ISSN 2656-8039 (online)
International Journal of Environment, Engineering & Education
Volume 7, Issue 3, December 2025
www.ijeedu.com

OPEN ACCESS

Research Article

Achieving Sustainable Coastal–Marine Conservation: Lessons from a Community Social Movement in Torosiaje Ecotourism Village, Indonesia

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Abstract

The failure of top-down conservation in natural resource management continues to provoke resistance led by local communities. This study analyzes how the coastal community of Torosiaje constructs a polycentric governance system through collective action in response to ecological crises and to the state's appropriation of living space, aiming to achieve blue justice in the management of marine and coastal resources. The complex, polycentric governance in joint management involves various actors, including the state, local communities, and the private sector, who collectively play active roles in decision-making for sustainability. Meanwhile, blue justice requires the fair distribution of natural resources and ecosystem benefits, which is pursued through the collective struggle of the community against ecological injustice. Using social movement and political ecology theories as an analytical framework, this research redefines Community-Based Natural Resource Management (CBNRM) as a more inclusive and responsive model to local dynamics. A qualitative case study design was employed through in-depth interviews, participant observation, and document analysis, which were subsequently analyzed thematically. The findings reveal that integrating local knowledge and formal rules, embodied in the *paddakuang* and *sipakullong* conservation groups, results in a more adaptive and just CBNRM model in response to resistance. Cross-village collaboration, participatory ecotourism, and culture-based education strengthen the socio-ecological dimensions of this polycentric governance. This study contributes theoretically by applying social movement theory to redefine successful CBNRM. It argues that sustainable governance is a political outcome shaped by community resistance to ecological injustice and state dispossession, rather than merely a technical model.

Keywords: Blue Justice; Coastal Dispossession; Ecosystem Restoration; Ecological Degradation; Social Movements.

Received: Oktober 6, 2025
Accepted: November 29, 2025
Published: December 6, 2025

Article Citation: Hendra, Sumarmi, I.K. Astina, S. Aisyah, A.S. Rijal S, "Achieving Sustainable Coastal–Marine Conservation: Lessons from a Community Social Movement in Torosiaje Ecotourism Village, Indonesia," International Journal of Environment, Engineering & Education, Vol. 7, No. 3, pp. 208-221, 2025. https://doi.org/10.55151/ijeedu.v7i3.359

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1. INTRODUCTION

Community-based natural resource management (CBNRM) has emerged as a global paradigm promising to bridge the interests between environmental conservation and local community welfare. This approach is seen as an inclusive alternative to the failure of centralized top-down conservation models. Normatively, CBNRM promises a more democratic and socially just governance of natural resources, in line with the Sustainable Development Goals (SDG 14: Life Below Water) [1]. However, its implementation often faces challenges related to power issues, environmental degradation, and justice [2]–[5]. In practice, CBNRM is frequently co-opted by state or international donor agendas, leading to symbolic participation without altering the imbalanced power structures. As a result, economic and ecological benefits are often enjoyed by local elites, while indigenous communities and vulnerable groups remain

marginalized. This condition demonstrates that CBNRM represents a political arena marked by conflicting interests, negotiations, and struggles for legitimacy in natural resource governance.

Conservation challenges in Indonesia manifest as systemic failures and widespread environmental injustices. The government implements conservation policies that are inconsistent with local communities' traditional practices, creating tensions between the state and local communities. A lack of official authority to develop and, particularly, enforce rules at the local level represents a key challenge for CBNRM initiatives [6]. Severe coordination problems between local communities and high-level state actors further complicate this issue. Policies focused on territorial control and exclusion, such as the confiscation of fishermen's rights and the ban on traditional fisheries in Wakatobi, have placed indigenous communities in the position of lawbreakers [7], [8]. This condition demonstrates that the complexity of conservation issues in Indonesia demands not only more adaptive policies but also a deeper understanding of the social and political dynamics that shape resistance and bottom-up governance initiatives.

Although numerous studies have discussed conservation in relation to the state and the importance of community participation in natural resource management, few have examined in depth how local communities build alternative institutional forms in response to structural injustices in conservation policies. CBNRM has primarily focused on institutional effectiveness, community participation, and ecological outcomes. Most recent studies [9]–[11] have concentrated on participation or policy effectiveness, yet few have explored the processes of resistance, negotiation, and institutional innovation emerging from the grassroots. However, these practices have the potential to lay the foundation for a more inclusive and adaptive polycentric governance system that responds to local contexts. Thus, empirical research is needed to understand how communities can resist and build alternative institutional systems.

The local community in the Torosiaje ecotourism area, Gorontalo, has faced social and environmental injustices due to coastal development projects and state conservation policies that restrict their access to natural resources [12], [13]. The conversion of mangroves into shrimp ponds and conservation policies that fail to consider local community needs have exacerbated marginalization and created tensions between the state and indigenous communities [14]. This power imbalance has triggered the Torosiaje social movement as a response to the appropriation of living space, with the community fighting to preserve their cultural identity, territorial rights, and control over the resources that sustain their livelihoods [15].

The Torosiaje movement not only focuses on conservation but also rejects the "epistemic exclusion" that disregards local knowledge and marginalizes indigenous people from decision-making processes [16]. Through collective resistance, the Torosiaje community has transformed its identity into a conservation village and community-based tourism, demanding recognition of coastal rights and protection of marine ecosystems within the framework of "blue justice" as a response to the inequalities generated by the expansion of the blue economy [17]–[19]. By balancing ecological effectiveness and sustainable welfare, these efforts contribute to achieving the Sustainable Development Goal (SDG 14). The Torosiaje phenomenon underscores the importance of examining local community resistance in building joint governance systems as the foundation for creating alternative, more just, and sustainable governance systems.

Specifically, this research asks how the Torosiaje community mobilizes collective action to construct a polycentric governance system in response to state-led dispossession through the case of the Torosiaje Ecotourism Village. The Torosiaje phenomenon provides a critical case to explore this gap. The community has faced significant dispossession, yet has mobilized a collective response rooted in cultural identity and demands for blue justice. This leads to the central question guiding this study: "How does a community mobilize collective action to construct a polycentric governance system in response to state-led dispossession and ecological crises. Grounded in the integration of CBNRM and social movement approaches, we examine the emergence of conservation movements, resource mobilization strategies, community institutional structures, and their impacts on conservation, restoration, and environmental quality. Understanding these dynamics provides a foundation for successful conservation in community-based tourism villages and enriches global discourses on sustainability and political ecology.

