



Effectiveness of Co-Management Approach for Conflict Resolution in Jozani Chwaka Bay National Park and Muyuni B Community Forest, Zanzibar

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Abstract

Forests found in Zanzibar archipelago consist of short coral scrub to higher closed canopy forests and mangroves. Local people have been using the forests for medicinal plant uses, fuel wood, building materials and food. However, there are growing conflicts on access, ownership and uses of the forest resources despite these forests being managed by diverse management arrangements including local community participation. The study aimed to examine the level community participation in co-management for conflict resolution in Jozani Chwaka Bay National Park (CBNP), to identify measures taken by stakeholder through co-management approaches to resolve conflict in JCBNP. The study sample of 50 respondents was obtained from the communities of Chwaka, Charawe, and Muyuni B villages. The data were collected by face-to-face interview household-based survey methods. Both descriptive and inferential data analyses were applied to meet the study objectives. The study showed that most respondents (42%) of communities do not participate in patrolling related decisions, 52% participate in trainings about forest conservation activities while only 60% participate in incentives planning related to forest conservation. The study shows that the highest rated measures (30%) of conflict resolution is the use of police forces while, the poverty reduction was rated highest (34%) positive effect of co-management approach to resolve in JCBNP, followed by 32% community empowerment. The results showed a significant relationship between actions taken to resolve conflicts and the reasons for the effectiveness of the co-management approach (Chi-Square value = 51.95, $p = 0.041$). There is high significant relationship (Chi-Square value = 21.996, $p =$

0.000) between variables “training and patrolling effectiveness” meaning that these two variables are closely related to forest conservation. The study concludes that embedding the participatory approach at JCBNP would improve the performance in reducing conflicts and enhance conservation mechanism for maintaining the equilibrium of Jozani, Chwaka Bay ecosystem.

Subject Areas

Environmental Sciences

Keywords

Forest, Co-Management, Conflict Resolution, Conservation, Patrolling, Training

1. Introduction

Forest management has undergone significant transformations over the past decades, shifting from traditional to centralized and, more recently, to participatory approaches. Globally, these changes have been driven by the need for sustainable resource management, biodiversity conservation, and local community empowerment [1]. Historically, forests were managed traditionally through local customs, religious beliefs, and taboos that regulated access and ensured conservation with minimal government interference [2].

Following the 1964 Revolution, all land and forest reserves were nationalized, and management became government driven. While intended to protect forests, centralized management often excluded local participation, leading to inefficiency, corruption, deforestation, and persistent conflicts between communities and state authorities [3]. These shortcomings mirrored global challenges, prompting a paradigm shift after the 1992 Rio Earth Summit toward participatory forest management (PFM) that integrates communities into conservation efforts [4].

Introduced in Zanzibar during the 1990s, PFM promotes shared decision-making between government institutions and local communities [5]. It operates through two main models: Community-Based Forest Management (CBFM) and Co-management, both legally supported by the 1995 Forest Policy and the 1996 Forest Conservation and Management Act [6]. These initiatives facilitated the creation of Village Conservation Associations (VCAs) and Community Forest Management Agreements (COFMAs), encouraging collective responsibility for forest conservation.

Despite its successes, PFM in Zanzibar faces persistent challenges, including illegal logging, forest fires, financial constraints, and resource-use conflicts among communities and management institutions [7] [8]. Conflicts, ranging from boundary disputes to resource utilization disagreements, continue to undermine sustainable forest governance. These dynamics underscore the importance of evaluating the effectiveness of participatory approaches, particularly co-management strategies, in promot-

ing conflict resolution and sustainable resource management in protected areas such as the Jozani-Chwaka Bay National Park (JCBNP).

Despite these participatory efforts, forest management under the co-management framework in Zanzibar continues to face persistent challenges, particularly conflicts among community members, between communities and park management, and between individuals and institutions [9]. While numerous global studies have examined forest management systems and their related conflicts [10] [11], only a few have focused on Zanzibar's context.

