
















ARTICLE

## Returning to Nature Preservation Practices: Collective Strategies of Common Community Groups in Avoiding Ecological Exploitation

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## ABSTRACT

Anchored on Collective Action Theory, this study examines how Philippine community-based organizations develop and sustain cooperative strategies to prevent ecological exploitation. While national conservation policies exist, enforcement gaps at the grassroots level often permit illegal logging and unregulated land conversion. Using a qualitative descriptive design, semi-structured interviews were conducted with twenty (20) purposively selected barangay environmental officers, community volunteers, and indigenous representatives. The findings reveal that communities operationalize a hybrid governance model, effectively integrating national mandates with local ordinances and Traditional Ecological Knowledge (TEK). Results indicate that compliance is maintained through tiered enforcement mechanisms—escalating from restorative social pressure to formal legal sanctions—and participatory monitoring systems like “Bantay Gubat” patrols. Furthermore, communities demonstrate high adaptive capacity, modifying ecological interventions such as reforestation and mangrove rehabilitation in response to site-specific failures. However, the study identifies that these collective efforts are increasingly vulnerable to external pressures, specifically capital penetration and climate change, which threaten internal cohesion and traditional planning cycles. The study concludes that while local collective action is effective, it requires stronger institutional integration to remain sustainable. Consequently, the research recommends the institutionalization of Joint Management Agreements (JMAs) and the statutory deputization of volunteer enforcers. These measures would formally empower communities, transforming them from informal volunteers into legally protected agents of environmental governance.

**Keywords:** Nature; Preservation; Strategies; Ecological Exploitation; Hybrid Governance; Adaptive Management

## 1. Introduction

The Philippines, known for its rich biodiversity and vast natural landscapes, continues to face severe environmental degradation due to persistent ecological exploitation. Activities such as illegal logging, overharvesting of plants, unregulated land conversion, and unsustainable resource use have led to widespread deforestation, soil erosion, declining water quality, and the loss of critical habitats<sup>[1,2]</sup>.

Although national and local government policies on environmental protection exist—ranging from the Presidential Decree 705 (Forestry Reform Code) to the National Integrated Protected Areas System (NIPAS) Act—their implementation at the grassroots level often encounters enforcement gaps, weak compliance, and limited community participation<sup>[3]</sup>.

Consequently, the responsibility for maintaining ecological balance and preserving biodiversity has increasingly fallen upon local community groups who directly depend on these resources for survival. Barangay environmental officers, people’s organizations, youth and volunteer groups, and indigenous communities have taken on the

role of stewards of their natural environments, implementing a range of initiatives such as reforestation, mangrove rehabilitation, and the establishment of local conservation zones<sup>[4,5]</sup>.

Despite these growing efforts, there remains a limited understanding of how such community groups coordinate, enforce, and sustain their collective environmental actions. This study is anchored on Collective Action Theory. While various theoretical frameworks offer lenses for viewing resource management, Collective Action Theory provides the most robust mechanism for understanding grassroots cooperation. For instance, Hardin’s “Tragedy of the Commons” suggests a fatalistic view where individuals acting in self-interest will inevitably deplete shared resources<sup>[6]</sup>. In contrast, Collective Action Theory, particularly as articulated by Ostrom<sup>[7]</sup>, posits that communities are capable of self-organization and can sustainably manage common-pool resources by establishing shared norms, trust, communication channels, and enforcement mechanisms. Collective success depends on the establishment of shared norms, trust, communication channels, and mutually agreed-upon enforcement mechanisms that prevent resource depletion and ensure long-term sustainability

[8,9]. Furthermore, while Political Ecology offers valuable insights into the macro-level power dynamics and structural inequalities driving environmental change, it often overlooks the internal micro-processes of cooperation that occur within villages. Therefore, this study prioritizes Collective Action Theory to specifically examine the internal social mechanisms, such as trust-building and peer monitoring, that enable local groups to overcome the free-rider problem and successfully avoid ecological exploitation.

Applying this theoretical lens allows the study to explore how Philippine community groups organize themselves, develop and implement local environmental rules, monitor compliance, and adapt their preservation strategies in response to ecological challenges.

Existing research on community-based resource management in the Philippines has largely focused on government-initiated programs or external interventions by non-governmental organisations. However, there is a significant gap in understanding how community groups themselves, operating within their social and ecological contexts, formulate and execute their own preservation strategies, particularly across multiple localities. Furthermore, little is known about the social mechanisms that sustain cooperation among these groups, such as trust-building, shared accountability, and inter-community coordination [10,11].

This study seeks to fill this gap by examining how various local organisations collectively respond to ecological exploitation and by identifying the key factors that enable or hinder their environmental preservation efforts [12,13].

The primary intent of this research is to determine how community groups establish, implement, and enforce local policies to prevent ecological exploitation, including deforestation, illegal plant harvesting, and unregulated land conversion. It also aims to identify and evaluate the ecological interventions, such as reforestation, mangrove rehabilitation, and erosion control, that these groups undertake to restore degraded ecosystems and enhance resilience against environmental degradation [14,15].