2. LITERATURE REVIEW

The issue of justice in coastal resource governance demands a theoretical approach that can connect structural, normative, and practical dimensions. Within this framework, the research develops an analytical model that integrates four key perspectives Political Ecology, Blue Justice, Social Movement Theory, and Polycentric Governance-CBNRM to explain how local communities build alternative institutional systems in response to power imbalances and unjust conservation policies.

Political Ecology serves as the macro foundation for understanding the roots of ecological and social injustice in natural resource management. According to Peet and Watts [20] and Robbins [21] environmental issues cannot be detached from power relations and the political-economic structures that regulate access to resources. This approach highlights that conservation and coastal development policies often reproduce structural inequalities by positioning the state and market actors as the main holders of control. At the same time, local communities become the most vulnerable to the appropriation of their living space. In Indonesia, this is evident in conservation practices based on territorial control and the blue economy that exclude indigenous communities from their management areas. Thus, Political Ecology provides a critical lens to understand how power operates behind conservation practices and why environmental injustices emerge systematically.

Meanwhile, Blue Justice adds a normative dimension to the Political Ecology framework by emphasizing recognition, equality, and justice in coastal and marine governance. This approach is grounded in the idea that sustainability is not only ecological but also moral and social [17]. By assessing who benefits and who suffers from marine policies, Blue Justice expands the critique of political ecology by stressing the need for fair benefit-sharing, meaningful participation, and protection of the rights of small-scale fishermen and indigenous communities. In this context, Blue Justice is not merely an ethical concept but an action framework that guides governance transformation toward a more inclusive and ecologically just system.

To explain how communities respond to such injustices, Social Movement Theory serves as a framework for agency and social change. Referring to McCarthy and Zald [22] and McAdam et al. [23] this theory emphasizes that social movements arise when communities identify injustice as a shared moral issue and mobilize collective identities to resist oppressive structures. In the context of resource management, this mobilization is often driven by social solidarity and local knowledge as tools to renegotiate policies and power structures. Political opportunity structures become an important factor in opening space for communities to influence policies and create institutional change. Thus, Social Movement Theory explains the mechanisms by which local communities, such as the Torosiaje community, transform from policy objects into active political subjects in shaping the future of their environment.

The structural dynamics and agency culminate in the formation of CBNRM and Polycentric Governance as institutional outcomes of a complex socio-political process. In this framework, CBNRM is no longer understood as a technocratic model but as a result of the interaction between community resistance, justice values, and power restructuring. As Leach et al [24], argue, the success of CBNRM depends on how communities can negotiate rights, build adaptive institutions, and strengthen collective capacity in the face of external pressures [25], [26]. By integrating principles of social justice and local participation, polycentric governance reflects the transformation from social movements to an adaptive, just, and collaborative institutional system.

3. MATERIAL AND METHODS

3.1. Research Location

The research location is in the Ecotourism Village of Torosiaje, Pohuwato Regency, Gorontalo, Indonesia. Figure 1 shows the location of the study area in the Torosiaje Ecotourism Zone, situated in Popayato District, where mangrove areas extend westward to Popayato Barat District. The managed fishing grounds are designated for public use by all community members without exception, yet remain primarily organized and led by the local Torosiaje community. The study site is located on Sulawesi Island, one of Indonesia's major islands.

This village is unique because it is a floating settlement on the sea inhabited by the Bajo people, a community known for its traditional ecological knowledge. The presence of significant ecosystems makes Torosiaje not only an ecological space but also a socio-ecological space where conservation is practiced as a way of life and a cultural identity [27]. The dynamics in this village reflect how coastal communities face pressures such as environmental degradation and limited resources while also developing solutions by mobilizing conservation initiatives, thus transforming into a conservation village strengthened by customary laws and fostering collaboration through ecotourism [28]–[30].

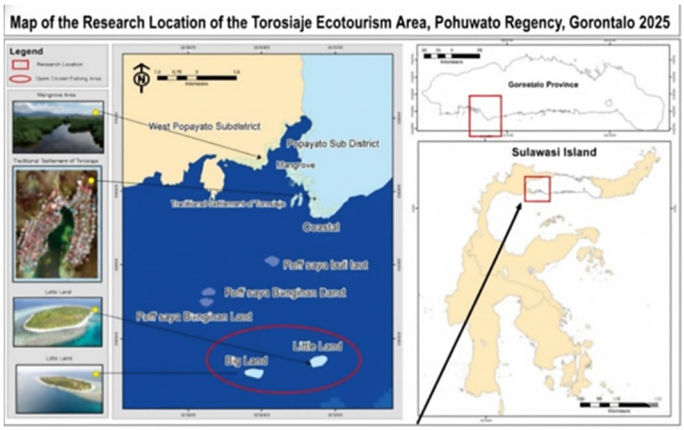

Figure 1. Map of Research Location

3.2. Research Design

This study employed a qualitative case study approach focusing on a local community in the Ecotourism Village of Torosiaje, which actively advocates for marine and coastal conservation for sustainability. The Torosiaje community has experienced complex environmental dynamics in mobilizing conservation as a social movement. This research was conducted to explore how the Torosiaje community mobilizes conservation within the ecotourism village. The sub-research focuses on examining the movement's triggers, institutional configurations, and how the community can protect and manage natural resources to support sustainable conservation practices. This design was deemed appropriate because it allows for an in-depth exploration of complex social phenomena in real-world contexts [31]–[33], particularly for understanding how local communities and leaders build collective action for conservation [33], [34].

3.3. Participants and Data Collection Strategies

Participant selection in this study employed a purposive sampling technique, targeting individuals and groups who played significant roles in the conservation movement within the Torosiaje Ecotourism Village. A total of 25 participants were involved in the study. The main criteria included being at least 40 years old, having lived in Torosiaje for at least 20 years, and having been actively engaged in the village's socio-ecological dynamics. Participants included traditional leaders, heads of local organizations, senior fishers, and representatives from external institutions involved in ecotourism or conservation. This selection ensured both the depth of experience and the relevance of the data collected.

