

Research Article

Social and Institutional Status of Area Exclosure in North Wollo and Wagemira Zones, Northeastern Ethiopia

Melkamu Kassaye Mekonen ¹, Abrham Abiyu Hailu,² and Asmamaw Alemu Abitew³

¹Injibara University, Injibara, Ethiopia

²World Agroforestry Center (ICRAF), Addis Ababa, Ethiopia

³University of Gondar, Gondar, Ethiopia

Correspondence should be addressed to Melkamu Kassaye Mekonen; malkamukassaye@inu.edu.et

Received 23 December 2021; Revised 25 March 2022; Accepted 19 April 2022; Published 11 May 2022

Academic Editor: Nikolaos D. Hasanagas

Copyright © 2022 Melkamu Kassaye Mekonen et al. This is an open access article distributed under the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

Forest restoration with area exclosure has the hopeful restoration strategy for nature conservation and social development goals as a countermeasure against deforestation and forest degradation. However, the status of these restoration interventions is not well known with scientific evaluation. Thus, this study aimed to evaluate the social and institutional status of forest restoration with area exclosures. To do this, three districts in three agroecologies were selected purposively based on exclosure availability, and in each district, three exclosures were selected. The questionnaire survey was administered to households near the selected exclosures for both user and nonuser groups selected with simple random sampling. Required data were collected and analyzed by descriptive and inferential statistics and then compared against the best practices of Ostrom's design principles (ODPs). The result revealed that the local community has good trust and participation in highland (63%) and mid-altitude (70%) areas, but low trust and participation in lowland areas (85%). In the highland and mid-altitude areas, local communities have the right to use exclosure for multiple uses. In lowland areas, the use right is very restricted for local communities. Exclosure institutions and governance showed medium compliance in the highland, very good compliance in mid-altitude, and very poor compliance in the lowland with the ODP. This was triangulated when 79% of the respondents in highland and 82% in mid-altitude argued that area exclosure is successful and 82% of respondents argued that area exclosure is failed in the lowland. For successful and sustainable forest restoration practice with area exclosure, the approach should start at the bottom and the activity should require the full participation of the local community in all stages.

1. Introduction

Deforestation has long-term local and global effects such as climate change and biophysical changes that in turn have environmental, social, and economic impacts with the immediate effects on the communities that depend on forests for part or their entire livelihood [1]. This calls urgent intervention by different approaches such as restoration of cleared and degraded forest with area exclosure [2]. Danano [3] explains that area exclosure and protecting an area of open grazing land from human use are an important practice in Ethiopia to permit natural rehabilitation, enhanced by additional vegetative and structural conservation measures.

Forest restoration as area exclosure has the hopeful restoration strategy in get-together both nature conservation and economic development goals [4]. According to the above scholar, degraded forests under area exclosure in Ethiopia are bringing social, economic, and ecological benefits to the participating communities. According to Kidu et al. [5], communities downstream of the protected forest have better access to water for their livestock, thereby increasing the livestock productivity of the communities. Additionally, forest under area exclosure provides timber and poles for construction and fuelwood and to serve as a windbreak, boundary markers, and for stabilizing river banks and controlling soil erosion for the entire community near the protected forest [5].

There are many forest restoration practices with area enclosure in the northern degraded lands of Ethiopia. However, their status is not well known whether area enclosure is successful or not in terms of economic and social gains. This is because there are limited synthesis and methodological research to develop indicators and evaluation criteria. Due to this, the determinants for success and failure of forest restoration with area enclosure were not identified in the study areas.

Thus, this research is designed to evaluate the status of enclosures on social and institutional status after passive restoration intervention of area enclosure. Therefore, this study was designed to determine social and institutional factors for the success of forest restoration with area enclosure in the study areas and then compare the resilience of current management of enclosure when evaluated against Ostrom's design principles (ODPs).

2. Theoretical Framework

Most natural resources in Ethiopia [6] are the common resources without any management intervention, which leads to the tragedy of the commons. The tragedy of the commons is a situation where all have access and shared the resources, which resulted in high depletion of resources [7]. To solve this situation, two scientists [7, 8] have a contrasting idea that Hardin believes the solution is dividing the resources and converting them to private resources, while Ostrom said the best solution for the tragedy of the commons is common pool resource management. Most scientists [6, 9–12] support Ostrom's design principles.

Thus, for this research Ostrom's design principle (ODP) was applied. The principles have not only the strategy of managing the common pool resources but also show evaluation of the successes and failure of the common pool resource management with community organization and participation. Mainly, the ODP has set out 8 principles for the evaluation of whether the organized community have successfully managed the common resources or not. These are biophysical extent; institutions and local rules; collective choice of actions; monitoring and evaluation; conflict resolving mechanism; graduate sanctions; the right to organize; and work nested within larger networks.

These principles have been applied in different studies [6, 11–16] around the world. This is why this research applied the principles to evaluate the institutions organized for forest restoration with area enclosure to avert the tragedy of the commons.

3. Methodology

3.1. Description of the Study Area. The study was conducted in Waghemira and Semen Wollo Zones, in three agroecologies (lowland, mid-altitude, and highland) in the Amhara Region (Figure 1). It is located between 12°15' north latitude and 39°17'34 east longitude. Waghemira is an administrative zone in eastern Amhara having six districts namely Sekota, Dehana, Gazgibla, Abergele, Sihala, and Ziquala. Sekota Town, the capital of the zone, is 720 km

north of Addis Ababa and 540 km northeast of the regional state capital, Bahir Dar [17]. Lasta District is one of the administrative districts in Semen Wollo Zone, which is geographically located between 1235'31" N latitude and 3904'30" E longitude (Figure 1 and Table 1).

3.2. Sampling Procedure and Data Collection. Three districts in different agroecological zones were selected purposively. The districts were Abergele (lowland), Sekota (mid-altitude), and Lasta (highland). The criteria for selection were the presence of enclosure intervention and their accessibility. Then, in each agroecology (district), three area enclosures were selected. The questionnaire survey was used to collect data on selected socioeconomic and institutional characteristics. Respondents were selected by simple random sampling. Key informants were selected purposively for the interview. The proportion of the respondents was 10% of the total population in the study site. Based on this, 48, 40, and 45 respondents were interviewed in the highland, mid-altitude, and lowland areas, respectively. Three group discussions having seven members and seven key informants were interviewed in each agroecologies. Social, economic, and institutional indicators were measured by structured questionnaires and interviewing the key informants, and group discussion about the area enclosure activities in the study areas.