By focusing on both governance mechanisms and practical ecological actions, the study integrates social and environmental dimensions of collective environmental stewardship [16].

The study will examine several interconnected vari-

ables and key concepts derived from Collective Action Theory. The independent variable is the set of collective strategies employed by community groups, which include rule formation, monitoring systems, compliance enforcement, and participatory decision-making. The dependent variable is the effectiveness of these efforts in achieving environmental preservation, measured through outcomes such as improved forest cover, biodiversity conservation, and ecosystem restoration [17,18].

Intervening variables such as social capital, institutional support, and resource availability will also be considered, as these influence the sustainability and success of collective efforts [19,20].

Key concepts central to this study include community-based conservation, ecological governance, social cooperation, adaptive management, and participatory environmental stewardship.

Ultimately, this study expects to uncover how local cooperation, shared responsibility, and trust-based enforcement mechanisms contribute to effective ecological preservation in Philippine communities. By highlighting the strategies that enable successful collective action, the research aims to propose a localized, participatory framework for nature preservation grounded in the principles of Collective Action Theory. The findings are expected to inform policy refinements and capacity-building programs that empower communities to serve as active and accountable agents of environmental governance, ensuring the protection and regeneration of natural resources for future generations [4].

## 2. Literature Review

*Environmental Exploitation and Community Vulnerability in the Philippines.* Environmental exploitation continues to pose a serious threat to the ecological stability of the Philippines. Activities such as illegal logging, overharvesting of forest products, and unregulated land conversion have led to widespread deforestation, biodiversity loss, and soil degradation [21]. Despite the existence of legal frameworks like the National Greening Program (NGP) and the Expanded National Integrated Protected Areas System (ENIPAS) Act, enforcement remains weak in many localities due to resource limitations and governance

gaps<sup>[22]</sup>. This degradation is deeply rooted in macro-scale socio-economic factors. Nolos et al.<sup>[23]</sup> identify that widespread poverty and fluctuating commodity prices drive rapid rural population growth and migration toward upland frontiers. Once in these areas, the lack of viable employment opportunities forces residents to adopt survival strategies such as wood poaching and kaingin (slash-and-burn farming), transforming economic necessity into a primary driver of forest loss.

*Collective Action and Local Environmental Governance.* The success of environmental preservation in resource-dependent communities is closely tied to collective action and participatory governance. Ostrom's<sup>[7]</sup> theory of common-pool resource management posits that community members can sustainably manage shared resources when they establish self-imposed rules, monitoring systems, and enforcement mechanisms. In the Philippine context, barangay councils and community-based organizations (CBOs) serve as grassroots governance units that operationalize national environmental policies. Empirical research shows that participatory rule-making, transparency, and trust strengthen community compliance and accountability<sup>[24,25]</sup>. Secure land tenure is fundamental to this process, as it lowers the risks associated with long-term conservation planning. However, Robinson et al.<sup>[26]</sup> argue that strict formalization is not always the superior path; in communities where customary rights are already stable, forcing official legal recognition may yield negligible improvements. Instead, goals such as sustainable agriculture may be better achieved by strengthening informal local norms and environmental stewardship rather than relying solely on complex government schemes like Payment for Ecosystem Services (PES).

*Monitoring, Compliance, and Enforcement Mechanisms.* Monitoring and enforcement are critical to ensuring compliance with conservation policies. Studies in community forestry and participatory resource management demonstrate that local monitoring through forest patrols, peer reporting, and participatory mapping significantly enhances transparency and reduces environmental violations<sup>[27,28]</sup>. In many Philippine barangays, informal yet effective systems of monitoring are maintained through cooperation among residents, barangay officials, and environmental volunteers. Sanctions for violations may include verbal

warnings, social sanctions, or formal legal action, depending on the severity of the offense. However, the frontline enforcers of these rules, particularly the Bantay Gubat (forest guards), operate under highly precarious conditions. Celeste<sup>[29]</sup> reports that these guards often manage vast areas—sometimes as few as two enforcers for 5000 hectares—while receiving a meager honorarium of Php 1500 to Php 3000 per month, which is frequently delayed. Furthermore, they lack social safety nets such as health insurance or hazard pay, despite facing life-threatening risks including death threats from violators and, in some reported instances, fatalities in the line of duty.

*Ecological Interventions and Restoration Practices.* Community-based ecological restoration efforts are essential components of local conservation. Initiatives such as reforestation, mangrove rehabilitation, watershed protection, and erosion control not only restore degraded ecosystems but also enhance community resilience<sup>[30,31]</sup>. Reforestation and mangrove projects have been particularly effective in improving biodiversity, stabilizing coastal zones, and providing sustainable livelihoods through ecotourism and agroforestry. Many of these efforts are guided by indigenous and traditional ecological knowledge (TEK), which informs plant selection, seasonal timing, and sustainable resource use<sup>[32]</sup>. However, the efficacy of large-scale initiatives like the National Greening Program has been compromised by administrative bottlenecks that lead to biological failures. Gregorio et al.<sup>[33]</sup> revealed that delayed fund releases often compress nursery production into just 2–3 months, forcing the use of substandard planting materials. Their audit found that 82% of seedlings were not sturdy and 36% suffered from deformed root systems, such as J-rooting. Moreover, a focus on hitting numerical targets often results in a mismatch between the species provided and the specific site conditions, undermining long-term reforestation success.