Data were gathered through semi-structured in-depth interviews, participant observation, and document analysis. In the initial stage, the researcher conducted field observations to gain a detailed understanding of the study area and community context, and conducted reconnaissance to identify key actors with deep knowledge of conservation practices and social dynamics in Torosiaje. The selection of participants aimed to capture comprehensive perspectives on the factors that shape how the community interprets issues, formulates solutions, and mobilizes collective action for conservation in Torosiaje Village.

Interview questions focused on collective action and shared institutional arrangements for sustainability. Each participant was assigned an anonymous identifier coded P1–P25. Participant observation involved engaging in the community's daily activities. Field notes were used to complement interview data with social context and cultural symbolism. Secondary data were obtained from local government policy documents, NGO reports such as Japesda and Burung Indonesia, and digital archives from related institutions.

3.4. Data Analysis

For the qualitative data analysis, we adopted a hybrid inductive–deductive thematic analysis to explore the dynamics of community-based natural resource management, aligning empirical findings with existing theoretical frameworks. The analytical process began with an inductive approach, where data collected through community interviews and field observations were analyzed without pre-existing theoretical assumptions. At this stage, naturally emerging themes, such as triggers of collective action, were identified and developed. Once these patterns were established, a deductive approach was applied by connecting the findings to established theories, such as social movement theory, to confirm their relevance and applicability within the specific context.

This allowed for a more comprehensive understanding of how the community responded to natural resource governance policies and adapted them to their lived realities. The thematic analysis followed the six-phase approach outlined by Braun and Clarke [35]. The process includes the following steps: first, Familiarization with the Data. We reviewed the interview transcripts and field notes to understand the initial context of the data and identify relevant data segments for the research focus. For example, we found a statement from a fisherman referring to mangroves as "a living place," indicating the community's emotional connection to them.

Second, Code Creation. We marked relevant data excerpts and assigned codes, such as "mangrove as home," which illustrate the role of mangroves in the community's social, cultural, and economic life. We also assigned codes to other emerging concepts, such as "nature-based economy" and "sustainable natural resources." Third, Identifying Potential Themes. We grouped the codes into larger categories, identifying relationships between the code "mangrove as home" and other codes, such as "ecological identity" and "ecosystem roles," which reflect the connection between mangroves and the cultural and ecological identity of the Torosiaje community.

Fourth, Identifying Subthemes. We developed subthemes, such as "mangrove as a living space," which represents the deep connection between mangroves and the community's life, encompassing ecological, social, and cultural aspects. Fifth, Reviewing and Refining Themes. We reviewed and refined the identified themes by comparing them with the original data to ensure they accurately represent the entire dataset. This resulted in the merging of two subthemes into a larger theme, namely "Ecological Identity as a Driver of Mobilization," which summarizes how the community's identity as environmental stewards drives collective action to protect mangroves. Sixth, Compiling the Final Analytical Report. The final stage involved compiling a report that integrates the identified and analyzed findings and explains how the main themes and subthemes illustrate the dynamics of community-based natural resource management.

3.5. Trustworthiness and Data Validity

Trustworthiness in qualitative research was ensured to guarantee that the data obtained were accurate, valid, and appropriately represented the experiences of the Torosiaje community. Therefore, we employed data triangulation by collecting information through various methods, including in-depth interviews, focus group discussions, and participant observation. During the in-depth interviews with participants, we gathered narratives about mangrove degradation and restoration that they had experienced and witnessed. These narratives were then cross-validated using time-series spatial analysis (Figure 2), which illustrated annual changes in mangrove cover derived from satellite imagery. For instance, when a participant described past mangrove deforestation, we verified the claim using spatial data showing a decline in mangrove cover in the same area during that period. In this way, participants' personal recollections could be substantiated with measurable data, thereby providing a stronger, evidence-based foundation for their narratives.

We strengthened the study's validity by using data triangulation and member checking, presenting preliminary analyses to community members for feedback to ensure our interpretations aligned with their perspectives. These approaches enhance credibility, confirmability, and dependability in qualitative research [36], with member checking specifically ensuring that findings reflect participants' lived experiences [37]. Integrating qualitative narratives with quantitative spatial data further improved the study's trustworthiness and provided a more holistic understanding of ecological changes and community responses [38].

3.6. Researcher Position and Bias Management

The researcher served as the primary instrument throughout the research process, from planning and data collection (as a participant) to analysis and conclusion drawing. Given the researcher's outsider status within the community, the data collection and interpretation process were shaped by this,

which may have affected both access to participants and the development of trust. Reflexivity was central to managing potential bias; we continuously reflected on how the researcher's external position might influence interactions with participants and the nature of the narratives shared. Specifically, the researcher's outsider status may have created both challenges and opportunities for trust-building, as participants' perceptions of the researcher's motivations could influence the openness of the shared narratives. To address these dynamics, the researcher explicitly bracketed personal perceptions throughout the research process and critically examined how their background might shape their understanding and interpretation of participants' stories. This ongoing reflexive practice helped mitigate subjectivity and provided greater transparency in the analytical process.

3.7. Ethical Considerations

Given the unique characteristics of the Torosiaje community as a local group, ethical considerations were carefully addressed throughout the study. Informed consent was obtained from all participants. Before conducting interviews, researchers provided a clear explanation of the study's objectives, how the data would be used, and participants' right to withdraw at any time. Based on the consent provided, we ensured participants' anonymity, privacy, and confidentiality to prevent any potential negative consequences. This research received formal ethical approval from a recognized institutional review board. In this way, we sought to avoid exploitation and ensure that the research outcomes would contribute to social benefits and justice for the Torosiaje community.

4. RESULTS

4.1. Drivers of Mobilization: Experiences of Exclusion, Dispossession and Ecological Loss

Our findings indicate that participants in the Torosiaje community perceived mangrove degradation not merely as the loss of vegetation but as the disappearance of their living space. One participant expressed:

> *"After many people came to open fishponds, the mangroves started to disappear. The mangroves are not just trees; they are also our place to live."* (P1, 65 years old).

Participants stated that mangroves serve as living spaces that embody their ecological identity. Participant statements illustrate how the community frames the conflict as a threat to their fundamental right to life, which serves as the basis for their struggle to defend their endangered living space.