Existing research has primarily assessed the effectiveness of co-management in promoting sustainable forest use and improving community livelihoods [7] or explored the nature of resource-use conflicts and participation in conservation efforts [9] [12]. However, there remains limited empirical evidence to the extent to which co-management has effectively resolved forest-related conflicts in JCBNP. Addressing these gaps is essential for improving forest governance and fostering harmonious relations between local communities and conservation authorities.

Therefore, this study aimed to assess the effectiveness of the participatory co-management approach in addressing forest-related conflicts within Jozani-Chwaka Bay National Park (JCBNP), Zanzibar. Specifically, it examined the extent of community participation in forest management, identified the main types and sources of forest-use conflicts, and evaluated the effectiveness of existing conflict resolution mechanisms. Findings from this study are expected to inform policy and practice toward strengthening participatory forest governance in Zanzibar and similar conservation settings.

2. Methodology

2.1. Study Design

A cross-sectional research design was employed to collect primary data from households at a single point in time. This design was selected for its cost-effectiveness and its ability to provide a snapshot of community participation, management interventions, conflict types, and resolution mechanisms, thereby offering a clear understanding of co-management practices and other related management approaches in the study area.

2.2. Study Area

This study was conducted on Unguja Island within the Jozani-Chwaka Bay National Park (JCBNP) situated about 35 km south from Zanzibar Town. The research focused on three Shehias; Charawe, Chwaka, and Muyuni B. Charawe and Chwaka are members of the Jozani Environmental Conservation Association (JECA) and actively participate in co-management arrangements within JCBNP. In contrast, Muyuni B, which lies outside the park, is not part of JECA but is affiliated with the South Environmental and Development Conservation Association (SEDCA), managing its forests under Community Forest Management Agreements (COFMA).

2.3. Study Population

The study population comprised residents of three Shehias; Chwaka, Charawe, and Muyuni B surrounding JCBNP. The populations in these areas depend primarily on fishing, agriculture, and forest resource utilization for their livelihoods. Rapid population growth, particularly in Chwaka, has increased pressure on forest resources, making these communities central to assessing the dynamics of participatory forest management and conflict resolution in Zanzibar. The study targeted adult household members (aged 18 years and above) from those Shehias who were knowledgeable about forest resource use and management.

2.4. Sampling and Data Collection

A non-probability-controlled convenience sampling approach was used to select household respondents who were available and met study criteria, including age and local residence. A total of 50 respondents participated in the study. Data was collected using structured questionnaires administered to household heads to capture demographic information, occupations, and forest conservation practices. The nature of such sampling process though sometimes can have limitations due to including members who are available not strictly who can be fully appropriate to respond; in this study those sampled members were all matured (18 years old) who are aware about the forest and associated conflicts. Meanwhile, the smallness of sample size did not affect the use of Chi-square test as none of expected cell counts were less than 5.

2.5. Data Analysis

Collected data were checked for completeness, coded, and entered a spreadsheet for analysis. Data were analyzed using SPSS version 25. Descriptive statistics, including frequencies and percentages, were used to summarize the data while Chi-square tests of independence were applied to examine associations between the role of co-management in resolving conflicts and the actions taken, as well as the relationship between training and patrolling effectiveness. All tests were conducted at a 5% level of significance.

2.6. Ethical Consideration

Ethical clearance was obtained from the Zanzibar Research Unit, and a research permit was issued by the Revolutionary Government of Zanzibar. Local leaders were informed of the study objectives, and verbally informed consent was obtained from each participant. Respondent anonymity and confidentiality were strictly maintained.

3. Results

3.1. Socio-Demographic Characteristics of Respondents

A total of 50 respondents participated in the study, comprising 29 males (58%)

and 21 females (42%). Chwaka had the highest proportion of respondents (46%), followed by Muyuni B (34%) and Charawe (20%). The predominance of participants from Chwaka suggests stronger engagement and interaction with the park's conservation initiatives, possibly due to its proximity and socio-economic reliance on forest and marine resources. Most respondents (52%) had attained secondary education, while 30% completed primary school and 10% had university-level education. Only 8% of respondents reported having no formal education (**Figure 1**).

