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Saving Banate Bay: An Extension Project for Sustainable Protection of Coastal Ecosystems and Communities

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ABSTRACT

This extension project, conducted in the coastal municipalities of Anilao, Banate, Barotac Nuevo, and Barotac Viejo in Iloilo Province, Philippines, aimed to improve solid waste management and coastal ecosystem conservation through an integrated, multi-stakeholder, and data-driven approach. Baseline surveys and ecological assessments identified knowledge gaps, pollution hotspots, and degraded habitats. Capacity-building workshops empowered policymakers, LGU staff, and communities, while community-led initiatives focused on mangrove reforestation, greenbelt protection, sustainable fishing, marine protected areas, and reef rehabilitation. Innovative waste management practices such as source segregation, composting, and plastic collection were introduced alongside multimedia awareness campaigns and participatory policy dialogues that strengthened local regulations. Monitoring showed a 15% increase in mangrove cover, early coral reef recovery, improved community participation, and adoption of sustainable behaviors. Comprehensive documentation and stakeholder engagement fostered project sustainability, presenting a replicable model that integrates ecological, social, institutional, and policy dimensions for effective coastal conservation and waste management.

Keywords: Banate Bay, Coastal Ecosystems, Sustainable Protection, Community-Based Management, and Coastal Conservation

INTRODUCTION

Banate Bay, situated in the Province of Iloilo, Philippines, encompasses four municipalities—Anilao, Banate, Barotac Nuevo, and Barotac Viejo—where coastal communities heavily depend on marine resources for their livelihoods. These coastal ecosystems, however, face escalating threats from population growth and inadequate waste management practices, resulting in significant marine pollution and ecosystem degradation (Nicolas et al., 2023; Salazar & Reyes, 2022). Globally, the magnitude of marine plastic pollution is alarming, with approximately 8 million metric tons of plastic entering oceans each year, severely impacting marine biodiversity and coastal communities (Jambeck et al., 2022; United Nations Environment Programme [UNEP], 2023). Coastal areas are particularly vulnerable due to their proximity to urban centers and riverine sources of waste, which contribute to the accumulation of mismanaged solid waste, especially plastics known for their environmental persistence (Li et al., 2022; Sharma et al., 2024).

Moreover, the worldwide production of municipal solid waste is projected to increase from 2.01 billion metric tons to 3.4 billion metric tons by 2050, with organic materials, plastics, and other waste components further complicating waste management efforts (Kaza et al., 2023). Recycling rates remain generally low, particularly in developing countries, underscoring the need for improved public awareness, innovative waste reduction technologies, and comprehensive policy reforms (World Bank, 2023; Tran et al., 2022).

Local government units (LGUs) in the Philippines have begun recognizing the critical importance of intact coastal ecosystems—such as mangroves, coral reefs, and beach forests—for climate change adaptation and coastal protection. Nonetheless, there is a pressing need to replicate successful conservation strategies across communities to achieve greater impact (Delgado & Santos, 2023; Molina et al., 2024). The present project, Saving Banate Bay: A Project for Sustainable Protection of Coastal Ecosystems and Communities, aims to

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support the development and implementation of sustainable conservation policies while capacitating policymakers and community stakeholders on biodiversity conservation and climate resilience mechanisms.

By fostering participatory approaches that involve learning visits, peer exchanges, and community training, this project emphasizes sustainable mangrove and coastal forest management, coral reef protection, and responsible land use as key interventions. Increasing community awareness of the critical role coastal ecosystems play in climate resilience will be enhanced through targeted public relations activities and consultations. Ultimately, the project strives to sustainably safeguard Banate Bay's coastal ecosystems and the communities reliant on them from the adverse effects of climate change, while promoting sustainable livelihoods and environmental stewardship.

METHODOLOGY

The project was conducted in the coastal municipalities of Anilao, Banate, Barotac Nuevo, and Barotac Viejo in Iloilo Province. Key stakeholders included local government units (LGUs), community leaders, fisherfolk groups, local environmental organizations, school representatives, and barangay councils. The baseline assessment and data collection phase involved community awareness and practices surveys through structured questionnaires and focus group discussions (FGDs) to evaluate knowledge, attitudes, and practices regarding solid waste management and coastal ecosystem conservation. Data on waste generation, disposal methods, and common pollution sources were also documented. Environmental baseline assessments measured marine and coastal ecosystem health by examining mangrove coverage, coral reef condition, and beach forest status using standard ecological survey techniques, while waste accumulation hotspots were identified through field observations and participatory mapping with the community.

Capacity building included training workshops for policy makers and LGU staff, focusing on biodiversity conservation, climate change adaptation and mitigation, sustainable coastal resource management, and enforcement of environmental regulations. Community members and local stakeholders participated in educational workshops and demonstration activities covering waste segregation, reduction, recycling, and alternative livelihoods linked to ecosystem protection. Peer-to-peer knowledge sharing, learning visits to successful conservation sites, and interactive activities further enhanced community engagement.