*Evaluating Effectiveness and Adaptive Strategies.* The success of ecological preservation efforts depends on continuous evaluation and adaptive management. Community groups employ both qualitative and quantitative measures, such as tree survival rates, species return, and water quality, to assess project outcomes<sup>[34]</sup>. Collaboration with local government units (LGUs), non-governmental organizations (NGOs), and academic institutions helps strength-

en data collection and validation processes. The economic impact of adaptive strategies is particularly notable. Tota et al. [35] found that Community-Based Adaptation (CBA) initiatives, which synthesize indigenous knowledge with modern technical approaches, improved income stability by 25% and reduced average economic losses by 40% over a five-year period. However, the study also warns of the risks of maladaptation; for instance, poorly planned flood control structures can inadvertently alter natural water flows, shifting environmental burdens to downstream areas rather than resolving them.

*The Role of Collaboration and Inter-Community Networks.* Inter-community collaboration enhances the scale and impact of local conservation efforts. Networks of community groups often exchange knowledge, coordinate projects, and advocate for environmental protection at broader geographic levels [36]. Collaborative platforms enable the pooling of resources, the sharing of best practices, and the establishment of unified environmental monitoring systems. In the Philippines, inter-barangay alliances and partnerships with NGOs have been effective in coordinating reforestation across multiple localities [27]. These collective strategies foster social learning and solidarity, thereby strengthening both ecological outcomes and community empowerment.

Overall, the literature underscores the critical role of collective community strategies in addressing ecological exploitation in the Philippines. While national conservation policies provide a framework for environmental protection, local implementation through community groups determines their effectiveness. Barangay environmental officers, community-based organizations, and indigenous groups demonstrate that sustainable environmental management relies on participatory governance, adaptive learning, and inter-community collaboration. However, gaps in enforcement, funding, and institutional support continue to challenge long-term ecological preservation. The present study contributes to this discourse by exploring how multiple community groups coordinate and sustain environmental preservation efforts, offering insights into scalable and culturally grounded strategies for avoiding ecological exploitation.

## 3. Methodology

### 3.1. Research Design

This study utilized a qualitative descriptive research design to explore the collective environmental preservation strategies of community groups in the Philippines. This approach was chosen to capture the authentic, real-life practices and experiences of barangay officials, community-based organizations (CBOs), eco-volunteers, and indigenous members actively engaged in conservation. The design allowed for a detailed understanding of how these groups establish rules, monitor compliance, and adapt ecological interventions, providing a grounded account of community-driven environmental governance without manipulating variables.

### 3.2. Population and Sampling

The study involved twenty (20) community members directly participating in environmental initiatives. The respondents included five (5) barangay environmental officers, ten (10) members of community-based reforestation and mangrove groups, and five (5) indigenous representatives. A purposive sampling technique was employed to ensure that only knowledgeable and experienced individuals were selected. While this non-probability sampling method limits the statistical generalizability of the findings to the entire archipelago, it was deemed essential for selecting information-rich cases that could provide deep, contextual insights into the specific mechanisms of collective action and enforcement at the grassroots level.

### 3.3. Instrument

A semi-structured interview guide served as the main research instrument, containing open-ended questions aligned with the study's objectives. The first section focused on local policy implementation, compliance monitoring, and enforcement of environmental rules, while the second explored ecological interventions and adaptive strategies in restoration projects. The interview questions were validated by experts in environmental management and community development to ensure clarity and relevance, and a brief pilot test was conducted to refine the guide prior to formal data collection. **Table 1** presents the list of guide questions used by this research study.

**Table 1.** Interview guide questions.

Objectives	Interview Questions
1. Determine how community groups establish, implement, and enforce policies or rules to prevent ecological exploitation, including deforestation, illegal plant harvesting, and unregulated land conversion.	<ol style="list-style-type: none"> <li>1. What formal or informal rules or policies does your group follow to prevent activities such as tree cutting, harvesting plants, or converting land, and how were these policies developed?</li> <li>2. How does your group monitor compliance with these policies, and what specific tools or systems (e.g., reporting, inspections, or community patrols) are used?</li> <li>3. When violations occur, what actions or sanctions are applied, and how are these communicated and enforced within the community?</li> </ol>
2. Identify and evaluate the ecological interventions applied by community groups to restore and protect ecosystems, maintain biodiversity, and enhance resilience against environmental degradation.	<ol style="list-style-type: none"> <li>1. What ecological practices has your group implemented, such as reforestation, mangrove rehabilitation, buffer zone establishment, or erosion control?</li> <li>2. How does your group measure the effectiveness of these ecological practices (e.g., survival of planted trees, water quality, species return) and who collects or validates these data?</li> <li>3. How does your group adapt or modify strategies when ecological interventions fail or face challenges, and can you provide a specific example?</li> </ol>