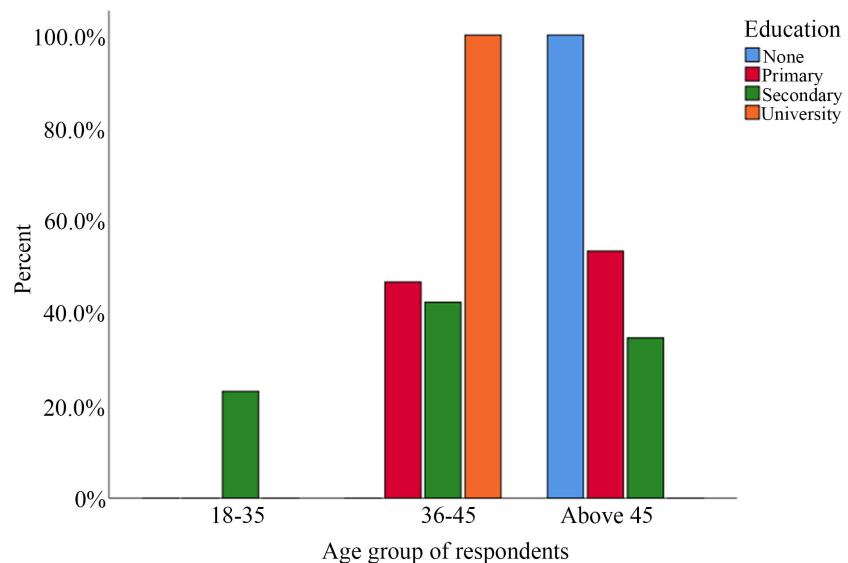


Figure 1. Distribution of educational levels by age groups (years).

Many participants (46%) were aged between 36 and 45 years, followed by 42% above 45 years, and 12% aged 18 - 35 years. The Chi-square test ($\chi^2 = 20.13$, $p = 0.003$) indicates a statistically significant association between age and education level, suggesting that educational attainment tends to vary across age groups, with younger respondents generally having higher education levels than older ones.

3.2. Community Participation in Co-Management Approach

The study found that community participation in co-management activities varied by age and gender. Male respondents were more actively involved in patrolling than females, with the highest participation among men above 45 years. Younger males (18 - 35 years) and most females reported low involvement, although participation among women was slightly higher in the oldest ages. Overall, patrolling roles were predominantly male-dominated and more common among older community members, reflecting traditional gender roles and age-related authority in community-based forest management.

3.3. Community Participation in Decision Making Regarding Conflict Resolution

Regarding participation in decision-making regarding conflict resolution, 42% of

respondents reported no involvement, 34% had little involvement, 18% reported a moderate role, and only 6% perceived their influence as large. Chwaka showed the highest representation across all participation levels, followed by Muyuni B, while Charawe exhibited minimal engagement. These results indicate that community participation in decision-making regarding patrolling activities remains limited, with most residents exerting little to no influence over the process.

3.4. Community Participation in Training

Participation in training programs related to co-management activities varied significantly across the three Shehias surveyed; Charawe, Chwaka, and Muyuni B. Overall participation was moderate, with 52% reporting attendance. However, participation rates varied significantly by location. Charawe recorded the highest level of engagement, with 70% of respondents having attended the training program compared to 30% who did not. In Chwaka, participation was moderate, with 56.5% of individuals trained, whereas in Muyuni B only 35.3% reported attending the training, with the majority (64.7%) not participating. These findings indicate notable disparities in awareness and outreach effectiveness across Shehia, suggesting the need for targeted efforts to improve participation, particularly in Muyuni B.

