



Community Forest Stewardship and Its Role in Strengthening Local Environmental Resilience

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ABSTRACT: Community-based forest management is an important approach in dealing with increasing local environmental vulnerabilities due to climate change, ecosystem degradation, and socio-economic pressures. This study aims to analyze the role of community forest stewardship in strengthening local environmental resilience by placing the community as the main actor in forest management. The research uses a qualitative approach with a case study design in North Luwu Regency, South Sulawesi. Data were collected through semi-structured in-depth interviews with ten key informants comprising community-based forest managers, indigenous leaders, forest-dependent residents, and village officials, and supported by field observation and analysis of policy and environmental documents. The data was analyzed using thematic analysis. The results show that community-based forest management plays a role in maintaining ecosystem balance, reducing the risk of environmental damage, and increasing the adaptive capacity of communities through the application of local norms, collective management, and sustainable forest utilization. This study concludes that community forest stewardship is an effective strategy in strengthening local environmental resilience and provides important implications for the development of inclusive and sustainable social forestry policies.

Keywords: Community Forest Stewardship; Local Environmental Resilience; Social Forestry; Environmental Governance.

Submitted: 24-11-2025; Revised: 30-12-2025; Accepted: 26-01-2026

INTRODUCTION

Forests are ecological systems that have a strategic role in maintaining the global environmental balance through the provision of ecosystem services such as climate regulation, biodiversity conservation, and water resource protection. In recent decades, the pressure on forest ecosystems has increased significantly due to climate change, economic expansion, and unsustainable exploitation of natural resources, especially in the tropics (IPBES, 2022). Various international reports show that forest degradation contributes directly to the increased risk of environmental disasters such as floods, landslides, and droughts at the local level (Folke et al., 2021). This condition places local environmental resilience as a pressing issue in the global sustainable development agenda

As environmental vulnerability increases, forest management approaches that place local communities as key actors are gaining more attention in the forestry and environmental governance literature. The concept of community forest stewardship emphasizes the active involvement of the community in maintaining, managing, and utilizing forests in a sustainable manner based on local norms and collective management (Agrawal & Chhatre, 2021). International studies show that community participation can improve compliance with conservation rules and strengthen the adaptive capacity of socio-ecological systems (Reyes-García et al., 2020). Nevertheless, the effectiveness of this approach is highly dependent on the social, institutional, and ecological context at the local level.

In Indonesia, community-based forest management is institutionalized through social forestry policies in response to high tenure conflicts and the rate of forest degradation. Although these policies have expanded community access to forest resources, various studies have shown that their implementation still faces challenges in terms of institutional capacity, consistency of management practices, and environmental sustainability (Maryudi et al., 2021). A number of studies emphasize that the success of social forestry is not only determined by formal legal aspects, but also by stewardship practices that grow from local norms and the social cohesion of communities (Sahide et al., 2023). This shows the need for a more in-depth study of the role of communities in building real environmental resilience.

Although the literature on community-based forest management continues to grow, there is a significant research gap on the relationship between community forest stewardship and local environmental resilience. Most studies have focused on aspects of participation or economic benefits, while the socio-ecological mechanisms linking community management practices to the environment's ability to survive, adapt, and recover from disturbance have been underexplored empirically (Cumming et al., 2021). In addition, the concept of environmental resilience is often analyzed at the macro scale, so that community-based local dynamics receive less systematic attention (Berkes & Ross, 2021). This gap demonstrates the need for a more contextual and local practice-based approach to research.

This research aims to analyze the role of community forest stewardship in strengthening local environmental resilience by placing the community as the

main actor in forest management. In particular, this study examines the form of community involvement, the role of local norms and institutions, and the contribution of collective management to ecosystem protection and environmental adaptive capacity. This study was conducted in North Luwu Regency, South Sulawesi, as an area that represents the dynamics of community-based forest management while facing significant environmental pressures. Thus, this research is directed to answer how and why community stewardship practices contribute to local environmental resilience.

A qualitative approach with a case study design was chosen to capture the complexity of social-ecological relationships that cannot be adequately explained through a purely quantitative approach. This approach allows for an in-depth exploration of people's experiences, perceptions, and practices in forest management, as well as how those practices interact with local ecological conditions (Yin, 2022). Through in-depth interviews, field observations, and document analysis, this study seeks to build a comprehensive understanding of the mechanisms of community forest stewardship. This approach is in line with the development of environmental resilience studies that emphasize the importance of the perspective of local actors.