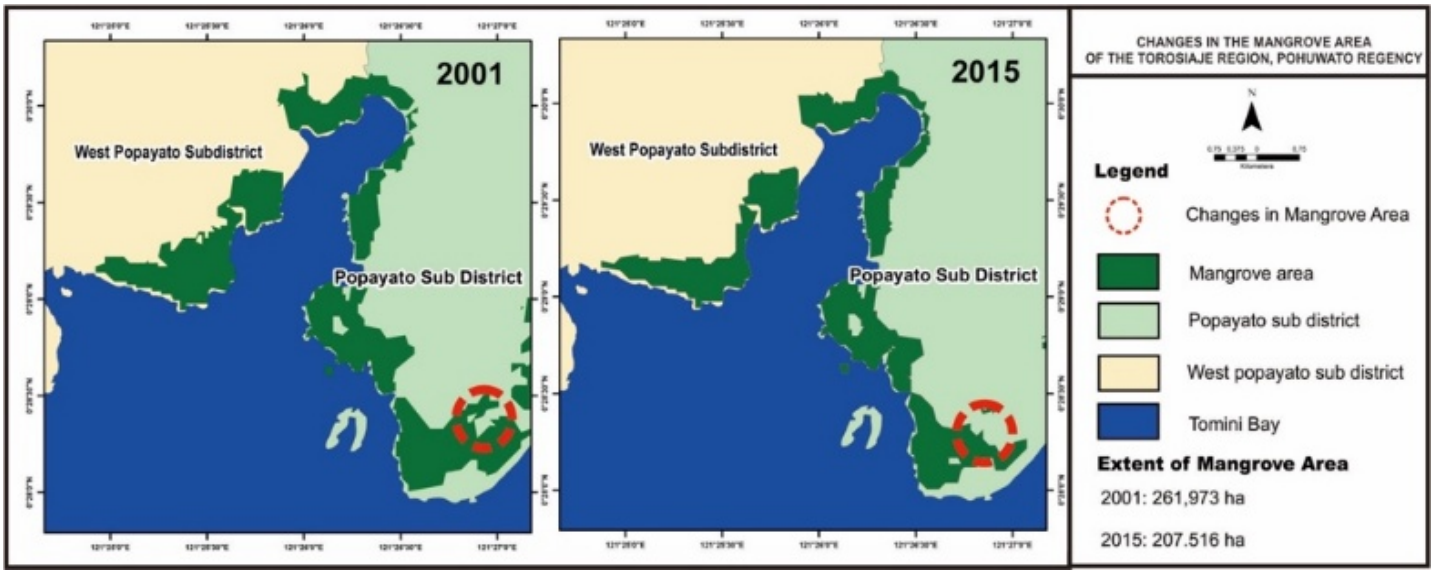

Figure 2. Map of Mangrove Area Change in Torosiaje due to Deforestation (2001–2015)

Figure 2 show a clear reduction in mangrove cover in the Torosjae region between 2001 and 2015. In 2001, mangroves formed a dense and continuous belt along the Popayato coast, especially in the southeastern area facing Tomini Bay. By 2015, significant losses occurred in this same zone, highlighted by the red-circled areas. These mangrove stands became fragmented or replaced, likely due to coastal development such as aquaculture, settlements, or agriculture.

Overall mangrove extent declined from 261,973 ha in 2001 to 207,516 ha in 2015 a loss of more than 54,000 ha (about 20%). The most severe changes occurred in the southeastern coastal section, while the West Popayato area remained relatively stable. The trend indicates increasing pressure on coastal ecosystems and highlights the need for improved mangrove conservation and management.

This understanding was reinforced by other experiences describing the environmental impacts of fishing activities. One participant shared:

> *"There were often fishers who caught fish carelessly, and in the past, they used skapator to clear land for fishponds." (P2, 55 years old).*

The participant's remarks emphasize how environmental exclusion and unsustainable practices have intensified coastal ecosystem degradation and threatened the livelihoods of those dependent on these resources. Based on time-series spatial data (Figure 2), the Torosiaje mangrove area declined (-20.79%) between 2001 and 2015, mainly due to land conversion for aquaculture, providing measurable visual evidence to reinforce this narrative.

Meanwhile, the relocation of settlements to the mainland has also severed the community's connection with the sea, leading to difficulties in accessing basic services. One participant explained:

> *"These houses on the water were considered backward in the past, so everyone was moved to the mainland, 154 families, but no one could stay there... the water source is far away." (P1, 65 years old).*

This relocation exacerbated social injustice and revealed how government decisions can force communities to confront difficulties in accessing basic needs, further worsening their living conditions.

In addition, the community faces tangible threats from climate change, which has increasingly worsened their daily lives. Participants described recurring tidal floods that make survival increasingly difficult. One participant shared:

> *"Yes, every year the water rises... we also have trouble finding clean water—we have to go to the neighboring village to get it, it's far." (P19, 66 years old).*

The ongoing tidal flooding cycle illustrates their vulnerability to climate change, adding further pressure on their livelihood resilience and creating uncertainty that affects their physical and mental well-being. Another participant added,

> *"When the big tides come, our houses can get flooded... sometimes we cannot sleep at night" (P1, 65 years old).*

These statements underline the psychosocial impacts that intensify their sense of insecurity. Despite these challenges, the community has begun to build collective motivation to protect and restore the coastal, marine ecosystem, which they regard as part of their right to live. Residents reported increased fish catches after restoration-based management was implemented. One participant described:

> *"Before... people only caught 3–4 fish a day. After the open-and-close system was introduced, we could get 5–10 kilograms. The price now is around Rp 30,000–70,000 per kilogram." (P11, 58 years old).*

Participants illustrated how ecosystem restoration can improve fish catches, thereby supporting the community's economic stability.

Furthermore, participants demonstrated a sophisticated ecological understanding of the interconnection among ecosystem components. One participant explained:

> *"Mangroves, seagrass, and coral reefs... if the mangroves are damaged, the seagrass and coral reefs also suffer, and that affects fishers' income." (P21, 72 years old).*

This awareness reinforces their commitment to preserving the coastal ecosystem, recognizing the close link between ecological sustainability and economic well-being. Accordingly, Table 1 shows that environmental problems in the Torosiaje ecotourism area over recent decades have been the key drivers of collective action and of the transformation toward more effective and sustainable institutional governance.