3.5. Types of Conflicts Reported by Respondents

Regarding types or sources of conflicts (**Figure 2**), Charawe reported illegal logging (40%) and utilization conflict (24%) as the major issues, while Chwaka showed a strong dominance of utilization conflict (48%), followed by ownership conflict (23%) and illegal logging (22%). In contrast, Muyuni B primarily experienced management conflict (33%), along with notable levels of illegal logging (27%) and utilization conflict (20%). These variations illustrate that each Shehia faces distinct forest-use pressures and governance challenges.

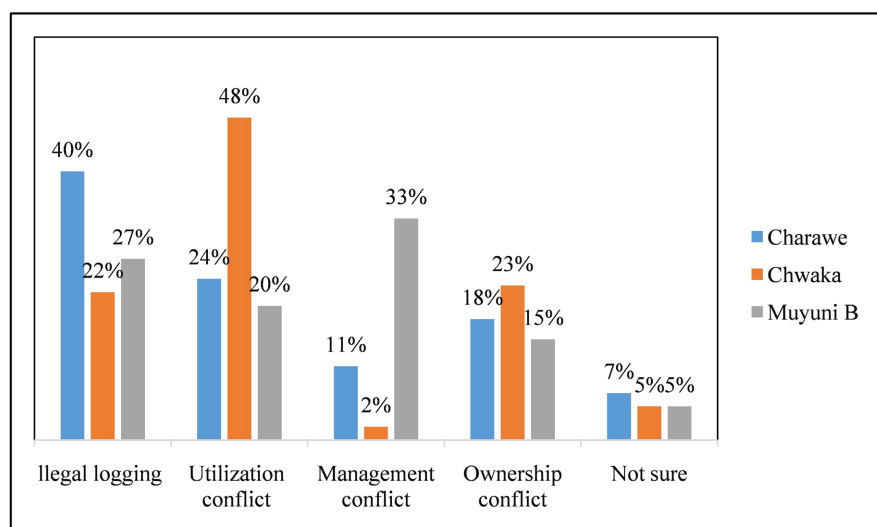


Figure 2. Types of forest related conflict in study sites.

3.6. Measures Taken by Communities to Resolve Conflicts through Co-Management Approach

Results in **Figure 3** display community respondents rated measures taken regarding forest conservation using co-management approach. The results show that the police force, typically used to maintain public order, has limited power within the community. Considering the study sites, **Figure 3** summarizes the results of patrolling-decision making across three Shehias. The results reveal that community involvement (28.0%) and police participation (30.0%) were the most frequently cited forms of engagement in patrolling decision-making, followed by court and empowerment mechanisms (each 18.0%).

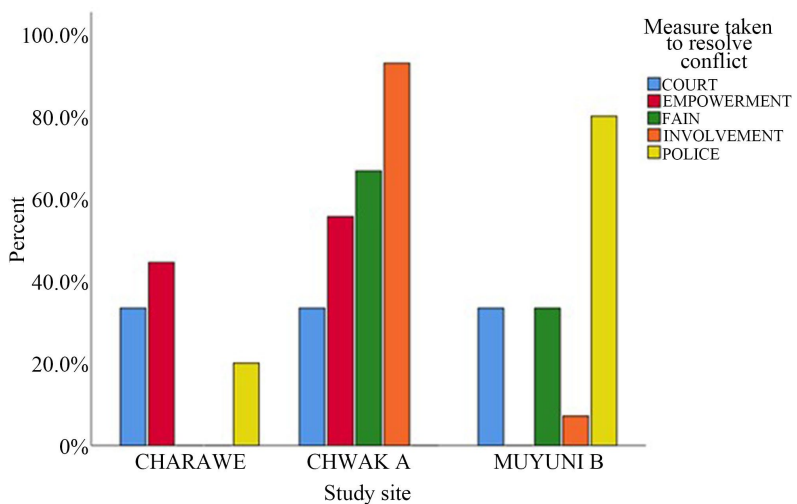


Figure 3. Measures taken by communities to resolve conflicts through co-management approach.