3.3. Data Analysis. Social and economic institutional indicators were analyzed based on Ostrom [19], Fisher [20], and Unger's [4] principle of effective participatory forest management. Then, finally, the data were tested with SPSS Vr. 25.

4. Results

4.1. Motivation and Levels of Participation in Area Enclosure. There were a high significant difference and association ($p < 0.000$) of participation within and among the agroecologies. High participation with the reason and level of participation was observed in highland and mid-altitude (>75%) enclosures, but low participation in lowland enclosures (69%). The respondents in highland and mid-altitude areas participated in area enclosure practices for ecological and economic use, but in lowlands community participation was for incentives. In highland and mid-altitude areas, respondents participated at the planning stage led by the decision-makers, while in lowland enclosures the participation is after planning as a consultancy and information giving and most respondents were not participated (Table 2).

4.2. Economic Indicators of Area Enclosure in the Study Areas. There were a high significant difference and association ($p < 0.000$) of economic benefit within and among the enclosures at different agroecology. Most respondents in highland and lowland areas (69%) persuade that the area enclosure is used for cutting and carrying grass, while in mid-altitude areas (78%) enclosure is important for seasonal crop production, honey production, fattening, and cut and

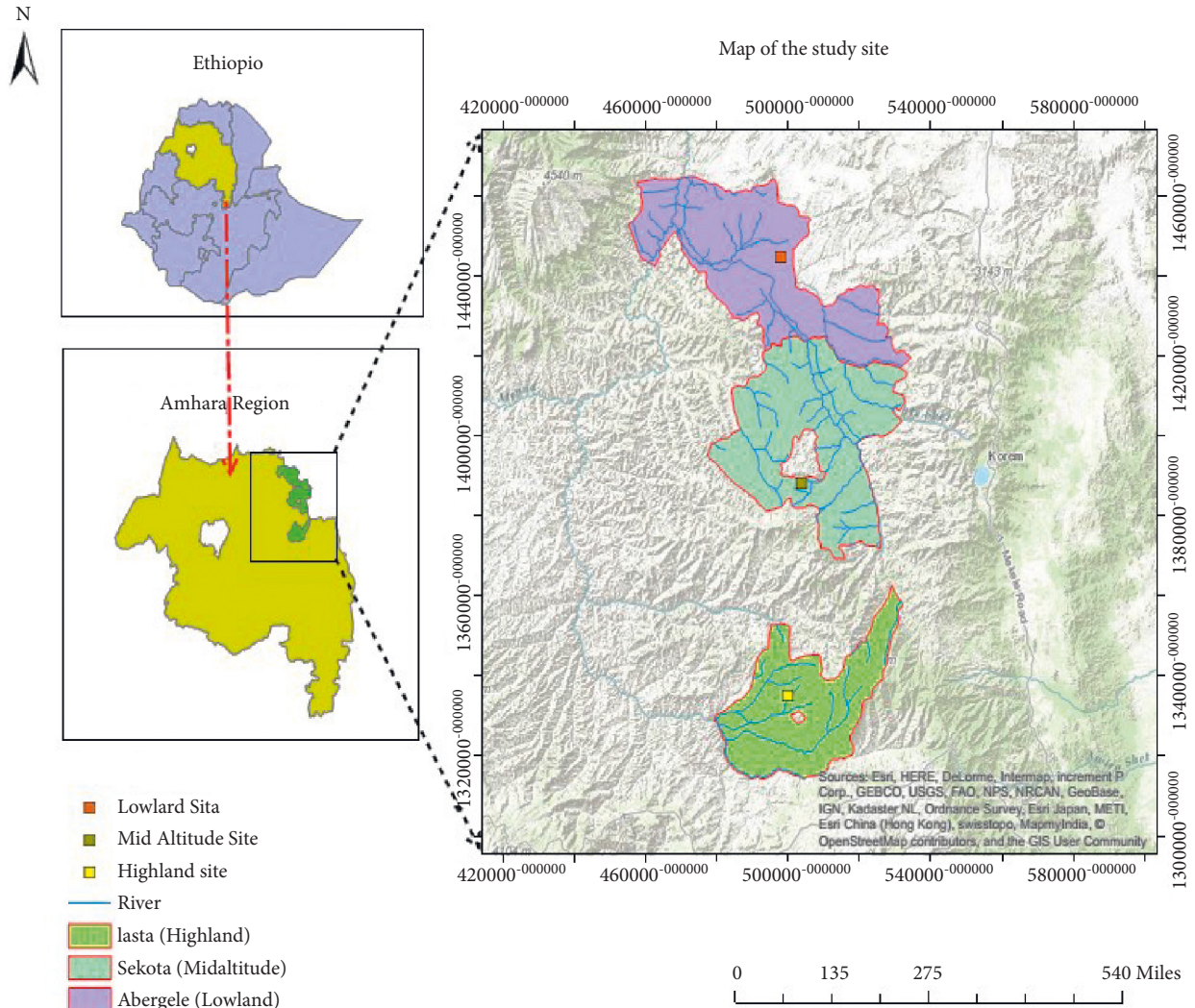


FIGURE 1: Map of the study area.

TABLE 1: Characteristics of the study area [18].

Attributes	Highland	Mid-altitude	Lowland
Altitude (m.a.s.l.)	2129 to 3600	1340 to 2200	500 to 1300
Rainfall (mm)	500 to 1000	350 to 700	250 to 750
Temperature (°C)	24.5	16 to 27	23 to 43
Soil	Eutric Cambisols (51%)	Umbric Leptosols (52%)	Eutric Leptosols (29%)
Agroecology	Dega (52.7%)	Woyena Dega (65%)	Dry Kolla (55%)
Topography	Chain of mountains, hills, ad cliffs		
Vegetation	Bushy woodlands and forest only at churches		

carry grass for landless youth. For most respondents in the highland, enclosure supports their livelihood, and in mid-altitude, it improved their livelihoods, but in the lowland parts, the enclosure does not change their livelihoods (Table 3).