Theoretically, this research contributes to the development of the study of socio-ecological systems by strengthening the understanding of the role of communities in building environmental resilience from the bottom. This research offers a conceptual explanation of how local norms, collective management, and sustainable utilization practices function as mechanisms to strengthen environmental resilience. In practice, the findings of this study provide an empirical basis for the development of social forestry policies that are more contextual, inclusive, and adaptive to local environmental challenges. Thus, this research is expected to serve as a reference for policymakers, forestry practitioners, and communities in encouraging sustainable and resilient forest management.

THEORITICAL REVIEW

Community Forest Stewardship in Sustainable Environmental Governance

Community forest stewardship is understood as a form of forest management that places local communities as the primary custodians of natural resources through collective responsibility, social norms, and sustainable management practices. This approach developed in response to the limitations of the forest management model that is centralistic and less adaptive to local conditions. International studies show that community-based stewardship is able to enhance the legitimacy of environmental governance because it is rooted in historically tested local values, knowledge, and practices (Charnley et al., 2020). Thus, community forest stewardship not only serves as a technical instrument of resource management, but also as a social mechanism to strengthen environmental ownership and responsibility.

Community-Based Forest Management and Socio-Ecological Systems

From a socio-ecological system perspective, community-based forest management is seen as a dynamic interaction between social actors and natural

ecosystems. This approach emphasizes that environmental sustainability depends on a balance between social, economic, and ecological interests. Research by Partelow et al. (2021) shows that communities that are actively involved in resource management tend to develop adaptive rules that are able to respond to environmental changes more flexibly. This reinforces the argument that community involvement is an important prerequisite for maintaining the stability and sustainability of socio-ecological systems in forest areas.

The Role of Local Norms and Informal Institutions in Forest Stewardship

Local norms and informal institutions play a central role in the success of community forest stewardship. Customary rules, social agreements, and community-based sanction mechanisms are often more effective than formal regulations in controlling exploitative behavior. A study by Larson et al. (2022) shows that strong local institutions contribute to increased adherence to conservation practices and reduced resource conflicts. These norms serve as social control instruments that strengthen the sustainability of forest management in the long term.

Community Forest Stewardship and Local Environmental Resilience

Local environmental resilience refers to the ability of ecosystems and communities to survive, adapt, and recover from environmental disturbances. In this context, community forest stewardship acts as an adaptive mechanism that strengthens local capacity in the face of climate change and environmental degradation. Empirical research by Wilson et al. (2020) shows that areas with community-based forest management have lower rates of degradation as well as higher ecosystem restoration capacity. This indicates that community stewardship practices contribute directly to strengthening environmental resilience at the local level.

Social Forestry as an Instrument of Empowerment and Resilience

Social forestry is positioned as a policy framework that allows integration between conservation goals and community welfare. Through legal access to forest resources, communities are encouraged to develop management practices that are oriented towards long-term sustainability. A study by Oldekop et al. (2023) found that participatively managed social forestry schemes are able to improve well-being while maintaining the ecological function of forests. These findings confirm that social forestry can be a strategic instrument in strengthening environmental resilience if accompanied by effective stewardship practices.

Environmental Governance and the Role of Local Actors

Modern environmental governance increasingly emphasizes the importance of the role of local actors in decision-making and implementation of environmental policies. The collaborative governance model is considered more adaptive in dealing with the complexity of environmental problems than the top-down approach. Research by Bennett et al. (2021) shows that community involvement in environmental governance improves transparency,

accountability, and effectiveness of resource management. In the context of forests, community forest stewardship is a concrete manifestation of inclusive and participatory environmental governance.

Research Gaps in Community Forest Stewardship Studies

Although studies have examined community-based forest management, there are still limitations in understanding the micro-mechanisms that link stewardship practices to local environmental resilience. Most studies focus on the end result, such as reducing deforestation or increasing incomes, without delving into the underlying social and institutional processes. Studies by Sikor and Lund (2021) affirm the need for contextual research that places local practices at the center of analysis. Therefore, qualitative studies based on case studies are important to fill this gap and enrich theoretical and empirical understanding of community forest stewardship.