3.7. Effectiveness of Co-Management Approach

Co-management Activities Distribution

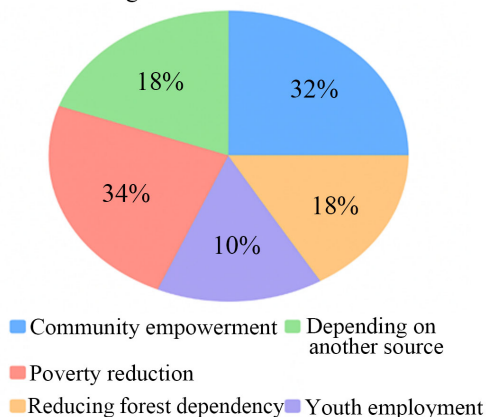


Figure 4. Distribution of co-management activities.

The distribution of co-management activities (**Figure 4**) indicates that poverty reduction (34%) and community empowerment (32%) are the most effective areas

of co-management approach. These two activities collectively account for more than two-thirds of all interventions, suggesting a strong emphasis on improving livelihoods and local participation in resource governance. Depending on another source (18%) also reflects a moderate reliance on external support mechanisms. Conversely, reducing forest dependency (6%) and youth employment initiatives (10%) are less prioritized, highlighting potential gaps in addressing environmental sustainability and targeted socio-economic opportunities for young people.

3.8. Association among Factors and Measures Taken to Resolve Conflicts

Figure 5 compares the participants' responses based on the proportion of actions taken to resolve conflicts according to the reasons that make co-management approach to be more effective in conflict resolution at Jozani Chwaka Bay National Park. The chart indicates that the highest rated action taken to resolve conflicts is the use of "police force" with the highest reason for this is the "compliance with regulation".

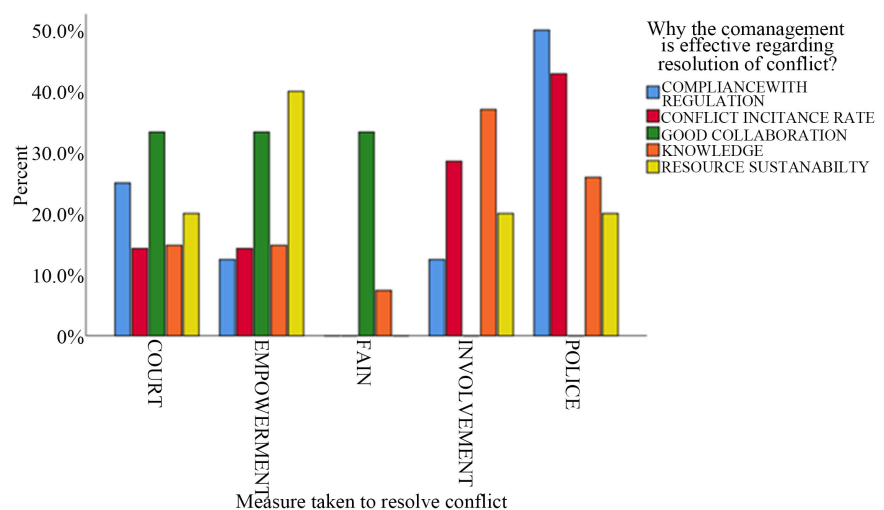


Figure 5. Distribution of actions taken to resolve conflict at JCBNP.

A Chi-square test was conducted to examine the association between actions or measures taken to resolve conflicts and the reasons for the effectiveness of the co-management approach. The results indicated a significant relationship between these two variables (Chi-Square value = 51.95, df = 36, p-value = 0.041 < 0.05). This underscores the importance of understanding the dynamic relationship between community-driven governance and formal enforcement mechanisms.