The project implemented innovative protective measures such as community-led mangrove reforestation and restoration initiatives, including the protection of existing greenbelts. Collaboration with local fisherfolk promoted sustainable fishing practices, the establishment of marine protected areas (MPAs), and reef rehabilitation. Waste management initiatives introduced community-based systems emphasizing segregation at source, composting of organic waste, and plastic collection drives, supported by the establishment of collection points and coordination with LGU waste services.

'Public relations efforts included multi-media awareness campaigns utilizing posters, social media, and radio to highlight the importance of coastal ecosystems and climate resilience. Community forums facilitated participatory consultations to integrate community feedback into policy development and project activities. Policy support focused on reviewing existing coastal and waste management policies in coordination with LGUs, facilitating policy dialogues and workshops to promote the adoption of sustainable conservation measures, and assisting in drafting or strengthening local ordinances based on project findings and community input.

Monitoring and evaluation (M&E) were conducted regularly using pre- and post-intervention environmental indicators such as mangrove cover and reef health, surveys assessing changes in community knowledge and behavior, and feedback mechanisms from stakeholders. Continuous documentation of best practices was maintained, and periodic evaluation workshops assessed progress and enabled adaptive management. Finally, knowledge management and reporting included developing comprehensive documentation such as reports, manuals, and case studies for knowledge sharing. Closing workshops presented project outcomes to stakeholders and aimed to foster sustainability beyond the project's duration.

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RESULT

The project was implemented in the coastal municipalities of Anilao, Banate, Barotac Nuevo, and Barotac Viejo in Iloilo Province, engaging key stakeholders such as local government units (LGUs), community leaders, fisherfolk groups, environmental organizations, schools, and barangay councils. It addressed issues in solid waste management and coastal conservation using an integrated, multi-sectoral approach supported by baseline and post-intervention data.

Baseline assessments using structured surveys and focus group discussions (FGDs) generated quantitative and qualitative data on community knowledge, attitudes, and practices (KAP).

Initial findings indicated low levels of compliance with proper waste management, with only about 35% of households practicing waste segregation and limited participation in recycling activities. Waste audits also identified high levels of mixed waste disposal and the presence of multiple pollution hotspots.

Following the interventions, post-assessment results showed measurable improvements. Waste segregation practices increased to over 70% of households, while participation in recycling initiatives approximately doubled. Reported reductions in improper waste disposal and increased adoption of composting practices suggest statistically meaningful behavioral changes, although further inferential testing (e.g., paired t-test or chi-square analysis) is recommended to confirm significance.

Ecological assessments were conducted using standardized coastal resource evaluation methods. Baseline measurements documented degraded mangrove areas, declining coral reef conditions, and fragmented beach forests.

Post-intervention monitoring indicated a 15% increase in mangrove cover over a two-year period, alongside early indicators of coral reef recovery in marine protected areas (MPAs), such as improved live coral cover and reduced signs of physical damage. These improvements, while still in early stages, reflect positive ecological trajectories associated with conservation interventions.

Capacity-building initiatives involved structured training programs for LGU personnel, policymakers, and community leaders. Pre- and post-training evaluations showed a 40% increase in institutional readiness scores, particularly in areas of environmental policy enforcement, climate adaptation strategies, and coastal resource management planning.

Community-based interventions—including mangrove reforestation, greenbelt protection, reef rehabilitation, and sustainable fishing practices—resulted in increased local participation. Waste management innovations, such as segregation at source, composting, and plastic recovery systems, contributed to observable reductions in coastal waste accumulation in identified hotspots.

Public awareness campaigns and participatory policy development processes further strengthened community engagement. LGUs reported improvements in local policy frameworks, including the revision and enhancement of ordinances related to coastal management and solid waste regulation.

Monitoring and evaluation (M&E) systems tracked both environmental and social indicators using pre- and post-intervention comparisons. While descriptive data indicate positive outcomes, the absence of advanced statistical testing limits the ability to generalize findings with high confidence.

Overall, the results demonstrate consistent improvements across behavioral, ecological, and institutional dimensions, supported by measurable indicators, though further statistical validation is recommended. Table 1 shows the results.

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Table 1

Quantitative Results

Indicator	Baseline Condition	Post-Intervention Outcome	Change/Interpretation
Household waste segregation	35%	>70%	+100% relative increase
Recycling participation	Low	~2× increase	Significant improvement
Mangrove cover	Degraded	+15% increase	Positive ecological recovery
Institutional capacity score	Baseline level	+40% increase	Enhanced governance readiness

DISCUSSIONS

The project targeting the coastal municipalities of Anilao, Banate, Barotac Nuevo, and Barotac Viejo in Iloilo Province exemplifies a successful model of integrated coastal management through a comprehensive, multi-sectoral, and data-driven approach. Engaging diverse stakeholders—including local government units (LGUs), community leaders, fisherfolk groups, environmental organizations, schools, and barangay councils—addressed critical challenges in solid waste management and coastal ecosystem conservation, consistent with contemporary best practices in coastal governance (Smith et al., 2023; Reyes & Cruz, 2024).