Table 1. Drivers of Community Conservation Mobilization in Torosiaje

Initial Code	Subtheme	Key Findings Triggering Mobilization	Description
Mangrove degradation	Mangrove as a living space	Ecological identity as a driver of mobilization	Loss of mangroves threatens the community's right to life and ecological identity.
Unsustainable fishing practices	Coastal ecosystems under threat	Loss of living space and economic security	Destructive fishing activities damage ecosystems and threaten coastal livelihoods.
Mangrove ecosystem change	Decline in mangrove areas and land conversion	Ecosystem degradation as a social threat	Pond conversion and mangrove reduction degrade ecosystems, impacting community life.
Settlement relocation	Separation from the sea and limited access	Social and environmental exclusion	Relocation limits access to natural resources and clean water, causing socio-environmental exclusion.
Climate change	Tidal flooding and difficulty accessing water	Vulnerability to socio-ecological changes	Tidal flooding and water scarcity increase psychosocial distress and vulnerability.
Restoration-based management	Improved fish catch results	Sustainable economic development through natural resource management	Ecosystem restoration enhances fish catch and strengthens economic stability.

Initial Code	Subtheme	Key Findings Triggering Mobilization	Description
Ecological understanding	Interconnectedness of ecosystems	Ecological awareness as the foundation of collective action	Understanding inter-ecosystem relationships motivates community engagement in conservation.

4.2. Strategies of Resistance and the Construction of Local Institutions

Our findings further indicate that conservation strategies in Torosiaje heavily rely on community resources and collective solidarity. Participants confirmed that the motivation to protect coastal and marine areas stemmed from the community's intrinsic sense of responsibility. As one participant noted:

> *"After many people came to open fishponds, the mangroves started to disappear. Mangroves are not just trees; they are where we live." (P1, 65 years old).*

This statement illustrates that the community perceives mangroves as vital living spaces essential for their survival, rather than merely as part of the natural ecosystem.

Participants directly experienced the ecological crisis, including mangrove conversion, destructive fishing practices, development pressures, and threats of relocation. As one participant recounted:

> *"It came to the point of risking lives... people stood together to resist the destruction." (P2, 55 years old).*

This reflects how solidarity serves as the principal driving force behind collective actions to defend existing ecosystems. Subsequently, conservation efforts were formalized through internal governance mechanisms. The community began establishing collective rules to regulate activities such as mangrove planting, coastal patrols, and the seasonal closure of octopus-harvesting areas. One participant explained:

> *"Now everything is more organized... for example, with octopus fishing, there are agreed periods when catching is not allowed." (P2, 55 years old).*

The emphasis on collective discipline is also reflected in their daily practices. As another participant stated:

> *"Replanting and routine patrols are emphasized to prevent random cutting." (P1, 65 years old).*

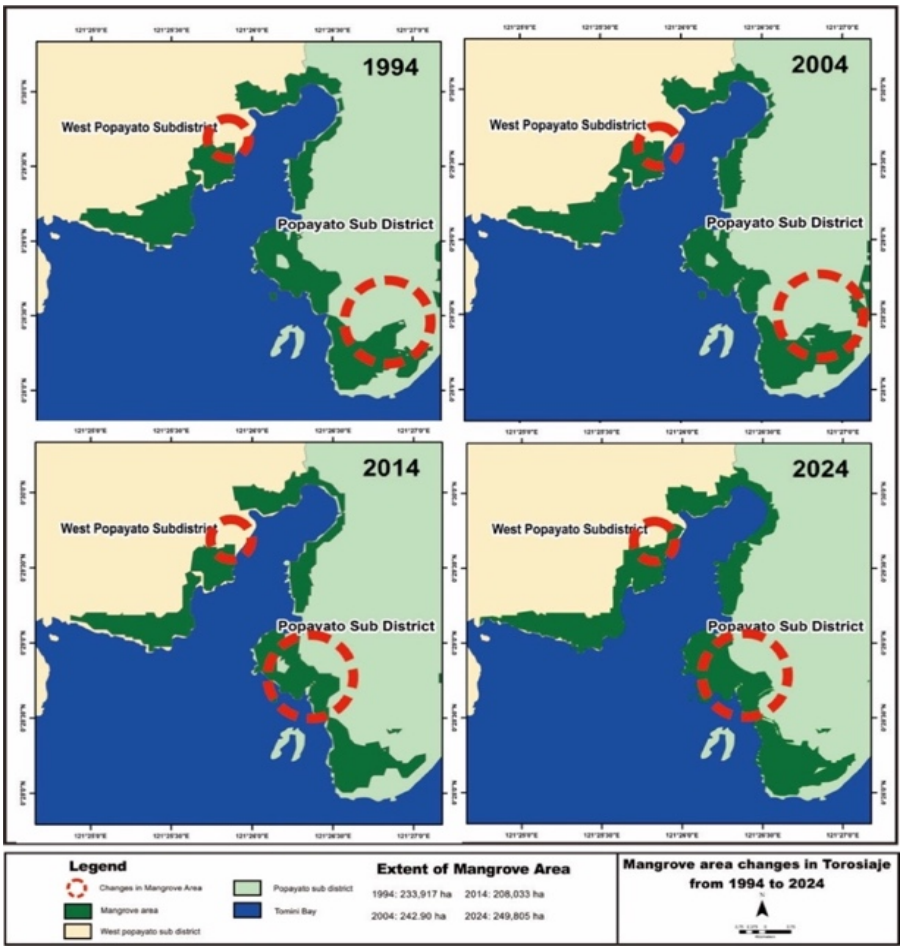

Figure 3. Changes in the Mangrove Area of Torosiaje from 1994 to 2024

Table 2. Drivers of Community Conservation Mobilization in Torosiaje

Year	Mangrove Area (Ha)	General Description of Change
1994	233.937 ha	Initial condition; mangrove cover was still relatively extensive, especially in the Popayato Subdistrict and parts of West Popayato.
2004	242.940 ha	Mangrove area increased compared to 1994, with new zones showing regeneration or expansion.
2014	208.033 ha	A significant decrease compared to 2004; several areas (highlighted in red circles) experienced shrinkage.
2024	249.803 ha	Mangrove area increased again, surpassing previous years. Recovery is clearly visible in the red-circled areas.