4.3. Successfulness of Area Enclosure Based on Ostrom’s Design Principles. Based on Ostrom [19], Fisher [20], and Unger’s [4] design principles, formal and informal institutions organized for area enclosure should be evaluated by the clearly

stated boundary, organization of the members, decision-making, local rules and institutions, monitoring, and management, conflict, and penalties.

4.4. Clearly Defined Boundary (Biophysical Extent). There was a clearly defined biophysical resource boundary at highland and mid-altitude area enclosures. The community have a map with a land certificate, and the boundary was well-defined for users (are the organized local community who are the member of area enclosure) and nonusers (are the

TABLE 2: Social indicators for area enclosure.

Characteristics	Categories	Participation		Frequency	Chi-square (X^2)
		Yes	No		
Have you participated in forest restoration works?	Highland	48	0	48	35.47* (df = 2; $p < 0.000$) *significant at 0.01 level
	Mid-altitude	30	10	40	
	Lowland	19	23	42	
	Total	97	33	130	

Characteristics	Categories	Reasons for participation			Frequency	X^2
		For all benefit	For economic benefit only	For incentives only		
If say "yes" for participation why you have participated?	Highland	27	20	1	48	7.8* (df = 2; $p < 0.099$) *significant at 0.1 level
	Mid-altitude	25	10	5	40	
	Lowland	26	18	1	45	
	Total	78	48	7	133	

Characteristics	Categories	Level of participation					Frequency	X^2
		At beginning	At implementation	After implementation	Information giving	Consultation only s		
At the level of participation, you have engaged	Highland	17	14	6	10	1	48	66.3*(df = 10; $p < 0.000$) *significant at 0.01 level
	Mid-altitude	16	10	5	0	9	40	
	Lowland	5	0	4	13	23	45	
	Total	38	24	15	23	33	133	

TABLE 3: Benefits of area enclosure.

Variables	Response	Highland (n = 48)	Mid-altitude (n = 45)	Lowland (n = 40)
Economic benefits	Cut and carry grass	68.8	7.5	66.7
	Fuelwood	10.4	7.5	22.2
	Timber	4.2	7.5	11.1
	Honey production, crop, fattening, and grass	16.7	77.5	0.0
$X^2 = 44.3^*$ (df = 8; $p < 0.000$) *significant at 0.01 level				
Livelihood change	Yes	31.3	40	13.3
	Support	37.5	22.5	11.1
	No	20.8	5	55.6
	Negative impact	10.4	7.5	20.0
$X^2 = 55.016^*$ (df = 9; $p < 0.000$) *significant at 0.01 level				

TABLE 4: Biophysical extent of area enclosure at different agroecologies.

Principles	Highland	Mid-altitude	Lowland
Clear boundary	(i) Well-defined boundary and well known by users and nonusers	(i) Well-defined boundary and well known by users and nonuser	(i) Not well-defined boundary and well not known by users and nonuser
	(ii) Have the map but not the certificate still	(ii) Have the map and land certificate	(ii) Have the map but no certificate
Evaluation	Medium	Strong	Very weak (absent)

local communities who are not the member of area enclosure). However, in lowland areas, there is no clearly defined biophysical resource boundary of area enclosure and the boundary is not well-defined (Table 4).

4.5. *Institutions and Local Rules.* There were a high significant difference and associations ($p < 0.000$ and 0.013) of the presence of institutions, types of intuitions, and who have established the instructions within and among the enclosures in different agroecologies. Above 72% of the respondent

agreed that local institutions have legally signed local bylaws in all agroecologies. Most of the institutions (>72%) were formal institutions led and organized by the government in a top-down approach (Tables 5 and 6).

There were a high significant difference and associations ($p < 0.000$) of the presence of local bylaws, legally signing, and community trust within and among enclosures at the different agroecologies (Tables 6 and 7). Confidentially in all agroecology, most respondents argued that there is no problem of law and legal problem; however, in lowland enclosures, there was low trust with local bylaws.

TABLE 5: Institutions of area enclosure.

Variables	Response	Highland (n = 48) %	Mid-altitude (n = 45) %	Lowland (n = 40) %
Institutions	Yes	79.2	72.5	77.8
	No	20.8	70	22.2
$X^2 = 21.4.016^*$ (df= 2; $p < 0.000$) *significant at 0.01 level				
Type of institution	Formal	72.9	75	62.2
	Senbete (is an informal religious local institution at which the members meet once on Sunday like gating together)	16.7	12.5	8.9
	Mahiber (is an informal religious local institution gating together one common day per month)	10.4	5	8.9
$X^2 = 12.6^*$ (df= 4; $p < 0.000$) *significant at 0.05 level				
Who organized the institutions	Government	81.3	62.5	77.8
	Self-organized	18.8	37.5	22.2
$X^2 = 38.9^*$ (df= 6; $p < 0.000$) *significant at 0.01 level				

TABLE 6: Local rules and institutions of area enclosure in the study area.

Principles	Highland	Mid-altitude	Lowland
Local rule and institutions	(i) Have local rules and institutions	(i) Have local rules and institutions	(i) They have local rules and institutions
	(ii) But led and organized by the government	(ii) The rules and institutions developed and organized by the participation of members	(ii) But weak and led by the government
Evaluation	Medium	Strong	Very weak (absent)

TABLE 7: Local bylaws.