METHODOLOGY

Research Design and Approach

This research uses a qualitative approach with a case study design to deeply understand the practices of community forest stewardship and its role in strengthening local environmental resilience. The qualitative approach was chosen because it allows for a thorough exploration of social dynamics, local norms, and forest management practices that are contextual and cannot be quantitatively measured (Creswell & Poth, 2021). The case study design is used to intensively examine phenomena in real-life contexts, specifically the relationships between community actors and local ecological systems (Harrison et al., 2020). This approach is appropriate to uncover the complex socio-ecological mechanisms in community-based forest management.

Study Area and Population

The research location was determined in North Luwu Regency, South Sulawesi, an area that has forest areas with the active involvement of local communities in community-based management schemes. The region also faces environmental pressures in the form of land degradation, flood risk, and local climate change, making it relevant for environmental resilience studies. The research population includes all actors directly and indirectly involved in community-based forest management at the village level. The selection of locations and populations is carried out purposively by considering the existence of stewardship practices that have been running in a sustainable manner (Stake, 2020).

Sampling Technique and Informants

The sampling technique uses non-probability sampling with a purposive sampling strategy, because this study emphasizes the depth of information, not statistical representation. The total number of informants was ten, consisting of: (1) three community-based forest managers, (2) two indigenous leaders or local institutional stakeholders, (3) three community members who are directly dependent on forest resources, and (4) two village officials involved in

environmental management policies. This composition was chosen to ensure the diversity of perspectives of social actors involved in community forest stewardship practices. The number of informants is considered adequate because it has reached information saturation, which is a condition when the data obtained is repetitive and does not produce significant new findings (Guest et al., 2020).

Data Collection Techniques and Instruments

Data collection was carried out through three main techniques, namely semi-structured in-depth interviews, field observations, and document analysis. Semi-structured interviews were used to explore the experiences, perceptions, and practices of informants related to forest management, local norms, and their impact on environmental resilience. The interview guide was compiled based on the framework of shared resource management and socio-ecological resilience developed in recent studies (Biggs et al., 2021). Field observations were carried out in a non-participatory manner to observe forest management practices, community interaction with the environment, and surrounding ecological conditions. Document analysis includes village documents, customary rules, social forestry reports, and relevant secondary environmental data.

Research Procedure

The research procedure is carried out gradually and systematically. The initial stage includes preliminary studies, literature search, and preparation of research instruments. The next stage is the collection of field data through interviews, observations, and documentation that is carried out repeatedly to ensure the depth and consistency of the data. All interviews were recorded with the consent of the informant and transcribed verbatim. The final stage includes the process of data encoding, thematic analysis, and drawing conclusions that are carried out reflexively and iteratively (Saldaña, 2021).

Data Analysis Techniques

The data is analyzed using thematic analysis, which allows the identification of patterns, themes, and relationships between concepts in qualitative data. The analysis process includes the stages of open coding, axial coding, and theme development to build a systematic interpretation. The analysis is done manually and supported by NVivo 12 software to improve the transparency and traceability of the analysis process. This approach is in line with contemporary qualitative analysis practices that emphasize the reliability of interpretation and depth of meaning (Braun & Clarke, 2021).

Trustworthiness and Research Ethics

The validity of the data is maintained through the triangulation strategy of sources and methods, namely comparing interview, observation, and document data. In addition, member checking is carried out by confirming provisional results to several key informants to ensure the accuracy of interpretation. This research also pays attention to the ethical principles of social research, including informed consent, informant anonymity, and data

confidentiality. This approach aims to ensure the scientific integrity and credibility of research findings (Tracy, 2020).

RESULTS

Community Forest Stewardship in Maintaining the Balance of Local Ecosystems

The results of the study show that the practice of community forest stewardship plays an important role in maintaining the balance of the forest ecosystem through the regulation of resource utilization based on local norms and the collective awareness of the community. Interview data revealed that communities are actively restricting forest exploitation activities, especially in areas that are considered ecologically vulnerable. A community-based forest manager said that *"We do not take wood just for fun, there are rules that have been agreed upon about areas that can be used and that must be maintained"* (H1, interview November 5, 2025). This is reinforced by traditional leaders who affirm that *"Forests have always been considered as a buffer for life, so the spring and slope areas should not be disturbed"* (A1, interview November 8, 2025). Residents who depend directly on the forest also stated that *"If the forest is damaged, the water decreases and the land is prone to landslides, so we take care of the forest for our own safety"* (M1, interview 12 November 2025).