Baseline assessments utilizing surveys and focus group discussions provided essential insight into community knowledge, attitudes, and practices (KAP) regarding waste management and coastal conservation. These assessments documented prevailing waste generation rates, disposal methods, and primary pollution sources, highlighting gaps in community behavior and infrastructural capacity. Post-intervention data demonstrated a significant increase in community awareness, with waste segregation adoption rates rising from approximately 35% to over 70%, recycling participation doubling, and organic waste reduction practices becoming widespread (Local Environmental Report, 2025). These behavioral shifts parallel global findings that community education markedly enhances sustainable waste management (Garcia et al., 2022).

Ecological baseline surveys employed standardized marine and coastal assessment protocols to quantify mangrove coverage, coral reef health, and beach forest conditions. Initial findings identified critical hotspots of waste accumulation and environmental degradation through participatory mapping, an approach recommended by coastal ecologists for ensuring community involvement and precise localization of intervention sites (López & Tan, 2023). Following restoration activities and protection measures—particularly within established marine protected areas (MPAs)—monitoring indicated a 15% increase in mangrove coverage over two years and early but measurable improvements in coral reef vitality, consistent with recovery trends reported in similar MPAs in Southeast Asia (Nguyen et al., 2024). These ecological gains underscore the effectiveness of combining habitat restoration with local stewardship (Marquez & Delos Reyes, 2023).

Capacity-building workshops played a pivotal role in strengthening institutional frameworks. Trainings focused on biodiversity conservation, climate change adaptation and mitigation, sustainable resource management, and enforcement of environmental regulations, significantly improving the competencies of LGU staff, policymakers, and community leaders. Post-training evaluations revealed a 40% increase in institutional readiness scores and enhanced multi-sectoral coordination mechanisms, aligning with scholarship emphasizing capacity enhancement as central to resilient coastal management (Fernandez et al., 2022; Pérez & Santos, 2023).

The project's community-led protective measures—including mangrove reforestation, greenbelt preservation, sustainable fishing promotion, MPA establishment, and reef rehabilitation—demonstrated tangible ecological and social benefits. Innovative waste management strategies, such as source segregation, organic waste composting, and organized plastic collection campaigns, facilitated higher community participation rates and more sustainable resource use patterns, paralleling frameworks advocated in recent waste management literature

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(Kumar & Villanueva, 2022). These bottom-up approaches fostered ownership and behavioral change crucial for sustainability.

Public relations efforts utilized multi-media campaigns spanning posters, social media, and radio broadcasts to elevate public priorities around coastal ecosystem health and climate resilience. Community forums functioned as vital platforms for participatory engagement, ensuring community inputs informed policy formation and project interventions, a practice recognized as critical for equitable and effective environmental governance (Singh & Bautista, 2023). Policy support entailed reviewing coastal and waste ordinances and assisting LGUs in drafting stronger local policies reflective of project findings, institutionalizing conservation gains, and embedding community priorities, consistent with recommendations for local regulatory enhancement (Lopez & Dela Cruz, 2024).

Systematic monitoring and evaluation (M&E) integrated environmental data—mangrove cover, reef health metrics—and community surveys on behavioral change, facilitating adaptive management throughout the project. The inclusion of stakeholder feedback loops enabled responsive and flexible interventions, driving demonstrable environmental improvements and sustained shifts in community practices, corroborating conclusions in recent adaptive management studies (Tan et al., 2023).

The knowledge management was achieved through comprehensive documentation comprising detailed reports, operational manuals, and case studies, which serve as valuable resources for replication and scaling. Closing workshops consolidated stakeholder ownership and commitment to long-term sustainability of project outcomes, validating the vital role of knowledge dissemination in conservation initiatives (Reyes et al., 2022).

Finally, his coastal management project in Iloilo's municipalities demonstrates the critical importance of data-driven, integrated interventions that address ecological, social, institutional, and policy dimensions simultaneously. The significant achievements in enhancing community awareness, ecological health, institutional capacity, sustainable practices, and policy framework provide a robust foundation for ongoing conservation and improved solid waste management, aligning with contemporary multi-disciplinary best practices in coastal environmental management.

Conflict of Interest

The authors declare that they have no known financial or personal relationships that could have appeared to influence the work reported in this extension project. There are no conflicts of interest related to the implementation, outcomes, or dissemination of this study. All activities and findings reflect the objective and collaborative efforts to support sustainable coastal conservation and community well-being.

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The researcher extends our deepest gratitude to the local government units of Anilao, Banate, Barotac Nuevo, and Barotac Viejo for their unwavering commitment to conserving the vital coastal ecosystems of Banate Bay. Their leadership and active participation have been instrumental in advancing this initiative.

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The researcher also acknowledges the invaluable contributions of partner organizations and stakeholders who supported policy development, capacity-building endeavors, and public awareness campaigns aimed at enhancing climate resilience and environmental stewardship in the region.

Finally, the support enabled this project's comprehensive approach toward safeguarding Banate Bay's coastal ecosystems and sustaining the livelihoods of its dependent communities.

Through this collective effort, we move closer to preserving the natural heritage of Banate Bay for current and future generations.

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