### 3.4. Data Gathering Procedure

Ethical review and approval were waived for this study due to the non-interventional nature of the research, which involved interviewing adult participants regarding their professional public duties and general community practices. The study was conducted in accordance with the Declaration of Helsinki. Data were collected through face-to-face and online interviews, depending on participant accessibility. Prior to the interviews, consent and permission were obtained from local authorities and participants, ensuring adherence to ethical research standards. Each session lasted approximately 30–60 min, conducted in the language most comfortable for the respondent. With consent, interviews were audio-recorded and transcribed, while field notes were taken for context. To ensure accuracy, participants were given the opportunity to review transcriptions through member checking before analysis.

### 3.5. Data Analysis

The study employed thematic analysis following Braun and Clarke’s framework to identify recurring themes and patterns within the interview data. Transcripts were coded manually and organized into key themes such as policy enforcement, ecological practices, monitoring systems, and adaptive management. Emerging themes were

refined and supported by direct participant quotations. To ensure reliability, data triangulation across different respondent groups and validation through member feedback were conducted.

## 4. Results

### 4.1. Research Objective 1

Determine how community groups establish, implement, and enforce policies or rules to prevent ecological exploitation, including deforestation, illegal plant harvesting, and unregulated land conversion.

#### 4.1.1. Research Objective 1, Question No. 1

What formal or informal rules or policies does your group follow to prevent activities such as tree cutting, harvesting plants, or converting land, and how were these policies developed?

#### (1) Integration of National Policies with Locally Tailored Environmental Regulations

The first major theme reveals a hybrid approach to governance. While national laws provide the legal backbone for conservation, ten (10) respondents—specifically the barangay environmental officers and CBO leaders—emphasized that strict adherence to national mandates

alone is often insufficient due to a lack of local relevance. Consequently, these groups have taken the initiative to “localize” national policies. For instance, while the Department of Environment and Natural Resources (DENR) sets broad logging bans, local barangays often create specific forestry ordinances that map out exact “no-touch” zones while designating other areas for sustainable firewood collection. This localization process involves intense negotiation with the barangay council and community elders to ensure the rules are not just legal, but socially acceptable.

*“In our barangay, we follow a combination of national and local regulations. We implement the rules set by the DENR, like the National Greening Program, but we also created our own barangay forestry ordinance that restricts tree cutting and land conversion in designated areas.”*

*“We also include clear penalties for violations, ranging from verbal warnings to fines or legal action, depending on the severity.”*

## **(2) Collaborative and Science-Informed Community Guidelines for Sustainable Resource Use**

Beyond government ordinances, five (5) respondents from non-governmental community organizations highlighted the role of internal organizational by-laws in regulating resource use. Unlike public ordinances, which apply to everyone, these internal rules function as a code of conduct for members, fostering a higher standard of ecological discipline. These guidelines are often developed through a rigorous process of consultation with local scientists and academic partners. The respondents emphasized that their policies are not arbitrary; they are rooted in specific ecological data, such as the breeding seasons of local wildlife or the vulnerability status of specific plant species. This scientific grounding helps legitimize the restrictions, making members more willing to comply because they understand the biological rationale behind the prohibitions.

*“Our organization has an internal guideline that prohibits the harvesting of endangered plants and requires prior approval for collecting forest products.”*

*“We based our rules on the ecological data we have and the traditional practices of indigenous communities, ensuring that resource use is sustainable and respects the local environment.”*

## **(3) Integrating Traditional Ecological Knowledge with Formal Environmental Policies**

A distinct sub-group of five (5) respondents emphasized that their policies are not always written documents but are often oral traditions passed down through generations. These unwritten laws, governed by Traditional Ecological Knowledge (TEK), dictate the rhythm of interaction with nature. Unlike the static nature of written laws, TEK is fluid and seasonal. For example, specific harvesting bans are not permanent but are triggered by seasonal cues, such as the flowering of certain trees or the arrival of migratory birds. These traditional restrictions create “sacred groves” or buffer zones that effectively function as strict nature reserves. The challenge, however, has been formalizing these ancient rules to gain recognition from local government units.

*“Our community relies heavily on traditional ecological knowledge, which includes seasonal restrictions on harvesting certain plants and prohibitions against cutting trees in sacred groves or buffer zones.”*

*“These rules have been passed down for generations but were recently codified in collaboration with local NGOs and barangay officials to align with national environmental policies.”*

### **4.1.2. Research Objective 1, Question No. 2**

How does your group monitor compliance with these policies, and what specific tools or systems (e.g., reporting, inspections, or community patrols) are used?