Figure 3 illustrates the 30-year dynamics of mangrove ecosystems in Torosiaje, showing notable fluctuations in spatial extent. From 1994 to 2004, mangrove cover expanded from 233.937 ha to 242.940 ha, marked by wider vegetated areas in the Popayato region. This growth was followed by a substantial decline between 2004 and 2014, with the extent decreasing to 208.033 ha, particularly within circled zones likely affected by land-use change or natural degradation, reaching one of its lowest points around 2015.

From 2014 to 2024, the mangrove ecosystem experienced significant recovery, ultimately reaching its highest recorded coverage of 249.803 ha. Regeneration was especially evident in previously degraded areas, reflecting the effectiveness of rehabilitation efforts and strengthened ecosystem stability. Spatial analysis using ArcGIS Pro supports these observations, with the mangrove change map highlighting both the periods of decline and the sustained community-led restoration initiatives.

Furthermore, the spatial organization of marine living spaces is integrated with the development of community-based tourism. The community provides basic services to tourists independently. One participant explained,

> *"The lodging does not need to be luxurious; what matters is maintaining cleanliness" (P1, 65 years old).*

This statement indicates that the Torosiaje community leverages local economic potential to support sustainable conservation. The implementation of community-based tourism serves as one of their strategies to enhance economic well-being while maintaining the sustainability of coastal ecosystems.

To ensure conservation sustainability, the community also conducts monitoring and enforces sanctions. One participant described,

> *"Every three months, monitoring is carried out... we conduct six plot points in each different case" (P2, 55 years old).*

This monitoring system represents a form of community control implemented by the Torosiaje people to ensure the continuity of conservation activities. It also demonstrates the community's active role in protecting and maintaining its ecosystem in a structured, organized manner.

Meanwhile, enforcement mechanisms involve sanctions that promote ecological restoration and reinforce social norms. A participant explained,

> *"There is a sanction to replant... there will be a warning once, twice, and the third time, a fine is imposed" (P7, 67 years old).*

This statement illustrates the sanctions applied by the Torosiaje community, reflecting the implementation of social norms and local regulations to support ecosystem recovery. The participant's statement reflects the formation and strengthening of local institutions responsible for upholding collective agreements.

Intergenerational education is also conducted through practical activities and waste management. As one participant explained,

> *"We strengthen it by managing waste and providing education for school children... we exchange plastic waste for money... the lowest rate is 1,500 per kilogram" (P2, 55 years old).*

The participant described the Torosiaje community's efforts to educate younger generations about the importance of environmental protection and to engage them in conservation actions. At the same time, this statement reflects the formation of collective values that underpin community-based resistance strategies.

Meanwhile, local cultural values function as social control to guide environmentally responsible behavior. One participant stated,

> *"Since long ago, we still have customary laws that control... there are ritual sites in the mangrove and the sea, so they are sacred... there is a tradition prohibiting waste disposal into marine waters. We also have a prohibition against killing turtles; it is taboo" (P6, 56 years old).*

The participant emphasized how customs and local traditions serve as social controls that support ecosystem sustainability and strengthen local institutions governing natural resource use. Thus, it shows that local culture serves as a crucial foundation in building and maintaining community-based natural resource governance.

Customary institutions also frequently organize cultural events as part of environmental campaigns and as economic drivers. As one participant expressed,

> *"Cultural festivals with dance performances and boat races are organized by the community as conservation campaigns and as drivers of the local economy" (P1, 65 years old).*

This statement illustrates how cultural activities can serve as tools to enhance environmental awareness while simultaneously promoting local economic development. The cultural festival represents a resistance strategy that integrates natural resource management with economic development.

Moreover, mangrove rehabilitation is carried out voluntarily and collectively, from nursery preparation to replanting. As another participant described:

> *"When the mangroves are damaged, we replant them together... each group has its own program, some focus on planting, others on nursery development." (P8, 61 years old).*

Overall, Table 2 presents the forms of natural resource governance implemented by the Torosiaje community as expressions of collective protection and sustainable restoration of their natural environment.

Table 3. Drivers of Community Conservation Mobilization in Torosiaje

Data Code	Strategy	Description
Solidarity in collective action, Joint agreements on resource management, monitoring and sanction systems.	Solidarity and Collective Management	Solidarity and collective management are the foundation of resistance strategies against external policies and development projects that disadvantage local communities.
Mangrove replanting, Seasonal fishing closures, Coastal ecosystem restoration.	Ecological Restoration	Ecosystem restoration through collective action that supports natural resource sustainability and local community empowerment.
Cultural and customary values, Cultural festivals, Customary prohibitions.	Cultural Values and Traditions	Cultural values and traditions are the foundation of environmental management and community identity, driving conservation actions and local campaigns.
Internal governance, Routine patrols, and Community-based sanction systems.	Local Institution Building	Development of local institutions as part of efforts to strengthen governance and sustain collective natural resource management.

4.3. Conservation Institutions and Cross-Scale Networks in Torosiaje Ecotourism Village

Our findings indicate that the conservation institutional system in Torosiaje is organized polycentric ally and relies on community-based groups with complementary functions. As shown in Table 3, the institutional arrangements in Torosiaje comprise several conservation communities that play interconnected roles within a shared governance framework, each practicing conservation in accordance with its institutional functions.

Table 4. Drivers of Community Conservation Mobilization in Torosiaje

No.	Institutional structure	Practices
1.	Community Institutional Arrangements (*paddakuang, sipakullong,* customary norms)	Mangrove seedling and replanting activities; coastal and marine patrols; safeguarding of customary norms and sacred spaces.
2.	Governance and Compliance Enforcement	Agreements on open–closed fishing seasons; scheduled patrols and monitoring points; gradual warnings, social sanctions, replanting obligations, fines; and village regulations.
3.	Deliberation and Information Flow	Village deliberation meetings; reporting of monitoring results; public dissemination via notice boards; internal training sessions.
4.	Cross-scale Networking	Inter-village collaboration; establishment of similar community groups; sharing of seedlings, equipment, and guidelines; creation of inter-agency coordination channels.

The governance of conservation institutions in Torosiaje rests primarily on community groups. According to participant accounts, within the coastal habitat domain, the *paddakuang* group focuses on mangrove nursery management, replanting, and patrolling. Meanwhile, in marine areas, the *sipakullong* group is responsible for monitoring the use of fishing gear, identifying vulnerable zones, and maintaining prohibition markers across marine and small island areas. One participant described this division of roles:

> *"Here we have several groups, the paddakuang group takes care of mangroves, and the sipakullong group guards the sea and small islands... every year we replant*

and conduct regular patrols so that no one cuts mangroves recklessly." (P1, 65 years old).