Categories	Yes	No	Frequency	X^2
<i>Have your institution local bylaws</i>				
Highland	48	0	48	16.9^* (df= 2; $p < 0.000$) *significant at 0.01 level
Mid-altitude	31	7	38	
Lowland	39	0	39	
Total	118	7	125	
<i>If you say "yes" for the above, is it legally signed</i>				
Highland	48	0	48	17.7^* (df= 2; $p < 0.000$) *significant at 0.01 level
Mid-altitude	29	7	36	
Lowland	38	0	38	
Total	115	7	122	
<i>Have you trusted and truly acted in the local bylaws?</i>				
Highland	36	12	48	31.24^* (df= 2; $p < 0.000$) *significant at 0.01 level
Mid-altitude	29	7	36	
Lowland	8	27	35	
Total	73	46	119	

4.6. *Collective Choice of Actions.* There were a high significant difference and associations ($p < 0.000$) of local community freedom to take actions and self-organization, within and among the enclosures at different agroecologies. Mid-altitude user groups have to some extent better collective choices of actions; however, highland and lowland user groups have been ordered and led by the government and the officials (Table 8).

In the highland and lowland enclosures, the rule and all decisions are from top to down approach. The user groups have the right to add but not reduce the local bylaws. They do have not regular meeting times for decision-making and solving conflicts (Table 9).

4.7. *Monitoring and Evaluation.* The user groups in all agroecologies have the responsibility of controlling and managing the area enclosure. More than 79% of respondents in highland and mid-altitude areas agreed that the enclosure status was evaluated by the government at the district and community level. They evaluated based on vegetation cover, grass biomass, and protection from encroachment (Figure 2).

There were a high significant difference and associations (59.5^* (df= 2; $p < 0.000$)) of local community response of whether the enclosures were successful or not based on the participatory evaluation. Based on the ecological, social, economic, and institutional setup of area enclosure, most

TABLE 8: Conditions of community organizations.

Characteristics	Categories	Who initiated the enclosure practices			Frequency	X ²
		Government with full order	NGOs with partial freedom	The local community with self-organized		
How to become a member and have a freedom in the organized institution	Highland	39	9	0	48	X ² = 83.043* (df = 8; p < 0.000) *significant at 0.01 level
	Mid-altitude	12	5	30	47	
	Lowland	35	10	0	45	
Total		86	24	30	140	

TABLE 9: Collective choice of actions for area enclosure in the study areas.

Principles	Highland	Mid-altitude	Lowland
Collective choice of action	(i) Top-down approach	(i) The member decide led by professionals	(i) The rule and all decisions were from top to down
	(ii) The right to add laws but not minimize	(ii) They have the right to add laws but not minimize rule	(ii) The right to add laws but not minimize
	(iii) They do have not have a regular meeting time	(iii) They have a regular meeting time per month	(iii) They do have not a regular meeting time
Evaluation	Medium	Strong	Very weak (absent)

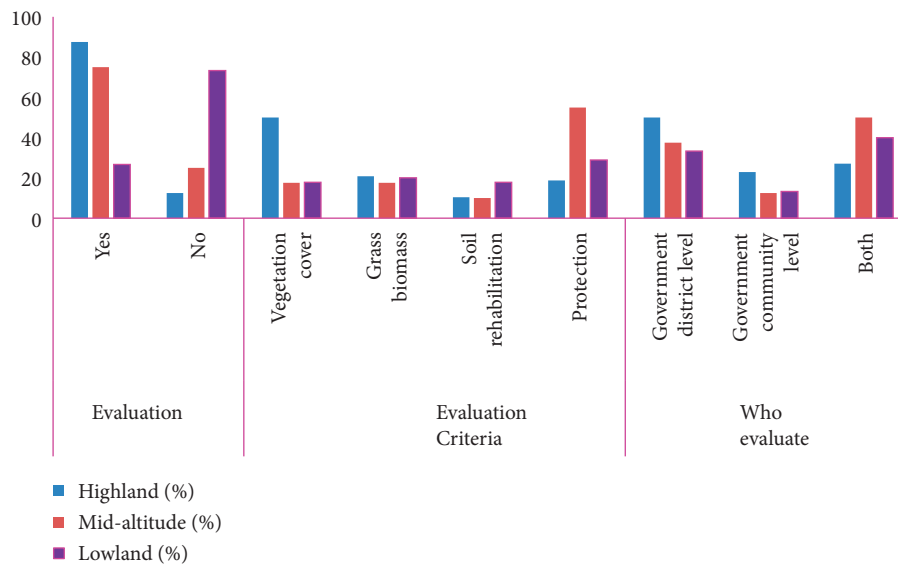


FIGURE 2: Monitoring and evaluation of the enclosure (evaluation, evaluation criteria, and who evaluate have shown significant difference (45.2* (df= 7; p < 0.000 at 0.01 level of significance)).

respondents (>72%) said that area enclosure is successful in the highland and mid-altitude areas, but most respondents (>82%) in lowland areas perceived that area enclosure is failed (Figure 3).

4.8. *Conflicts and Resolving Mechanism: Graduated Sanctions.* The high conflict was recorded in the highland and lowland, while the low occurrence of conflict was recorded in the mid-altitude areas. The conflict was solved by negotiation with elders and local committee in all agroecologies. Most respondents argued that there are penalties for violation of local bylaws in all agroecologies (Figure 4 and Table 10).

There were a high significant difference and associations (58.05* (df = 2; p < 0.000) of conflicts, penalties, and conflict resolving mechanisms) of locally organized community for area enclosures within and among the agroecology (Figure 4).

4.9. *The Right to Organize.* In highland and lowland areas, members were organized by the government, while in mid-altitude areas the members were organized by themselves and then facilitated by the government. In terms of the ownership security, in highland and mid-altitude areas, the members have a land certificate for use right forever but not ownership right. In lowland areas, they have no use and

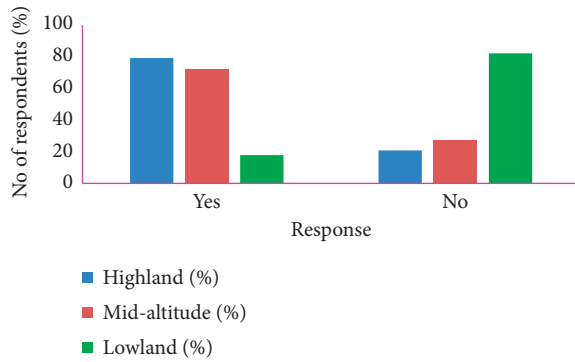


FIGURE 3: Enclosure successfulness.

ownership right still. In mid-altitude areas, the landless youth have the hope to benefit but are frustrated that state change may affect their investment (Table 11).