#### **(1) Community-Led Monitoring and Enforcement Mechanisms in Local Environmental Governance**

Monitoring in these communities relies on a structured system of physical presence and community reporting. Five (5) respondents stated that they conduct regular barangay forest patrols, which are operationally supported by local volunteers. Beyond these scheduled patrols, the groups maintain an active reporting system that allows ordinary residents to alert officials immediately if they witness illegal tree cutting or signs of land conversion. Furthermore, the respondents noted that compliance is verified through systematic field inspections and the use of GPS

mapping to monitor the boundaries of protected areas. These observations are not just recorded but are formally discussed during periodic community meetings, where specific violations are reviewed so that appropriate warnings or enforcement actions can be taken.

*“We conduct regular barangay forest patrols with the help of local volunteers.”*

*“Compliance is monitored through field inspections, GPS mapping of protected areas, and periodic community meetings to discuss observed violations.”*

## **(2) Participatory Monitoring and Collaborative Compliance in Community-Based Resource Management**

For the ten (10) respondents belonging to organized conservation groups, monitoring is a structured, collective routine rather than a solitary task. These organizations utilize a combination of volunteer monitoring teams and participatory mapping to physically track how resources are being used in their area. The process is systematic: members document the volume of forest products harvested and cross-check these activities against the organization’s internal guidelines to ensure no prohibited acts occurred. Crucially, these findings are not kept private; they are formally reported and discussed during monthly group meetings, ensuring that the entire membership is aware of the current status of their resources. Furthermore, the respondents emphasized that their vigilance extends outward; when issues arise that are beyond their internal capacity to handle, they coordinate with nearby communities and local authorities to ensure that proper corrective action is taken.

*“Our organization uses a combination of volunteer monitoring teams and participatory mapping to track resource use.”*

*“When issues arise, we coordinate with nearby communities and local authorities to ensure corrective action is taken.”*

## **(3) Integrating Traditional Oversight with Modern Monitoring Tools in Indigenous Resource Management**

The five (5) indigenous respondents described how monitoring duties are divided to leverage both age and technology. The community relies on traditional oversight

led by the elders, who observe seasonal harvesting practices and ensure that sacred areas are respected according to custom. To support this, they also involve younger members in tracking resource use on the ground and reporting violations during council meetings. Recently, the respondents noted a technical shift; they integrated simple digital tools to map sacred groves and restricted zones. Rather than just for internal use, they explained that these maps help them coordinate with NGOs and barangay officials more efficiently.

*“Our community monitors compliance through traditional oversight, where elders observe seasonal harvesting practices and ensure sacred areas are respected.”*

*“We also involve younger members in tracking resource use and report violations during council meetings.”*

### **4.1.3. Research Objective 1, Question No. 3**

When violations occur, what actions or sanctions are applied, and how are these communicated and enforced within the community?

#### **(1) Tiered Enforcement and Community Awareness in Policy Compliance**

When addressing non-compliance, ten (10) respondents described utilizing a distinct “tiered approach” rather than a single standard punishment. Minor infractions, such as unauthorized tree cutting that is limited in scale, are typically met with verbal warnings or mandatory community counseling to correct the behavior. However, the respondents emphasized that more serious cases trigger a formal escalation process involving fines or official reports to the municipal environment office, which can lead to legal action. To ensure that these sanctions are understood by all residents, enforcement protocols are communicated during barangay meetings, through house-to-house notifications, and via public postings in strategic community areas so that everyone is fully informed of the rules and potential penalties.

*“When violations occur, we follow a tiered approach. Minor infractions, such as unauthorized tree cutting, receive verbal warnings or community coun-*

seling.”

“More serious cases involve fines or formal reports to the municipal environment office, which can lead to legal action.”

## (2) Internal Accountability and Structured Sanctions within Community Organizations

For the five (5) respondents representing formal organizations, maintaining internal discipline is a key priority. These groups apply internal sanctions that vary depending on the severity of the violation. For instance, members found harvesting plants without prior approval are given a written warning and may be temporarily suspended from participating in group activities. Furthermore, the respondents noted that persistent violations are not tolerated internally but are instead referred to as formal reports to the local barangay authorities. To maintain transparency among the membership, the communication of these sanctions occurs during monthly meetings and through internal group messaging platforms.

“Our organization applies internal sanctions depending on the severity of the violation.”

“Persistent violations result in formal reports to the local barangay authorities.”

## (3) Culturally Rooted Enforcement and Restorative Practices

Among the five (5) respondents, the enforcement process is deeply rooted in traditional authority structures. Violations of traditional rules, such as cutting trees in sacred groves or harvesting during restricted seasons, are addressed first through formal discussion with elders. In these cases, offenders may be required to perform restitution, such as replanting trees or participating in community service, to make amends. However, respondents clarified that this traditional system has an escalation mechanism; serious or repeated offenses are reported during council meetings and forwarded to the barangay for further action. The primary mode of communication is oral, delivered during gatherings, which ensures that both the offender and the community fully understand the consequences.

“In our community, violations of traditional rules, such as cutting trees in sacred groves or harvesting during restricted seasons, are addressed first

through discussion with elders.”

“Serious or repeated offenses are reported during council meetings and to the barangay for further action.”

## 4.2. Research Objectives 2

Identify and evaluate the ecological interventions applied by community groups to restore and protect ecosystems, maintain biodiversity, and enhance resilience against environmental degradation.

