mixed type where farmers' livelihood was based on both crop cultivation and livestock rearing. As indicated in Table 1,

about 58.7% of the respondents' livelihood was depending on crop cultivation and livestock rearing. There were very little additional sources of income rather than agricultural activities, off farm activities (2.5%) and non-farm activities (2.5%).

**Table 1.** Demographic and socioeconomic characteristics of respondents.

Variables	Minimum	Maximum	Mean	Std.
Age	21	5	41.29	12.18
Education level	0	2	3.29	3.4
Size of the HH	1	6	6.21	2.25
Farming experience	2	50	19.8	11.2
Landholding in ha	0.25	7	1.15	0.925
TLU	0.00	14.02	2.25	1.14
Variable	Frequency (n = 80)		Percent	
Sex	Male	61	76.2	
	Female	19	23.8	
Marital status	Single	1	1.3	
	Married	79	98.8	
Major livelihood source	Crop production	28	35	
	Animal rearing	1	1.3	
	Mixed	47	58.7	
	Off-farming	2	2.5	
	Non-farming	2	2.5	

Source: Field survey, 2021.

### Degraded land rehabilitation mechanisms and purpose of enclosure

The result in Table 2, shows that the communities have used different mechanisms to rehabilitate the degraded land. From that type of rehabilitation mechanism soil and water conservation was the major practiced which account 45% of the respondents. Enclosures were mostly rehabilitating mechanism to the community next to SWC. And according to respondents the area close for different purpose and the major purpose were to rehabilitates the degraded land which account 52.5% of respondents and the other purpose of enclosure within the communities were to cut and carrying of grass and to prevent overgrazing, for job creation like fattening, beekeeping, planting of grass or forage and tree planting from enclosed area, to control soil erosion and flooding, to improve climate condition, to improve species diversity, to improve soil quality and the remained one was said to improve ecosystem productivity, to apiculture activity, to animal fattening.

**Table 2.** Mechanisms for rehabilitation and its purpose of enclosure.

Variables	Frequency	Percent	
Purpose of enclosure	To improve species diversity	4	5
	To rehabilitation of degraded land	42	52.5
	To improve soil quality	5	6.3
	To improve ecosystem productivity	3	3.8
	To apiculture activity	1	1.3
Occurrence of degraded land	Other	25	31.25
	Yes	79	98.7
Enclosed degraded land	No	1	1.3
	Yes	79	98.7
Mechanisms for rehabilitation of degraded land	Soil and water conservation enclosure	57	45
	Tree planting	12	10
	Reduced agricultural expansion	4	5
	combination one with the other	3	2.5
		4	5

Source: field survey 2021.

### Type of enclosures in the study areas

There are different kinds of area closure exist within the study area and its shows that 51.3% which was more than half of the respondents said the type of enclosure exist were exclude from human and livestock interference and the other type of enclosure was closing off degraded land and simultaneously implementing additional SWC measure which account 18.8% from the respondents. 41.3% of the respondents responded that the number of year closed the degraded land exclude from human and livestock interference for long period of time, 31.2% were said from 5-10 years, 12.5% and 15% were from 1-3 and 3-5 years respectively. The result show that the rehabilitation time of one degraded land is different from another means one is fast to rehabilitate other slow based on the severity of degradation. This might indicate that the existence of variations in species diversity

within different age categories of area closures was a result of heterogeneous distribution of species due to time factors. The higher evenness was encountered in the 25-year-old closure, which could partly be explained by difference in site condition (Ambachew, 2006). And also the result show that major respondents said that terracing and tree plantation and grass over sowing were the possible activity often undertaking within area closure, this show it is possible to do different activity within enclosure site simultaneously doing rehabilitation processes. Within the study area different kinds of project were support to the community in area closure activity. Benefit of the projects were by providing agricultural tools and financial support, awareness creation the community about enclosure and moral support, payment of farmer when doing terracing as purpose of job creation for farmers, providing different tree seedling, support during conservation SWC activity. The principal environmental impacts of land degradation include a rapid loss of habitat and biodiversity, modifications of water flows, and sedimentation of reservoirs and coastal zones (Project Development Facility 2007) (Table 3).