3.9. Association between "Role Played by Co-Management in Resolving Conflict" and "Action or Measure Taken to Resolve Conflict"

Regarding participants' responses on the role played by co-management in resolving conflicts. It indicates that the highest rated role played by co-management ap-

proach is the “poverty reduction” using “fain”, a measure taken to resolve conflicts. A Chi-square test showed no significant relationship between these two variables (Chi-Square value = 27.145, $df = 27$, $p\text{-value} = 0.456 > 0.05$).

3.10. Relationship between Training and Patrolling Effectiveness

Figure 6 compares the participants’ responses based on “training” and “patrolling effectiveness”. The chart indicates that the highest quantify rated response is “not” meaning the largest portion of respondents who were not rated the extent of decision making’ issues are the stakeholders who have “not” got training about patrolling-related matters.

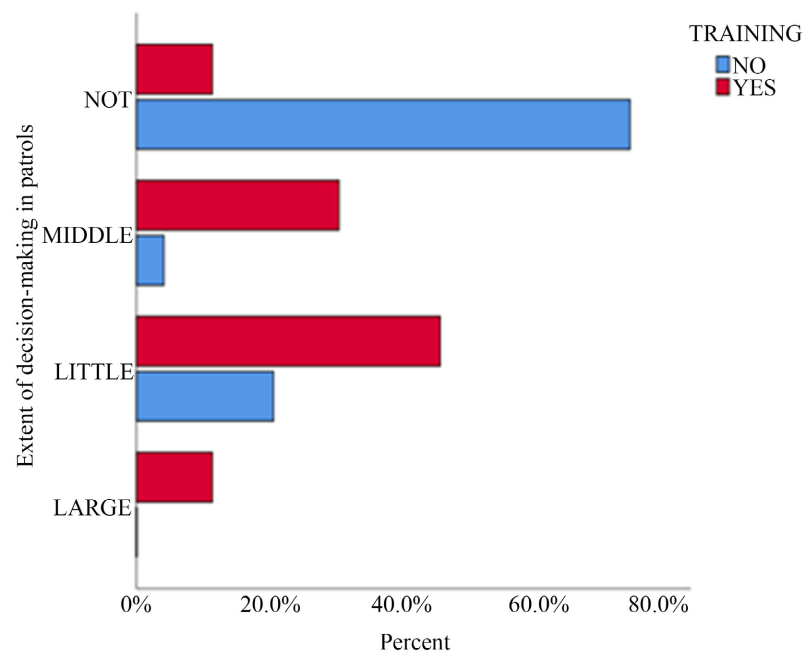


Figure 6. Relationship between training and patrolling effectiveness.

Chi-square test of association showed a presence of highly significant relationship (Chi-Square value = 21.996, $df = 3$, $p\text{-value} = 0.000 < 0.05$) between these two variables, meaning that training and patrolling effectiveness are closely related to each other in forest conservation management.

4. Discussion

This study examined community participation, training, and conflict resolution mechanisms within forest co-management structures across three Shehias in JCBNP Zanzibar. The results demonstrated moderated but meaningful participation of community members in management activities such as patrolling, awareness campaigns, and tree planting. This aligns with previous studies in coastal East Africa, which highlight that active community involvement strengthens compliance with conservation regulations and reduces illegal resource extraction [13] [14].

Training emerged as a critical determinant of management effectiveness. Respondents who had participated in conservation-related training exhibited greater knowledge of regulations and reported higher patrolling efficiency. This finding supports earlier evidence that capacity-building initiatives enhance local technical competence and encourage collective responsibility in co-management settings [15]. Continuous training and awareness programs can therefore empower local communities to make informed management decisions and reduce dependency on external interventions.

Regarding community participation in decision making in conflict resolution, the study found most residents having little to no influence over managing conflicts. These findings are consistent with [15] who emphasize that effective co-management requires stakeholders, particularly local communities, to have genuine influence over decisions, not just be consulted.