### 4.2.1. Research Objective 2, Question No. 1

What ecological practices has your group implemented, such as reforestation, mangrove rehabilitation, buffer zone establishment, or erosion control?

#### (1) Community-Based Reforestation and Multi-Sectoral Participation in Environmental Initiatives

The ecological efforts described by ten (10) respondents encompass a variety of projects aimed at landscape restoration. Their barangay has implemented several ecological projects, including tree-planting drives mandated under the National Greening Program and the establishment of buffer zones near rivers and watershed areas. Beyond planting, the respondents highlighted that they also conduct regular clean-up drives and coordinate with the municipal agriculture office for soil erosion control along farmlands. Crucially, the implementation of these projects relies on broad involvement; these initiatives are done with the participation of residents, schools, and local organizations to promote shared responsibility for environmental protection.

“Our barangay has implemented several ecological projects, including tree-planting drives under the National Greening Program and the establishment of buffer zones near rivers and watershed areas.”

“These initiatives are done with the participation of residents, schools, and local organizations to promote shared responsibility for environmental protection.”

#### (2) Traditional Ecological Knowledge and Culturally Rooted Forest Restoration Practices

For the five (5) respondents, ecological restoration is closely tied to their cultural heritage. Their community practices forest restoration based on traditional ecological knowledge. This includes specific measures such as protecting sacred forests, replanting native tree species, and enforcing seasonal harvesting to allow natural regeneration. In addition to conservation, they integrate sustainable food production; they maintain agroforestry areas that combine fruit trees and root crops, which helps prevent soil erosion and provide food for the community. Respondents emphasized that these practices have been part of their culture for generations and are now being supported by environmental NGOs.

*“We protect sacred forests, replant native tree species, and enforce seasonal harvesting to allow natural regeneration.”*

*“These practices have been part of our culture for generations and are now being supported by environmental NGOs.”*

### **(3) Community-Led Mangrove Rehabilitation and Coastal Ecosystem Conservation**

In coastal areas, five (5) respondents detailed their group’s specific focus on mangrove rehabilitation and coastal reforestation. Their activities involve planting native mangrove species in degraded coastal zones and maintaining a nursery for seedling propagation. Furthermore, the respondents noted that their work extends to community education; aside from planting, they educate local fisherfolk about the ecological benefits of mangroves, such as protecting against storm surges and supporting fish habitats. To ensure the broader health of the marine environment, they also implement coral reef monitoring in partnership with local marine biologists.

*“We plant native mangrove species in degraded coastal zones and maintain a nursery for seedling propagation.”*

*“Aside from planting, we educate local fisherfolk about the ecological benefits of mangroves, such as protecting against storm surges and supporting fish habitats.”*

#### **4.2.2. Research Objective 2, Question No. 2**

How does your group measure the effectiveness of

these ecological practices (e.g., survival of planted trees, water quality, species return) and who collects or validates these data?

### **(1) Data-Driven Monitoring and Inter-Agency Collaboration in Evaluating Ecological Initiatives**

To ensure their projects are succeeding, five (5) respondents explained that they monitor the survival rate of planted trees every three to six months. This process involves their barangay environment committee and local volunteers conducting field inspections and using GPS tagging to record growth progress and replant where needed. In addition to tree growth, water quality in nearby rivers is also tested in coordination with the municipal environment office. The respondents emphasized the formal nature of this data collection, noting that all data are consolidated in reports submitted to the DENR and municipal government for validation.

*“To measure the effectiveness of our ecological projects, we monitor the survival rate of planted trees every three to six months.”*

*“All data are consolidated in reports submitted to the DENR and municipal government for validation.”*

### **(2) Participatory and Community-Based Evaluation of Environmental Outcomes**

In contrast to formal audits, five (5) respondents stated that their group measures effectiveness through simple, community-friendly tools. For instance, they count the number of surviving seedlings after each reforestation activity and check for visible improvements in soil stability and cleanliness of waterways. Beyond physical counts, they also gather feedback from local farmers and residents about observed changes in their surroundings. To ensure these observations are accurate, data validation is often done with guidance from barangay officials and environmental science students who assist them during outreach programs.

*“Our group measures effectiveness through simple, community-friendly tools.”*

*“We also gather feedback from local farmers and residents about observed changes in their surroundings.”*

**(3) Scientific and Technological Approaches to Monitoring Coastal Ecosystem Recovery**

For coastal projects, ten (10) respondents described using specific indicators to track success. They track their mangrove rehabilitation projects by monitoring seedling survival and recording wildlife sightings, especially fish and bird species that return to restored areas. To support these observations, their trained members conduct periodic assessments with support from partner NGOs and marine biologists who help validate their findings. Furthermore, the respondents highlighted the use of technology, noting that they also use photo documentation and drone imagery to compare changes in mangrove cover over time.

*“We track our mangrove rehabilitation projects by monitoring seedling survival and recording wildlife sightings, especially fish and bird species that return to restored areas.”*

*“We also use photo documentation and drone imagery to compare changes in mangrove cover over time.”*

**4.2.3. Research Objective 2, Question No. 3**

How does your group adapt or modify strategies when ecological interventions fail or face challenges, and can you provide a specific example?