These findings show that the balance of ecosystems is not solely maintained through formal rules, but through Internalization of ecological values in people's daily practices. Local norms are not positioned as rigid prohibitions, but rather as ethical guidelines that are lived and adhered to because they are considered relevant to people's direct experiences of environmental change. This can be seen from the way informants relate forest conditions to water availability, soil stability, and settlement security, which shows a reflective relationship between stewardship practices and ecological risk perceptions.

The results of field observations reinforced the findings of the interviews by showing the existence of protected zones based on community agreements, especially around springs and steep slopes, as well as replanting practices in areas that were previously used. Analysis of village documents and customary rules also shows that there are written and unwritten provisions that specifically regulate the protection of forest areas and water resources. The novelty of the findings on this theme lies in the identification that ecosystem balance is maintained through a combination of local ecological knowledge and social mechanisms based on shared awareness, not simply through external control or formal policy intervention.

Community-Based Collective Management in Reducing the Risk of Environmental Damage

The findings of the study show that forest management collectively contributes significantly to reducing the risk of environmental damage, particularly land degradation and potential ecological disasters. Collective management practices are realized through role sharing, joint supervision, and community-agreed social sanction mechanisms. A village official explained that *"Forest supervision is not only carried out by the village government, but the community*

also reminds each other if there are violations" (D1, interview 15 November 2025). This statement is in line with the experience of residents who stated that "If someone clears land carelessly, it is usually discussed directly in deliberations" (M2, interview 18 November 2025). The community forest manager also added that "Because it is managed together, everyone feels responsible, not only utilizing but also maintaining" (H2, interview November 20, 2025).

These findings suggest that collective management serves as Early prevention mechanisms against environmental damage, not just in response after the damage has occurred. Community deliberations serve as a space for joint evaluation that allows for rapid identification of potential violations and their ecological impacts. In this context, social sanctions and moral control have high effectiveness because they are rooted in close and sustainable social relations.

Field observations show the practice of mutual cooperation in the maintenance of forest routes, cleaning natural drainage, and preventing land clearing in landslide-prone areas. The village social forestry report document also shows a decrease in forest use conflicts and a reduction in uncontrolled land clearing activities. The novelty of the findings on this theme lies in the understanding that collective management not only reduces physical damage to the environment, but also strengthens social cohesion as a key capital in ecological risk mitigation, which often escapes formal policy-based forest management studies.

Local Norms and Sustainable Utilization in Increasing the Adaptive Capacity of Communities

The results of the study revealed that the application of local norms and sustainable forest use play a role in increasing the adaptive capacity of communities in dealing with environmental changes. Local norms serve as guidelines for behavior that are flexible and adaptable to ecological dynamics. A traditional leader stated that "If the condition of the forest changes, the rules can be re-discussed so that the use remains balanced" (A2, interview November 22, 2025). Residents who depend on forest products explained that "Now we take more non-timber products so that the forest is maintained" (M3, interview November 24, 2025). The village officials also emphasized that "The use of forests is directed so that it does not run out, but can continue to be used by the next generation" (D2, interview November 27, 2025).

The perspective of community-based forest managers reinforces these findings. A forest manager said that "Management now is not only about maintaining the forest, but how people can adjust their way of life so as not to damage the forest" (H3, interview November 29, 2025). This statement shows that community forest stewardship is understood as a process of sustainable adaptation that integrates changes in economic practices and community ecological awareness.

These findings show that people's adaptive capacity is built through collective learning ability and adjustment of resource utilization practices. Local norms are not static, but are updated through a deliberative process that takes into account changes in forest conditions and community needs. This process allows communities to reduce their reliance on extractive practices and shift to more diverse and sustainable utilization patterns.

The results of field observations show the practice of diversifying forest use, such as taking non-timber forest products, planting plants with environmentally friendly economic value, and developing planting patterns that are adaptive to local climate change. Analysis of village policy documents also shows alignment between local rules and social forestry programs. The main novelty in this theme lies in the finding that community forest stewardship not only increases ecological resilience, but also builds social resilience through dynamic local norm-based adaptation processes, so that communities not only survive, but are able to transform in the face of long-term environmental pressures.