5. Discussion

5.1. Motivation and Levels of Participation in Area Enclosure.

The local communities in the highland and mid-altitude areas have good participation (>75%) in enclosure practices. Mulugeta & Achenef [21] and Mohammed Kasim et al. [22] in the northern and central rift valley of Ethiopia argued a similar idea that the majority of the local people also expressed positive attitude and have high participation towards the rehabilitation activities through enclosure. However, there was low participation in lowland areas; even some participants take part after the decision for only incentives during the meeting and conservation works. Birhane [23] in the West Amhara Region reasoned a similar argument that the local communities and most of the people have negative views about enclosure and they feel disadvantaged because of the enclosures. People argued that the enclosure losses culturally and spiritually valuable places, reduction in grazing areas, and fewer opportunities to harvest fuelwood and dung.

5.2. Economic Indicators of Area Enclosure in the Study Areas.

In the highlands and lowland areas, there was a high conflict of interest among user groups and the government (>71%). This is because the right to use and becoming user group in an enclosure in the highland exclude landless youths. In lowland areas, the local community has restricted to use right only fuelwood collection of dead woods. Even, cut and carry grasses collected by the local community have been given to the kebele administrations in the lowland enclosures. In mid-altitude enclosures, there was a low conflict because of the members, and the right to use is given to landless youths. Mengistu Tefera et al. [24] realize that the issue of benefit, equitable distribution among community members, and security of ownership are the basis for the development and success of area enclosure and good attitude and trust in forest restoration with area enclosures.

As Mammo [25] apart from the biodiversity and soil quality improvement, the local community has benefited from the enclosure in the form of forage for livestock by the

cut and carry system and farmland protection from clotting with silt and mud from the upper catchments. This has developed a positive attitude by the local communities towards enclosure development. Standing from this, the respondents (69%) in highland areas said that area enclosure supports our livelihood, while in mid-altitudes, 63% of the respondent said that the area enclosure supports and improves our livelihood. However, in lowland areas, most respondents argue that the area enclosure does not improve our livelihood.

5.3. Institutions of Area Enclosure Against Ostrom's Design Principles

5.3.1. Clearly Defined Boundary. All organized communities in highland and mid-altitude areas managing the forest restoration practices in all agroecology have clear boundaries with a legally prepared map. However, there is still boundary conflict, which has made the lagging of forest restoration successful. In lowland areas, the boundary is not clear, which is a means of conflict between users and nonusers. This is one of the determining factors for the unsuccessfulness of forest restoration. This idea is similar to [11, 15] that clear boundary is a key principle for successful forest restoration with community participation, which makes distinct uses of resources between users and nonusers. This indicates a clear and define resource boundary reduced the probability of conflict is occurrence. According to [26] well-defined community boundaries in common-pool resources management distinct access and use rights of users and nonusers which increases the chances of management success. Furthermore, the study by [27, 28] used Ostrom's design principle for the institutional evaluation of common-pool resource management and argued that clearly defined boundary of the natural resources identifies the use and owner rights leading to the successfulness of the resources management in organized communities.

5.3.2. Institutions and Local Rules. The institutions, local bylaws, trust, conflicts, and the conflict resolving mechanism affect the successfulness and development of area enclosure. Most respondents (77–87%) perceived that all enclosure has local bylaws, which are legally signed. However, the most proportion of respondents from the population argued that the government in the top-down approach developed the local bylaws (Table 6). In terms of trust in institutions and local bylaws, most respondents (73–75%) in mid-altitude and highland areas have high trust, while in lowland areas, the local community (60%) have no trust in local bylaws and institutions (Table 7). Yami et al. [29] argued that in northern Ethiopia the village bylaws should be respected and aware of their importance to the communities to address forest degradation. Village bylaws prevented overexploitation of forest resources by facilitating users to have common goals in the management of enclosure and defining users who have access to the enclosure. If local rules are not aware and accepted by local people, bylaws were not effective in meeting the high expectations of users to get economic

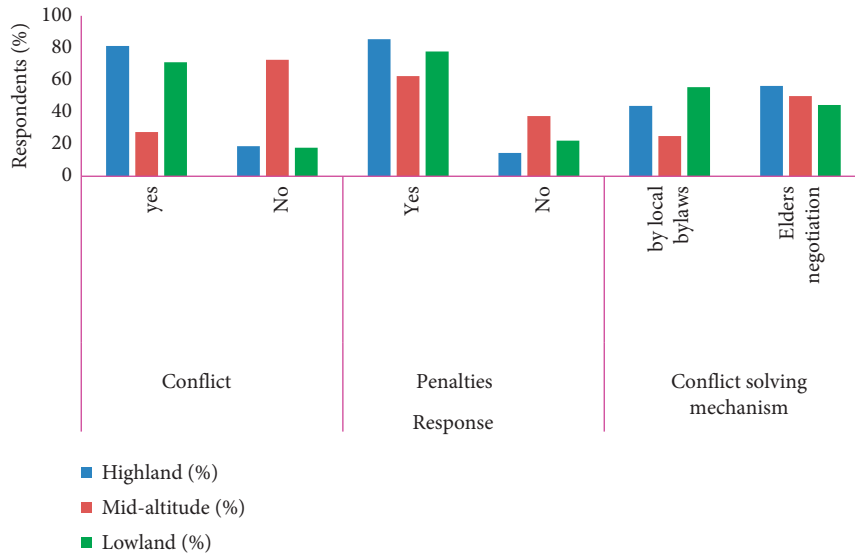


FIGURE 4: Conflict graduate sanction and conflict solving mechanism.

TABLE 10: Conflicts and graduate sanctions of area enclosure in the study area.