**Table 3.** Type of enclosure exist to ensure rehabilitation of the land.

Variables	Description of the variable	Frequency	Percent
Type of area closures	Exclude only from human interference	3	3.8
	Exclude only from livestock interference	2	2.5
	Exclude from human and livestock interference	41	51.3
	Closing and implementing additional SWC	15	18.8
	Combination of each practice	19	23.8
Year closed the degraded land from interference	1-3	10	12.5
	3-5	12	15
	5-10	25	31.3
	For longer time kept	33	41.3
Activity often undertaking along with the area closure	Terracing	11	13.8
	Tree plantation and grass over sowing	16	20
	Maintenance activity	5	6.3
	Other	3	3.8
	Terracing, tree plantation and grass over sowing and maintenance	12	15
	Terracing and tree plantation and grass over sowing	32	40
Initiatives for enclosure	Terracing and maintenance activity	1	1.3
	No	38	47.5
	Yes	42	52.5

Source: Field survey 2021.

### Types and possible causes of land degradation in the study area

In the study area Soil erosion (82.5%), deforestation (53.7%) and lack of fodder (65%) were major land degradation types in the area. The most common causes of land degradation were flooding (90%), topography (85%), deforestation (76.2%), overgrazing (57.5%), poor land management (68.7%) and population growth (61.5%). Similarly, studies conducted in northern Ethiopia reported that a rapid population growth causes a negative impact on agricultural activity. Occurrences deforestation within the study area causes for land degradation and not only this it also change climate condition negatively. The major causes of land degradation in Ethiopia are rapid population growth, severe soil loss, deforestation, low vegetative cover and unbalanced crop and livestock production (Girma 2001) (Table 4).

**Table 4.** Land degradation incidence, degree of severity and its cause.

Variables		Frequency	Percent
		<b>n=80</b>	
Land degradation types	Soil erosion	8	10
	Deforestation	1	1.3
	Soil erosion deforestation and lack of fodder	62	77.5
	Soil erosion and lack of fodder	5	6.3
	Soil erosion and deforestation	2	2.5
	No occurrence	2	2.5
Soil erosion severity rank	First	66	82.5
	Second	11	13.7
	Not occurrence	3	3.8
Deforestation severity rank	First	12	15
	Second	43	53.7
	Third	10	12.5
	Not occurrence	15	18.8

	First	1	1.3
	Second	15	18.8
Lack of fodder severity rank	Third	52	65
	Not occurrence of lack of fodder	12	15
	Incidence		
	Deforestation	61	76.2
	Overgrazing	46	57.5
Cause of land degradation	Poor land management	55	68.7
	Poverty	28	35
	Topography	68	85
	Flooding	72	90
	Others	14	17.5

Source: Field survey, 2021.

### Farmers' perception of enclosures and its benefit in the study areas

In the present study area, a majority of the respondent had a positive attitudes and perceptions towards area closures in their community. As summarizing below Table 5 establishing enclosures has a high contribution to the livelihood of local communities for the study area. As a result most of the local communities had a positive attitude towards the establishment of enclosures in the degraded land. Sample respondents' have reported that enclosure provides high benefits for a communities such as improve ground vegetation cover (87.5%) this indicate enclosure enhanced different plant species composition, diversity and structure. Several studies indicated that establishment of enclosure in a degraded land enhances the floristic/flora diversity, composition, structure and density. Similarly, the abundance of woody species was larger in enclosure than adjacent open grazing land (Birhane et al., 2007). To prevent further degradation of land (97.5%), used as fodder source (86.3%), provide grass for sale (57.5%) This finding coincides with Abiy (2008) works at Kelala Dalacha, Central Rift Valley of Ethiopia he said area enclosure is the most crucial way of overcoming environmental degradation, loss of biodiversity and deforestation problem of the country especially to determine the way rehabilitating severely exploited vegetation and degraded dray land and environment.

Also enclosed area provides habit for wild animals (66.2%), source of income for local communities (71.2%) and encouraging apiculture practice and source of feed for bees (75%). Understanding peoples' attitudes and addressing their needs and priorities towards successful utilization and management of common resources such as forest/woodland resources is critical (Carena, 1985). However, according to sample respondents' enclosure practice reduce available grazing land (36.3%), cause for border conflicts (45%), illegal cutting and grazing in enclosure (37.5%) and limit free access to foul wood (35%). About 90% of respondents have satisfied from benefit sharing of enclosure. About 53.8%, 28.7% and 6.3% of the household have satisfied from enclosure highly, moderately and poorly.