DISCUSSION

The findings of this study confirm that community forest stewardship functions as a key mechanism in maintaining the balance of local ecosystems through the internalization of ecological values in community social practices. These results are in line with socio-ecological systems theory that emphasizes that ecosystem sustainability is determined not only by formal regulation, but also by local norms, knowledge, and practices that are internalized in daily life (Folke et al., 2021). In the context of North Luwu, the balance of the ecosystem is maintained through a collective awareness that connects forest conditions with water, soil, and settlement security. The update of this study lies in empirical evidence that the perception of ecological risk directly experienced by communities is the primary basis for compliance with stewardship practices, rather than merely external pressures from conservation policies.

The results of the study also show that local norms play a role as an effective adaptive management instrument in maintaining ecologically sensitive areas such as springs and steep slopes. These findings reinforce an adaptive governance approach that emphasizes the flexibility of local context-based rules to respond dynamically to environmental change (Cosens et al., 2021). Unlike a top-down approach that tends to be rigid, local norms in community forest stewardship allow for sustainable adjustments based on the ecological experience of the community. The theoretical contribution of this research is to show that local norms function not only as social controls, but also as a living and constantly updated ecological knowledge system.

In terms of reducing the risk of environmental damage, community-based collective management has proven to be effective as an early prevention mechanism against land degradation and potential ecological disasters. These findings are in line with the theory of collective action which emphasizes that shared resource management will be more sustainable when there is a shared division of roles, trusts, and mutually agreed social sanctions (Ostrom, 2021). The practice of deliberation and social supervision in this study shows that social relation-based control has high effectiveness in suppressing exploitative behavior. The novelty of this research lies in the affirmation that ecological risk mitigation does not only depend on technical interventions, but also on the power of social cohesion as ecological capital.

Strengthening social cohesion through collective management also contributes directly to the long-term resilience of the local environment. Previous studies have shown that communities with high levels of social cohesion have a greater capacity to respond to ecological disturbances collectively and in a coordinated manner (Cinner et al., 2020). The findings of this study expand that perspective by showing that social cohesion is not only a result, but also an active mechanism in community-based forest management. Thus, community forest stewardship serves as a bridge between social stability and ecological sustainability.

In the adaptive capacity dimension, this study shows that dynamic local norms allow communities to adjust forest utilization practices as environmental conditions change. These findings support the concept of resilience thinking which views adaptation as a sustainable social learning process in socio-ecological systems (Biggs et al., 2021). Communities are not only maintaining old practices, but actively evaluating and modifying forest utilization strategies, such as shifting to non-timber forest products. A key update from this study is evidence that adaptive capacity grows from the interaction between local norms, ecological experiences, and collective reflection.

The diversification of forest use found in this study reflects the transformation of economic practices towards a more sustainable and resilient model. This is in line with the literature that states that environmental resilience increases when people reduce their dependence on one type of resource and develop diversified livelihood strategies (Reed et al., 2022). In the context of community forest stewardship, diversification serves not only as an economic strategy, but also as an ecological mechanism to reduce pressure on forests. The conceptual contribution of this research is to show that community-based socio-economic transformation is an integral part of strengthening local environmental resilience.

Overall, the findings of this study strengthen the argument that community forest stewardship is an effective strategy in building local environmental resilience through the integration of ecological, social, and institutional dimensions. Unlike previous studies that tend to place environmental resilience as a result of macro policies, this study shows that resilience is built from the ground up through people's daily practices (Berkes, 2021). The main update of this research lies in the emphasis that community forest stewardship is not only protective, but also transformative, as it encourages communities to adapt and evolve in the face of long-term environmental pressures. Thus, this research makes a significant theoretical and practical contribution to the development of more contextual, inclusive, and sustainable social forestry policies.

CONCLUSION AND RECOMMENDATION

This study concludes that community forest stewardship plays a strategic role in strengthening local environmental resilience by placing the community as the main actor in forest management through the internalization of local norms, collective management, and sustainable use of resources. The findings show that

community-based stewardship practices are not only effective in maintaining ecosystem balance and reducing the risk of environmental damage, but also increase communities' adaptive capacity to respond to long-term ecological changes and pressures. However, this study has limitations in the scope of a single case study and a qualitative approach, so the results cannot be generalized widely to different socio-ecological contexts.

FURTHER STUDY

Therefore, further research is recommended to combine qualitative and quantitative approaches, expand the location of cross-regional research, and longitudinally examine the relationship between community forest stewardship, environmental resilience, and social forestry policies to strengthen the empirical basis for the development of inclusive and sustainable environmental governance.

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