Principles	Highland	Mid-altitude	Lowland
Penalties	(i) Penalty is 50 birr per cattle (ii) Repeated violators are not penalized up to excluding from the user group	(i) Penalty is 100 birr per cattle (ii) Repeated violators are penalized up to excluding from the user group	(i) Penalty is 30 birr per cattle (ii) Repeated violators are not penalized (iii) Some violators have not even been penalized
Conflict	(i) Landless youth are not user groups (ii) Thus, they violate the local bylaws (iii) Border farmers encroach on the enclosure area (iv) Conflicts are mostly resolved with the negotiation of elders	(i) There is no more conflict but sometimes during benefit-sharing (ii) Conflicts are mostly resolved with the negotiation of elders and on table discussion	(i) They violate the local bylaws (ii) Border farmers encroach on the enclosure area (iii) Conflicts are resolved with the negotiation of elders, but mostly by the local rules
Evaluation	Medium	Strong	Very weak (absent)

TABLE 11: Right to organize for area enclosure in the study area.

Principles	Highland	Mid-altitude	Lowland
Right to organize	(i) Organized by the government (ii) Have no right to self-organized (iii) The users do no evaluate the district and professional supports (iv) The use right is forever	(i) Organized by the government based on their interest (ii) Have the right self-organize and ask for additional open grazing land for enclosure (iii) The user does no evaluate the district and professional support (iv) The use right is forever but has no ownership right (v) They are frustrated with the state change as before	(i) Organized by the government (ii) Have no right to self-organize (iii) The users do no evaluate the district and professional support
Evaluation	Medium	Strong	Very weak (absent)

benefits from enclosure. Biophysically, there is some improvement in lowland areas, but the institutions are weak to implement the local bylaws. Local people and members of enclosure should be benefited, but it is not in the lowland areas. The presence and sustainability of institutions with strong local bylaws make a clear difference in whether the area enclosures are successful or not. The experience in different parts of the world [28] shows that the common pool

resource management without an organized community is not successful.

5.3.3. *Collective Choices of Action.* In highland and lowland areas, the user groups have the right to add to the local rule but not minimize the rule formulated by the government at the official level, while in mid-altitude areas the local rules

TABLE 12: Monitoring and evaluation of area enclosure in the study areas.

Principles	Highland	Mid-altitude	Lowland
Monitoring and evaluation	(i) The resource protected by guards employed by the government (ii) The user does not control the guard in repeated encroachment (iii) Exclude landless youth who makes repeated violations (iv) Biophysical condition evaluated by the government with not clearly stated criteria	(i) The resource protected by guards employed by the user groups (ii) So, they have the right to control guard for repeat encroachment (iii) The users are only landless youths (iv) Biophysical condition evaluated by the members guided by professionals (v) But they have not sated criteria to evaluate the biophysical, social, and institutional strength (vi) They monitor their cost and benefit and have the account book	(i) The resource protected by guards employed by the government (ii) The user does not control the guard in repeated encroachment (iii) Biophysical condition evaluated by the government with not clearly stated criteria (iv) Still, the members have not used right (v) The benefit is for the kebele administration
Evaluation	Medium	Very good	Very weak (absent)

and institutions were developed by the discussion with members. Group members must be able to create at least some of their own rules and make their own decisions by consensus [13].

In mid-altitude areas, the member and local communities have the power of decision-making guided by professionals at the kebele level. The user groups have the right to add but not reduce the local bylaws. They have a monthly meeting of the committee and the user groups and have an annual meeting like the general assembly. In particular, in highland and lowland areas the economic and institutional conditions are not examined, while in mid-altitude areas the institution and economic condition of enclosure are evaluated annually (Figure 2). In the highland areas, the management plan was prepared at the district level and the members applied that plan guided by kebele officers, while in mid-altitude areas the management plan of area enclosure was developed and applied by the full participation of members. However, there is no management plan for lowland areas. This is why in the highland and mid-altitude areas, the social, economic, and institutional setups for enclosure are to some extent strong. In these areas, local communities and user groups have the use right. There is a strong institutional setup to implement the benefit and cost-sharing and local bylaws. Thus, the local community develops a sense of ownership and control of the enclosure. This makes area enclosure successful to achieve conservation and social development goals. If there are no strong institutions with legally signed local bylaws and a lack of benefit to local communities, the community has not cared for violations of local bylaws. This leads to the enclosure that became failed. However, as Stanturf et al. [30] restoration success is tremendous, which means difficult to detect or grasp by the mind or analyzed. It depends on the history of land uses, institutions and local rules, community trust, acceptance and participation, government priority, and reference sites.

5.3.4. Monitoring and Evaluation. In all agroecologies, some guards protected the enclosure employed by the government. However, there are high livestock and human encroachment in the lowland areas. The guards are employed

by the government so the members have no right to control guards in repeated violation of local bylaws (Table 12). This shows that users of organized community for forest restoration with area enclosures have no freedom to evaluate and monitor the resources, which make low trust and reduced the sense of the ownership. If the user groups have low trust and limited participation, the restoration may not be successful. The research by [31] argued a similar idea that freedom of local decision-makers enhances the successfulness of forest restoration with area enclosures as a common pool resource management. It makes the local communities more empowered, develops trust, and becomes actively participated, and finally, the restoration becomes successful with ecologically sound, economically profitable, and widely accepted. The mid-altitude and highland area enclosure institutions have relatively the right to evaluate and monitor their biophysical resources. However, the institutions in the lowland enclosures have no freely monitoring and evaluate the biophysical resources (Table 12).

5.3.5. Conflict, Resolving Mechanism, and Graduate Sanction. In lowland and highland area enclosures, there were repeated violations of local bylaws. The repeated violators have not that much punished, which makes the high conflict in addition to excluding landless youths from user groups. In mid-altitude area enclosures, the user groups were landless youths and there is a high graduate sanction up to excluding from user groups. Thus, the chance of occurring conflict was limited. The conflicts in all area enclosures were solved with negotiation mostly and sometimes with local rules. The elite elders take lead in conflict resolution with indigenous solving mechanisms. Thus, the enclosures in mid-altitude areas were in good compliance than lowland and highland enclosures. Most global and regional evaluations [13, 27, 28] of institutions organized for common pool resource management argued that repeated violations, graduate sanctions, and conflict resolution mechanisms are the best principles to determine whether the resource management is successful or not. The conflict must be solved quickly with indigenous knowledge; otherwise, the institution and local rules may decline and the resources become the tragedy of the commons again.