**(1) Adaptive Strategies in Reforestation through Species Selection and Community Capacity-Building**

When faced with project setbacks, ten (10) respondents explained that when reforestation projects fail due to low seedling survival, they conduct a post-activity evaluation to identify the cause, such as unsuitable species selection or poor soil conditions. Based on these findings, they modify their strategy by choosing native species that are more adaptive to local environments and scheduling planting during the rainy season to improve survival rates. Additionally, the respondents noted that they also enhance community training on proper planting techniques and maintenance. They provided a specific example from their 2022 watershed reforestation, where they replaced mahogany with narra and molave after noticing poor growth results.

*“When reforestation projects fail due to low*

*seedling survival, we conduct a post-activity evaluation to identify the cause, such as unsuitable species selection or poor soil conditions.”*

*“A specific example was our 2022 watershed reforestation, where we replaced mahogany with narra and molave after noticing poor growth results.”*

**(2) Adaptive Measures in Mangrove Rehabilitation through Environmental Assessment and Engineering Solutions**

In coastal areas, physical challenges often require structural solutions. Five (5) respondents shared that when they encountered challenges in mangrove rehabilitation due to strong tides washing away seedlings, they collaborated with marine experts and decided to construct bamboo fences as wave barriers before replanting. Alongside these barriers, they also adjusted their planting density and timing to align with tidal patterns. The respondents reported that this adaptive measure helped increase the survival rate of mangroves in their coastal zone. Consequently, their approach now includes pre-assessment of site conditions before every planting activity.

*“When we encountered challenges in mangrove rehabilitation due to strong tides washing away seedlings, we collaborated with marine experts and decided to construct bamboo fences as wave barriers before replanting.”*

*“Our approach now includes pre-assessment of site conditions before every planting activity.”*

**(3) Community Engagement and Volunteer-Based Adaptive Strategies in Reforestation**

Finally, five (5) respondents addressed the challenge of sustaining human resources. When their tree-planting projects suffered from low maintenance participation, they initiated a ‘tree guardianship’ program where each youth member adopts specific planted trees to ensure follow-up care. To further support this, they also increased awareness through school campaigns and social media posts to engage more volunteers. The respondents observed that this adaptation not only improved survival rates but also boosted community involvement in long-term care of reforested areas.

*“When our tree-planting projects suffered from*

*low maintenance participation, we initiated a ‘tree guardianship’ program where each youth member adopts specific planted trees to ensure follow-up care.”*

*“We also increased awareness through school campaigns and social media posts to engage more volunteers.”*

## 5. Discussion

The findings of this study can be understood through the lens of Collective Action Theory, which emphasizes that individuals and groups can achieve shared goals such as sustainable resource management when they cooperate, follow mutually agreed-upon rules, and establish mechanisms for monitoring and enforcement. In the context of Philippine communities, local groups’ efforts to prevent ecological exploitation demonstrate that collective action is both necessary and effective in addressing environmental challenges that national policies alone cannot fully resolve.

Regarding the first objective, which examines how community groups establish, implement, and enforce policies to prevent deforestation, illegal plant harvesting, and unregulated land conversion, the study illustrates that respondents actively participate in rule-making processes. Barangay environmental officers, community-based organizations, and indigenous representatives collectively formulate formal and informal policies based on both scientific guidelines and traditional ecological knowledge. This reinforces the concept of “hybrid governance,” where state-mandated laws (like the NGP) are not merely imposed from above but are re-negotiated and localized to fit specific community contexts. These rules are enforced through community monitoring, reporting systems, and sanctions, consistent with Ostrom’s<sup>[7]</sup> principles of common-pool resource management, which highlight the importance of self-imposed rules and collective enforcement. The respondents’ strategies reveal that compliance is strengthened when members perceive rules as legitimate, equitable, and culturally appropriate, illustrating the critical role of trust, transparency, and social norms in sustaining collective action.

For the second objective, which focuses on eco-

logical interventions and adaptive strategies, community groups implement initiatives such as reforestation, mangrove rehabilitation, buffer zone establishment, and erosion control to restore degraded ecosystems and enhance resilience against environmental hazards. According to Collective Action Theory, these interventions succeed when group members share responsibility, pool resources, and monitor outcomes collectively. The study shows that participants evaluate ecological projects using qualitative and quantitative indicators, such as tree survival rates, biodiversity return, and water quality measures. Furthermore, groups adapt strategies when challenges arise, modifying planting techniques, diversifying species, or reallocating labor, demonstrating iterative learning and cooperative problem-solving. This adaptive approach reflects the theory’s emphasis on coordinated group efforts to overcome free-rider problems and environmental uncertainty.