Community participation in training programs related to co-management activities was observed to vary significantly across the sites surveyed due to different awareness among communities and members themselves and called for more training as pointed out by [16] emphasize that capacity building through training strengthens local institutions and enhances community resilience in managing natural resource conflicts.

For the case of measures taken by communities to resolve conflicts through Co-management approach, community involvement (28.0%) and police participation (30.0%) followed by court and empowerment mechanisms (each 18.0%) indicating a small role of court in managing conflicts. These findings contrast with those of [17], who found that the court system plays an important role in resolving disputes. Also, these results differ from studies such as that of [18], who emphasized that successful natural resource conflict resolution requires prioritizing local participation and empowerment over external enforcement

Regarding the effectiveness of co-management, the findings suggest that the co-management strategy is primarily effective because it provides tangible socioeconomic benefits and fosters participatory legitimacy [19], highlights the importance of integrating local knowledge to improve legitimacy and adaptability, and while [20] stated that co-management with income diversification is more sustainable.

A significant association between actions taken to resolve conflicts and the reasons for the effectiveness of the co-management approach underscores the importance of understanding the dynamic relationship between community-driven governance and formal enforcement mechanisms. This argument is supported by Ostrom (1990) and Berkes (2009) who stressed that the success of co-management systems depends not only on external regulations but also on the integration of local knowledge and community empowerment in managing natural resources and resolving conflicts.

To sum up, the discussion of the findings shows that 1995 Forest Policy's objective of community-led forest management in Zanzibar is still constrained by

centralized control. Shehia Conservation Committees' capacity to enforce bylaws and resolve conflicts between forest uses is weakened by a reduction in local authority. This disconnect slows response to issues on the ground and reduces community accountability. Local ownership can be improved by fortifying benefit-sharing arrangements and legal requirements. To fully implement participatory forest governance in Zanzibar, regular collaborative planning and capacity building are necessary.

5. Conclusions

Based on various reported findings from the study, the following enumerated points are the summary of study conclusions:

- 1) Educational attainment is crucial for enhancing a community's ability to participate, understand rules, and effectively negotiate in resource governance.
- 2) There are disparities in access to training opportunities and institutional support.
- 3) Chwaka demonstrates comparatively higher engagement, reflecting stronger institutional support and community mobilization, while Charawe shows moderate involvement, and Muyuni B lags considerably.
- 4) The police play a significant role in patrolling decision-making, but their authority is complemented by notable community involvement, reflecting the principles of co-management.
- 5) The relatively lower participation of courts and empowerment mechanisms indicates that decision-making is still partly centralized.
- 6) Enhancing co-management effectiveness requires alternative livelihood opportunities and youth-focused initiatives to reduce dependence on forest.

6. Recommendations

For the communities to participate in forest management activities (co-management) to overcome conflicts at forest resource and to reduce some problems related to their participation as well as ensure the sustainability of forest resources, the following recommendations have been suggested for consideration.

- 1) To enhance educational programs through investing in educational and awareness programs to improve community understanding of rules, governance structures, and negotiation skills, enabling more effective participation in resource management.
- 2) To create equitable training opportunities by addressing disparities in access to training by ensuring that all Shehias, especially Charawe and Muyuni B, that need sufficient institutional support and capacity-building programs tailored to local needs.
- 3) To promote inclusive decision-making and reduce centralization by enhancing the role of courts, empowerment mechanisms, and other local governance structures alongside police participation in patrolling and management decisions.
- 4) To foster stakeholder collaboration including community members, local in-

stitutions, and law enforcement to increase transparency, accountability, and effectiveness in forest conservation efforts.

5) To create alternative livelihood initiatives particularly targeting youth, to reduce dependence on forest resources and ensure sustainable community engagement.

6) To strengthen conflict resolution strategy. While police involvement is effective, integrate community-based conflict resolution mechanisms alongside enforcement to complement compliance with regulations and leverage local knowledge.

Conflicts of Interest

The authors declare no conflicts of interest.

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