5.3.6. *The Right to Organize.* The model area enclosure institution in terms of the condition of the organization is mid-altitude area enclosure, in which the user groups were organized by the government with their interest, and they have the right to ask for additional resources and support. This makes them take the resources as their resources and have a great commitment to take responsibilities with revenues. However, lowland and highland area enclosures were weak in terms of self-mobilization, which means the user groups were organized by the government and did not have the right to ask, and were not self-organized. This makes reservation among and within the user groups, which finally leads to the decline of the institution and the resources too. Similarly, [13] argued that user groups for common pool resource management must have the authority to conduct their activities for active and strong participation in resource management for the success of averting the tragedy of the commons. Furthermore, [26, 27] argued that self-mobilization and organization of local communities for common pool resource management increase trust and participation, which achieves the goal of common pool resource management.

Generally, based on Ostrom's design principles (ODPs), enclosure in the highland is in medium compliance with the ODP, and strong and very good compliance with the ODP was observed in the mid-altitude area enclosures. The governance structure in the lowlands showed very poor compliance with the ODP. This was triangulated when 79% of the respondents in highland and 82% in mid-altitude argued that area enclosure is successful, compared with the lowland where 82% of respondents argued that area enclosure is not successful [32].

6. Conclusion and Recommendation

There are good participation and trust of local communities for area enclosure in highland and mid-altitude areas but not in lowland areas. This is because of economic benefit and institutional strength in mid-altitude and highland areas. As a result, in highland and mid-altitude areas of enclosure the user groups and local communities are supported and improved. This develops a positive attitude of the local community towards area enclosure. However, in lowlands, the biophysical condition of area enclosure is good, but there are no strong institutions, and the benefits are not distributed for user groups. Thus, the local community in this area has a negative attitude and does not sense responsibility for enclosure practices. Thus, the area enclosure is weak and it became failed.

Based on Ostrom's [19] design principles (ODPs), enclosure in the highland is in medium compliance with the ODP, and strong and very good compliance with the ODP was observed in the mid-altitude areas. The governance structure in the lowlands showed very poor compliance with the ODP. This was triangulated with the respondents in highland and mid-altitude that claimed area enclosure is successful, compared with the lowland that area enclosure is failed. Therefore, forest restoration with area enclosure is the best-degraded forest restoration tool with a strong intuitive, economic, and social setup.

In the highland areas, area enclosure supports and improves the local communities and the local community has good participation and trust. The institution is in good condition based on Ostrom's design principle. However, there is a high occurrence of conflict due to user rights. Their bylaw and institution exclude landless youth from user groups. Therefore, the landless youth should become a user group for successful and sustainable forest restoration. The other problem in the highland area is that the institution organized for area enclosure is mostly formal institutions organized by the government. Informal institutions such as "Mahiber and Senbete" should be participated in strong and sustainable institutions. In mid-altitude areas, enclosure supports and improves the local communities and the local community has good motivation and trust. The institution is a very good condition based on Ostrom's design principle. The members are landless youth and have high government support. In this area, the members have the right to the production of seasonal cropping. The livestock for cropping practice moves into the enclosure during rainy season. This time is a critical time for natural regeneration. Thus, the livestock may be injured by the seedlings and soil condition by browsing and trampling. Thus, care and professional advice should take during seasonal crop production.

In lowland areas enclosure, there were low participation and trust of local people. This is because the local communities and user groups are not yet benefited. The institution is in a weak condition based on Ostrom's design principle. This resulted in the institutions for area enclosure do not meet the ecological and human well-being objectives. Thus, first of all, the benefit should be shared for the local community and user groups. The user groups should be get used right. The institution should be renewed and strengthened.

Generally, for successful and sustainable forest restoration practice with area enclosure, it should follow the following strategies: the approach should start at the bottom, which means that the activity should require the full participation of the local community starting with site selection, planning, and final evaluation and building a strong institutional setup first; before starting the restoration practices, the factors should identify and prepare the appropriate plan and state that the technique and approach depend on identified factors, which means state solution for determinant before starting the activity; after the enclosure is applied, indicators should be selected and the practice is evaluated; and successes and failure factors should be identified and then finally the failure practice taking experiences from successes factors are improved.

Further, the research will be required on the ecosystem goods and services of the forest under area enclosure.

Data Availability

The data will be shared upon authors request.

Conflicts of Interest

The authors declare that they have no conflicts of interest.

Supplementary Materials

The provided Excel contains the data. (*Supplementary Materials*)