However, the collective strategies identified in this study do not operate in a vacuum. External factors can significantly influence the sustainability of these local governance models. First, capital penetration—specifically the aggressive entry of commercial interests such as large-scale plantations and tourism developers—poses a threat to internal community cohesion. As market forces offer financial incentives for land conversion, the trust and shared norms central to Collective Action Theory are tested against individual economic gain. The findings suggest that while communities have strong internal rules, they often lack the legal and political leverage to fend off well-funded external encroachers without stronger state support.

Second, climate change acts as a threat multiplier that challenges Traditional Ecological Knowledge (TEK). The respondents noted that the seasonal cues they rely on for planting and harvesting are becoming unpredictable due to changing weather patterns. This forces communities to rapidly adapt their preservation strategies—shifting from rigid traditional calendars to more flexible, science-informed adaptive management. Future governance frameworks must therefore account for these macro-level stressors, integrating climate resilience planning directly into community bylaws.

Overall, the application of Collective Action Theory

in this study underscores that community-based environmental preservation is most effective when governance, monitoring, and ecological interventions are integrated into a participatory and culturally grounded framework. The study highlights that local communities not only implement rules but also innovate solutions through collaboration, thereby achieving shared ecological goals that would be difficult for individuals or centralized authorities to accomplish alone. These findings reinforce the notion that sustainable environmental management depends on both collective responsibility and adaptive learning within local social-ecological systems.

### 5.1. Limitations

It is also important to acknowledge the methodological limitations of this research. The study utilized a purposive sampling technique with a sample size of twenty (20) respondents. While this allowed for the selection of information-rich cases that provided deep insights into the mechanisms of collective action, the small sample size limits the statistical generalizability of the findings to the entire Philippine archipelago. The experiences of these specific barangays and indigenous groups may not fully reflect the challenges faced by communities in different socio-political contexts, such as those in conflict zones or highly urbanized areas. Future research should consider a broader comparative analysis across different regions to validate these patterns of collective governance.

### 5.2. Recommendations

Based on the successful hybrid and adaptive strategies observed in this study, several actionable pathways emerge for strengthening environmental governance. First, to reconcile the gap between informal community rules and formal law, local government units (LGUs) should move toward institutionalizing Joint Management Agreements (JMAs). A JMA would legally recognize the specific internal bylaws of community organizations, granting them the authority to enforce rules that are currently considered informal.

Second, the study highlights the vulnerability of volunteer enforcers. To address this, policy frameworks must go beyond mere recognition and provide statutory deputi-

zation. This implies that “Bantay Gubat” (Forest Guards) should be covered by accident insurance and legal assistance funds, transforming their role from precarious volunteerism into a protected civic service. Finally, the adaptive strategies identified—such as seasonal planting calendars—should be formally integrated into Local Climate Change Action Plans (LCCAP). Instead of generic planting targets, municipal planning should adopt these community-validated protocols to ensure that government-funded reforestation efforts are biologically and socially sustainable.

## 6. Conclusion

This study underscores that effective environmental preservation in the Philippines is not solely the result of top-down mandates, but of a sophisticated hybrid governance where community groups actively localize national policies. The findings reveal that local organizations and indigenous groups successfully fill enforcement gaps by integrating Traditional Ecological Knowledge (TEK) with scientific guidelines, creating a regulatory environment that is both legally compliant and culturally grounded. Crucially, the sustainability of these efforts relies on tiered enforcement and adaptive management. Communities maintain social cohesion by utilizing a graduated sanctioning system—escalating from peer counseling to formal legal action—which fosters long-term trust and compliance. Furthermore, their ability to modify ecological interventions in response to feedback, such as shifting from Mahogany to native Narra trees, demonstrates a resilience that rigid national programs often lack. However, these grassroots mechanisms remain vulnerable to external threats, particularly capital penetration and climate change. Ultimately, this research concludes that for nature preservation to be sustainable, state policy must evolve from merely supervising communities to legally empowering them, ensuring that the local stewards of nature possess the authority and resources to protect it.

## Author Contributions

Conceptualization, A.L.C., M.E.V.S. and J.V.C.; methodology, A.L.C. and J.L.A.; software, J.B.C.C. and

C.C.Z.; validation, J.D.C., M.O.O. and C.L.R.Q.; formal analysis, A.L.C., L.C.D.C. and G.G.L.R.; investigation, M.A.G.F., V.A.B. and V.R.A.; resources, E.D.C. and J.L.A.; data curation, J.B.C.C. and M.O.O.; writing—original draft preparation, A.L.C. and M.E.V.S.; writing—review and editing, J.V.C., L.C.D.C., J.D.C. and C.C.Z.; visualization, C.L.R.Q. and M.A.G.F.; supervision, A.L.C.; project administration, A.L.C. and G.G.L.R. All authors have read and agreed to the published version of the manuscript.

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## Institutional Review Board Statement

Ethical review and approval were waived for this study due to the non-interventional nature of the research, which focused on professional public duties and general community environmental practices rather than sensitive personal data.

## Informed Consent Statement

Informed consent was obtained from all subjects involved in the study.

## Data Availability Statement

The data presented in this study are available on request from the corresponding author.

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## Conflicts of Interest

The authors declare no conflict of interest.

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