**Table 5.** Farmers Perception of enclosure in the study areas.

Variable	Category	Frequency n=80	Percent
	No	11	13.8
Fodder access	Yes	69	86.3
	No	34	42.5
Grass for sale	Yes	46	57.5
	No	5	6.3
To prevent further degradation	Yes	75	93.7
	No	23	28.8
Source of income	Yes	57	71.2
	No	10	12.5
Improve ground vegetation cover	Yes	70	87.5
	No	2	2.5
Reduce land degradation	Yes	78	97.5
	No	27	33.8
Create habit for wildlife	Yes	53	66.2
	No	51	63.7
Reduce available grazing land	Yes	29	36.3
	No	50	62.5
Illegal grazing like cutting tree	Yes	30	37.5
	No	44	55
Create conflict between border	Yes	36	45
	No	52	65
Limit free access of fuel wood	Yes	28	35
	No	20	25
Important for bee keeping	Yes	60	75

Satisfy benefit sharing from enclosure	No	8	10
	Yes	72	90
	Highly	43	53.8
	Moderately	23	28.7
	Poorly	5	6.3
	No change	1	1.3

Source: Field survey, 2021.

### Major constraints of enclosure sustainability in the study areas

No guard for enclosure (96.25%), limited training (78.7%), no experience sharing about enclosure (78.7%), continuous follow up limitation by respective bodies (70%), fair benefit sharing problem in the local community (65%), expansion of urbanization (48.57%), no enough agricultural tools to reduce intervention in enclosure (47.5%), border conflicts (45%), poor awareness of the farmers about enclosure (41.25%) and enclosure competed communal grazing land (36.25%) were major constraints of enclosure sustainability in the study areas (Table 6).

**Table 6.** The major constraints that limit sustainability of enclosure.

Constraints	Frequency	Percent
Means of border conflict	36	45
Compete grazing land	29	36.25
Fair benefit sharing problem	52	65
Violate by-law	10	12.5
Continues follow-up limitation by respective bodies	56	70
Weak awareness about the enclosure	33	41.25
Lack of belongings to area closure	10	12.5
No enough agricultural tools to reduced intervention	38	47.5
Lack of guard	77	96.25
Expansion of urbanization	39	48.57
Weak responsibility of some community members	10	12.5
Lack of trainings	63	78.7
Lack of awareness	33	41.3
No experience sharing	63	78.7

Source: Field survey, 2021.

### Major opportunities of enclosure in the study areas

Enclosure makes common share of benefits (90%), communities' accountability for by-laws (90%), cutting and currying grass in enclosure (90%) access of extension services (80%), good farmers' motivation in the area (80%), good social work and coordination of the communities (76.25%), payment free participation of the farmers (76.25%), good awareness by communities about benefit sharing (58.75%) and presence of project intervention to strength enclosure (52.5%) were major opportunities to strength the sustainability of enclosure (Table 7).

**Table 7.** The major opportunities of enclosure.

Variables	Frequency	Percent
Free participation of the farmers	61	76.25
Good social work and coordination	61	76.25
Good farmer acceptance and attitude	43	53.75
Awareness creation about the benefit	47	58.75
Community work without payment	18	22.5
Make common share of benefit	72	90
Good farmers motivation	64	80
Support by project	42	52.5
Cutting and carrying grass in enclosure	72	90
Accountability for by - laws	72	90
Access of Extension service	64	80

Source: field survey 2021.

### Conclusion

From this study it was concluded that understanding of personal, socio-economic, institutional factors would contribute to the design of appropriate strategies to achieve technical change in soil and water conservation process and rehabilitation of degraded land in simultaneously area closure the study area. And enclosure enhancing the natural regeneration rates, potential to reduce erosion, improving soil nutrient content and properties and also improve the socio-economic benefits of the local communities. It improves the livelihood of the local community by providing animal feed, fodder, beekeeping activity and other non-wood forest



products. Majority of the local communities are supported the establishment of enclosure on the degraded grazing land because it is easy to establish, cheap and support their livelihoods. Soil and water conservation was the major mechanisms to rehabilitate the degraded. And more than half of the respondents said the type of enclosure exist were exclude from human and livestock interference, Soil erosion, deforestation and lack of fodder were major land degradation types in the area. The most common causes of land degradation were flooding, topography, deforestation, and overgrazing and poor land management and population growth. Despite of the ecological and socioeconomic roles there are also some challenges for enclosure practices like lack of enough training and experience sharing about enclosure, improper benefit sharing that resource getting from enclosure site and lack of enough grazing lands are some of the challenges listed by the respondents of the communities.

## **Recommendation**

Government organizations and concerned body should be educate or create more awareness to the local communities to developed sense of belongingness to the enclosure. Concerned body must be create balance both male and female participant in order to affirmation of gender equality regard to area closure. According to the results more than half the respondents were not getting training and experience sharing this indicates the community should be need further getting of training and experience sharing regard to enclosure.


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