References

- [1] S. Chakravarty, S. K. Ghosh, and C. P. Suresh, "Deforestation: causes, effects and control strategies," *Global Perspectives on Sustainable Forest Management*, pp. 3–29, 2011.
- [2] Y. Eshetu, "Deforestation in tropical Africa," in *Sustainable Forestry Challenges for Developing Countries*, M. Palo and G. Mery, Eds., p. 375, 1st edition, Kluwer Academic Publishers, Helsinki, Finland, 1996.
- [3] D. Danano, *Area Closure for Rehabilitation Ethiopia—Meret Mekele Enclosing*, Mekelle University, Mek'ele, Ethiopia, 2003.
- [4] K. Unger, *Area Enclosure Management in Ethiopia—A Multiple Case Study from the Adami Tulu Jido Kombolcha Woreda*, Technical University of Dresden Faculty, Dresden, Germany, 2016.
- [5] G. Kidu, B. Gebremedhin, E. Birhane, and H. Kassa, "Does communal forest intervention management enhance forest benefits of smallholder farmers? evidence from hugumbirda forest, tigray, Ethiopia," *Journal of Sustainable Forestry*, vol. 9811, 2017.
- [6] S. T. Holden and M. Tilahun, "The importance of Ostrom's design principles: youth group performance in northern Ethiopia," *World Development*, vol. 104, pp. 10–30, 2018.
- [7] G. Hardin, "The tragedy of the commons," *Science*, vol. 162, no. 3859, pp. 1243–1248, 1968.
- [8] E. Ostrom, *Governing the Commons*, Cambridge University Press, Cambridge, UK, 2011.
- [9] J. I. Ricks, "Building participatory organizations for common pool resource management: water user group promotion in Indonesia," *World Development*, vol. 77, pp. 34–47, 2016.
- [10] P. Bednarik, J. Linnerooth-Bayer, P. Magnuszewski, and U. Dieckmann, "A game of common-pool resource management: effects of communication, risky environment and worldviews," *Ecological Economics*, vol. 156, pp. 287–292, 2019.
- [11] P. Mudliar and T. M. Koontz, "Locating power in Ostrom's design principles: watershed management in India and the United States," *Society & Natural Resources*, vol. 34, no. 5, pp. 639–658, 2021.
- [12] S. R. Gari, A. Newton, J. D. Icely, and M. M. Delgado-Serrano, "An analysis of the global applicability of Ostrom's design principles to diagnose the functionality of common-pool resource institutions," *Sustainability*, vol. 9, no. 7, p. 1287, 2017.
- [13] G. Robert, O. Williams, B. Lindenfalk et al., "Applying Elinor Ostrom's design principles to guide co-design in health (care) improvement: a case study with citizens returning to the community from jail in Los Angeles County," *International Journal of Integrated Care*, vol. 21, no. 1, pp. 1–15, 2021.
- [14] P. Seward and Y. Xu, "The case for making more use of the Ostrom design principles in groundwater governance research: a South African perspective," *Hydrogeology Journal*, vol. 27, no. 3, pp. 1017–1030, 2019.
- [15] T. Haryanto, J. Van Zeven, and K. Purnhagen, "Ostrom's design principles as steering principles for contractual governance in 'hotbeds,'" *Forestry and Society*, vol. 6, pp. 175–201, 2022.
- [16] S. Sarr, B. Hayes, and D. A. DeCaro, "Applying Ostrom's institutional analysis and development framework, and design principles for co-production to pollution management in Louisville's Rubbertown, Kentucky," *Land Use Policy*, vol. 104, Article ID 105383, 2021.
- [17] F. Ephrem, *The Link Between Food Security and Land Degradation: Analysis of Determinants in Drought Prone Areas of Northeast Ethiopia. A Case of Sekota Woreda*, Addis Ababa University, Addis Ababa, Ethiopia, 2008.
- [18] M. Kassaye, A. Abiyu, and A. Alemu, "Effect of forest restoration on vegetation composition and soil characteristics in north Wollo and Waghemira zones, northeastern Ethiopia," in *Proceedings of the 2nd International Electronic Conference on Forests and Sustainable Forests: Ecology, Management, Products and Trade*, Basel, Switzerland, 2022.
- [19] E. Ostrom, *Governing the Commons: The Evolution of Institutions for Collective Actions*, Cambridge University Press, Cambridge, UK, 1990.
- [20] R. J. Fisher, "Participatory forest management, sustainable livelihoods and poverty reduction: experiences from community forestry in Asia," in *Participatory Forest Management [PFM], Biodiversity and Livelihoods in Africa*, Bangladesh Agricultural University, Mymensingh, Bangladesh, 2007.
- [21] G. Mulugeta and M. Achenef, "Socio-economic challenges of area enclosure practices: a case of Gonder Zuria Woreda, Amhara region, Ethiopia," *Journal of Natural Sciences Research*, vol. 5, no. 13, pp. 123–133, 2015.
- [22] M. M. Y. M. Mohammed Kasim, Z. Assfaw, and A. Derero, "The role of area closure in the recovery of woody species composition in degraded land and its socio-economic impact in Central Rift Valley, Ethiopia," *International Journal of Development Research*, vol. 5, 2015.
- [23] A. A. Birhane, *From Open Access to Common Property through Enclosure: An Analysis of Different Responses to the Enclosure of Avual in Korie, Ethiopia*, Wageningen University, Wageningen, Netherlands, 2014.
- [24] Y. Y. Mengistu Tefera, T. Demel, H. Hulthen, and Y. Yemshaw, "The role of communities in closed area management in Ethiopia," *Mountain Research and Development*, vol. 25, no. 1, pp. 44–50, 2005.
- [25] K. Mamo, *Enclosure as a Viable Option for Rehabilitation of Degraded Lands and Biodiversity Conservation: The Case of Kallu Woreda, Southern Wollo*, Addis Ababa University, Addis Ababa, Ethiopia, 2008.
- [26] K. Lacroix and G. Richards, "An alternative policy evaluation of the British Columbia carbon tax: broadening the application of Elinor Ostrom's design principles for managing common-pool resources," *Ecology and Society*, vol. 20, no. 2, p. art38, 2015.
- [27] J. Dell'Angelo, P. F. Mccord, D. Gower, S. Carpenter, K. K. Caylor, and T. P. Evans, "Community water governance on Mount Kenya: an assessment based on Ostrom's design principles of natural resource management," *Mountain Research and Development*, vol. 36, no. 1, pp. 102–115, 2016.
- [28] C. Nguyen Thi Quynh, T. Quynh, S. Schilizzi, A. Hailu, and S. Iftekhar, "Vietnam's territorial use rights for fisheries: how do they perform against Ostrom's institutional design principles," *World Development Perspectives*, vol. 17, Article ID 100171, 2020.
- [29] M. Yami, W. Mekuria, and M. Hauser, "The effectiveness of village bylaws in sustainable management of community-managed enclosures in northern Ethiopia," *Sustainability Science*, vol. 8, no. 1, pp. 73–86, 2012.

- [30] J. A. Stanturf, S. H. Schoenholtz, C. J. Schweitzer, and J. P. Shepard, "Achieving restoration success: myths in bottomland hardwood forests," *Restoration Ecology*, vol. 9, no. 2, pp. 189–200, 2001.
- [31] W. Mekuria, E. Veldkamp, M. Tilahun, and R. Olschewski, "Economic valuation of land restoration: the case of exclosures established on communal grazing lands in Tigray, Ethiopia," *Land Degradation & Development*, vol. 22, no. 3, pp. 334–344, 2011.
- [32] Z. Gebreegziabher, A. Mekonnen, B. Gebremedhin, and A. D. Beyene, "Determinants of success of community forestry: empirical evidence from Ethiopia," *World Development*, vol. 138, Article ID 105206, 2021.