The community thus divides responsibilities by distinct work areas, enabling more effective implementation of conservation practices.

Gradually, the community formulated rules on open and closed fishing seasons, patrol schedules, and monitoring points. They also established mechanisms for disseminating monitoring results so that all residents are informed. Compliance is enforced through a structured system of warnings and sanctions. As one participant noted:

"There is already a village regulation... if someone violates it, they receive one to three warnings, and then there is a fine system... we are also accompanied in supervision and program implementation." (P23, 56 years old).

This reflects that the community relies not only on formal regulations but also on internal monitoring to ensure conservation sustainability, indicating a structured application of rules and sanctions to maintain discipline in conservation implementation.

Moreover, through village deliberations, field findings are reviewed, planting priorities are adjusted, and closed periods are re-evaluated in response to ecological and social dynamics. One participant explained:

"Everyone is involved, there is monitoring and supervision... there are trainings on environmental issues... and new fisheries management initiatives that the community has been involved in since 2009." (P7, 57 years old).

This demonstrates that the community actively adapts and revises conservation policies in response to current conditions, highlighting collective participation by all members in village deliberations to ensure responsiveness to changing environmental and social contexts.

Furthermore, the community has made efforts to build collaboration with neighboring villages for conservation purposes. As one participant recounted:

"It started with three villages, Torosiaje and its sister villages... now others have joined... we are expanding our reach for broader conservation mobilization." (P8, 61 years old).

This illustrates the community's efforts to strengthen a wider conservation network by engaging more villages to achieve common goals. The involvement of additional villages in conservation programs enhances both the scope and the collective impact of these initiatives.

5. DISCUSSIONS

Our findings show that the Torosiaje CBNRM model identifies key conservation challenges and state policies that have dispossessed local communities of control over natural resources. The community has responded through collective action grounded in local solidarity and ecological identity to renegotiate previously state-dominated power relations into more effective and sustainable forms. The Torosiaje community has established a polycentric institutional network in which decision-making is distributed among local actors, civil society organizations, and local governments. Uniquely, this process marks a transformation from a resistance-based social movement to adaptive and collaborative governance, one that not only secures continued access to coastal resources but also strengthens the community's political position within the national conservation system.

5.1. The Torosiaje Model in Comparative Perspective

The CBNRM model in Torosiaje demonstrates that CBNRM's success depends not only on formal institutional design but also on the social forces arising from grassroots community movements. Unlike many failed CBNRM models due to weak legitimacy and the loss of local identity [39], [40]. Torosiaje grew from experiences of dispossession and ecological exclusion that triggered solidarity and collective action. The community has not only become the implementer of policy but the key actor in designing, managing, and overseeing resource management rules. This foundation distinguishes Torosiaje from many conservation programs in Asia and Africa that failed due to top-down approaches and dependency on external projects.

Torosiaje's success in avoiding identity and legitimacy crises is rooted in its ability to create an inclusive, solidarity-based management system free from elite domination. Through participatory mechanisms such as the open–closed fishing system and collective reforestation, the community has both restored the ecosystem and strengthened social justice. This approach reflects institutional bricolage [41] the community combines customary norms, ecological practices, and external negotiations to produce adaptive and autonomous governance. Unlike CBNRM cases in Madagascar and Vietnam, which were hindered by conflicts of interest and dependence on external aid [42], [43]. Torosiaje has developed institutional autonomy through deliberation, equitable power distribution, and recognition of rights to living space.

Thus, Torosiaje can be positioned as a deviant success case that defies the global trend of CBNRM failure. The ecological and social crises it faced have become catalysts for institutional innovation based on social movements and ecological identity. While many CBNRM models are trapped in false decentralization [44], Torosiaje exemplifies substantive decentralization rooted in social trust and ecological solidarity. This success underscores that the strength of the Torosiaje model lies not in external support but in the community's ability to transform resistance into a just, adaptive, and sustainable polycentric governance model, offering valuable lessons for the renewal of CBNRM in coastal areas and beyond.

5.2. From Social Movements to Polycentric Governance

The governance transformation in Torosiaje began as a community-based social movement in response to the dispossession of coastal resources through state development and conservation projects. This mobilization functioned as a social learning space, enabling the community to transform dissatisfaction into collective action, as explained in social movement theory [45], [46]. By strategically leveraging resource mobilization, seizing political opportunities, and framing ecological identity, the community successfully normalized practices such as reforestation, patrols, and the open–closed fishing system, which were institutionalized as collectively agreed-upon rules through deliberations and Village Regulations.

As a result, this movement led to the development of a polycentric governance system, with roles distributed among groups, such as the *paddakuang* on the coast, the *sipakullong* in the waters, and customary institutions that act as guardians of norms. This system integrated local knowledge with formal governance structures [47]. While polycentrism promotes cross-village learning and local adaptation, it also introduces significant challenges. Notably, these challenges include coordination difficulties, policy fragmentation, and power imbalances, which particularly affect small-scale fishermen and women [48], [49]. Such challenges, coupled with the risk of exacerbating inequalities, underscore the critical need for effective coordination mechanisms to bridge local interests with formal management processes [50].

Despite the ecological successes, such as the post-2015 mangrove recovery, the long-term sustainability of Torosiaje's governance model hinges on addressing coordination challenges and power asymmetries. The dominance of wealthier households and external actors in resource use threatens the full realization of polycentric governance's benefits. To ensure that this model endures, institutional pluralism must be managed in accordance with principles of justice, ensuring both ecological and social sustainability [51]. Ultimately, overcoming power imbalances and establishing effective coordination will be essential to maintaining resilience and achieving long-term success amid evolving governance challenges.

5.3. CBNRM and Environmental Justice

Traditional CBNRM is often understood as an approach that places local communities as the primary managers of natural resources, with the main objective of achieving ecological sustainability. However, this approach often neglects the social and political dimensions that influence natural resource management. The Torosiaje case illustrates how the concept of CBNRM must be updated to account for social tensions, structural injustices, and power dynamics that shape environmental governance. In this context, CBNRM can no longer be regarded as a neutral or technocratic system solely focused on ecological efficiency. Conservation practices in Torosiaje demonstrate that conservation frequently involves power conflicts, unequal benefit distribution, and injustices in decision-making processes that affect local communities.

5.3.1. Distributive Pillar: Justice in the Distribution of Benefits and Burdens

The open–closed system with measured openings in Torosiaje has resulted in tangible ecological and economic benefits, such as the recovery of octopus stocks, mangrove expansion, increased catch yields, and the emergence of value-added lines such as processed products, eco-friendly homestays, and small-scale aquaculture. Collective responsibility is carried out through patrols, monitoring of six plots, and graduated sanctions to ensure compliance. While the distribution of benefits at the village level has shown improvements [52], potential inequalities emerge when empowered households absorb more tourism opportunities and when external actors harvest without contributing to the closure phase. This exacerbates social injustice and creates distributive injustice [53]. Unlike many CBNRM models across various countries that fail to maintain distributional justice due to weak compensation mechanisms [54]. Torosiaje demonstrates social innovation grounded in local solidarity. The success of benefit distribution in community-based natural resource management depends not only on fair redistribution mechanisms but also on an inclusive decision-making structure that is responsive to existing social inequalities [55].

5.3.2. Procedural Pillar: Justice in Decision-Making

Furthermore, governance in Torosiaje operates through village deliberations, monitoring reports, and Village Regulations that ensure transparency, accountability, and active citizen engagement. Sanction mechanisms and information boards clarify expectations and reduce opportunities for abuse. However, challenges arise in representativeness (women, youth, small-scale fishermen), participation fatigue among poor households, and agenda bias stemming from reliance on NGOs/village governments. This situation contrasts with CBNRM in the Philippines and Tanzania, which faced elite capture due to weak participatory procedures [54], [56], [57]. This condition shows that governance effectiveness depends on how institutions internalize deliberative principles and social accountability within an adaptive polycentric framework [58], Torosiaje's strength lies in integrating local deliberative norms with formal mechanisms, bridging procedural justice with equitable benefit distribution, and recognizing local values. Thus, procedural justice here is not just formal; it also serves as the foundation connecting equal participation with the social legitimacy of resource management [15].

5.3.3. Recognition Pillar: Respect for Local Identity and Knowledge

Recognition justice in Torosiaje is evident in customary norms such as the prohibition on turtle hunting, waste restrictions, and sacred mangrove spaces, which strengthen the community's ecological identity. Local knowledge is transmitted through cross-generational education and cultural festivals, which serve both as conservation campaigns and economic means. However, as Childress et al. [59],

remind us, symbolic recognition without redistribution and inclusive procedures risks becoming cultural tokenism, as seen in some Pacific communities [60]. Torosiaje avoids this trap by linking customary practices to ecological sanctions (replanting) and formal rules, ensuring that recognition has a direct impact on material outcomes. The integration of local identity, deliberative mechanisms, and benefit distribution demonstrates how the three pillars of blue justice support each other, making Torosiaje a holistic and ecologically just CBNRM practice.

6. CONCLUSIONS

This study reaffirms the CBNRM approach within the socio-political context of local communities as a pathway toward sustainability. The case of Torosiaje demonstrates how collective action can be mobilized to construct a polycentric governance system as a response to state-led dispossession, in pursuit of environmental justice. Through a more inclusive governance model grounded in the vertical integration of local knowledge and formal regulations, the Torosiaje case offers a more adaptive framework that addresses the limitations of conventional CBNRM models. The Torosiaje CBNRM model emphasizes community-based ecosystem management, with residents directly involved in mangrove restoration and in regulating open–closed fishing seasons.

Territorial-based groups such as *paddakuang* and *sipakullong* conduct conservation activities through patrols, seedling programs, and the enforcement of social norms. Cross-village collaborations and culturally grounded education further strengthen the sustainability of conservation efforts, while participatory ecotourism integrates ecological incentives with community welfare. Together, these initiatives position Torosiaje as a model of inclusive and sustainable natural resource governance that directly contributes to achieving the Sustainable Development Goals, particularly Goals 14 (Life Below Water), 13 (Climate Action), and 8 (Decent Work and Economic Growth).

Theoretically, this study demonstrates that the success of CBNRM is not a pre-designed management model, but rather the institutional outcome of political struggles for environmental justice. It challenges technocratic conservation approaches by demonstrating that sustainable institutions are formed through collective action against land grabbing. Grounding CBNRM in social movements underscores the importance of community agency in shaping governance systems, thereby shifting from top-down conservation models to locally driven, politically contested processes. However, this study primarily focuses on community perspectives, often treating the state as a monolithic source of dispossession. Further analysis is needed to explore intra-state dynamics—for instance, how competition or alliances between different state agencies (e.g., local versus national) may have created the political opportunities that enabled the community's movement to succeed. Furthermore, while the Torosiaje governance system appears effective, its long-term financial sustainability and resilience to external political shifts remain uncertain. Future research could address these limitations by conducting comparative studies of other communities resisting "blue land grabbing" in Indonesia and conducting longitudinal analyses of Torosiaje's institutional evolution and power dynamics to assess its long-term effectiveness.

Acknowledgments

The author expresses his gratitude to the local community of Torosiaje who assisted with the field study. Lembaga Pengelola Dana Pendidikan (LPDP), Doctoral Scholarship Program for Indonesian Lecturers, Center for Higher Education Funding and Assessment (PPAPT) KEMDIKTISAINTEK, and Ministry of Higher Education, Science and Technology of Republic Indonesia. The LPDP, BPI, and PDDI Financing Schema provided enthusiasm and support for funding.

Conflicts of Interest

The authors declare that they have no known competing financial interests or personal relationships that could have influenced the work reported in this study.

Data Availability

Data is available and will be provided on request.

Ethical Statements

This study received ethical approval from the Research Ethics Committee of a reputable institution, with approval number No. 02.12.08/UN32.14.2.8/LT/2024. The study was deemed ethically suitable in accordance with the 7 (seven) WHO 2011 Standards.

Funding

This work was supported by Lembaga Pengelola Dana Pendidikan (LPDP), Doctoral Scholarship Program for Indonesian Lecturers, Center for Higher Education Funding and Assessment (PPAPT) Kemdiktisaintek, and Ministry of Higher Education, Science and Technology of Republic Indonesia. The LPDP, BPI, and PDDI Financing Schema.

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