

Strengthening Early Childhood Environmental Education and Community Awareness for Sustainable Marine Ecotourism in the Togean Islands National Park, Indonesia

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Abstract. The development of marine ecotourism in Togean Islands National Park offers a strategic pathway to balance environmental conservation and local economic development. However, its sustainability is constrained by low community awareness, limited participation, and insufficient environmental understanding. This study aims to analyze the role of community awareness and early environmental education in supporting sustainable marine ecotourism development. This research employs a qualitative approach combined with the Analytical Hierarchy Process (AHP). Data were collected through literature review, field observations, and stakeholder analysis, while comparative analysis was conducted with Komodo and Bunaken National Parks. The findings show that local livelihoods remain dependent on extractive activities, reflecting limited awareness of conservation benefits. Nevertheless, pilot ecotourism initiatives indicate that increased community engagement can reduce destructive practices and diversify income sources. Environmental education, particularly at an early stage, plays a crucial role in shaping pro-conservation behavior. AHP results identify environmental education as the top strategic priority, followed by community empowerment. This study proposes an integrated framework linking awareness, education, behavior, participation, and sustainable livelihoods. It concludes that sustainable marine ecotourism requires an integrated approach combining environmental education, community empowerment, and inclusive governance to align conservation objectives with socio-economic benefits.

Keywords: Marine ecotourism; community awareness; environmental education; community participation; sustainable livelihoods

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1. Introduction

Marine ecotourism has increasingly been recognized as an effective instrument for integrating environmental conservation with local economic development, particularly in coastal and island ecosystems (Das & Chatterjee, 2020; Honey & Krantz, 2021). In Indonesia, the marine tourism sector contributes significantly to regional income while simultaneously posing risks to fragile ecosystems such as coral reefs and seagrass beds (Ministry of Tourism, 2023). Ideally, ecotourism development should promote conservation values while enhancing community welfare. However, in practice, many ecotourism destinations still face sustainability challenges due to weak community engagement and limited environmental awareness (Wondirad et al., 2020).

Togean Islands National Park, located in Tojo Una-Una Regency, Central Sulawesi, Indonesia (Figure 1), represents one of Indonesia's priority marine conservation areas, covering approximately 362,605 hectares with high biodiversity, including coral reef ecosystems, mangroves, and endemic marine species (KLHK, 2022). Despite its ecological significance, the area faces pressures from destructive fishing practices, unmanaged tourism activities, and limited environmental education among local communities.



Figure 1. Geographic Location of the Togean Islands in Central Sulawesi, Indonesia.

Recent studies highlight that community awareness is a key determinant in achieving sustainable ecotourism outcomes (Lee et al., 2021). Low levels of participation often result in weak ownership and limited support for conservation programs. In addition, environmental education, particularly at an early age, is increasingly emphasized as a long-term strategy to foster pro-environmental behavior and strengthen conservation ethics (Ardoin et al., 2020).

However, limited studies have integrated environmental education, community awareness, and strategic prioritization using a multi-criteria approach in marine ecotourism contexts, particularly in small island ecosystems such as Togean Islands. The gap between ideal ecotourism practices and actual conditions in Togean Islands lies in the limited integration of community empowerment, education, and governance systems. While ecotourism offers economic opportunities, its sustainability depends on behavioral change and inclusive participation. Therefore, this study aims to analyze the role of community awareness and early environmental education in supporting sustainable marine ecotourism development.

2. Method

This study employs a qualitative research design combined with a multi-criteria decision-making approach to analyze the role of community awareness and environmental education in supporting

sustainable marine ecotourism development in Togean Islands National Park. This study was conducted in Togean Islands National Park, Tojo Una-Una Regency, Central Sulawesi, Indonesia, as one of the priority marine conservation areas with significant ecotourism potential.

2.1 Research Approach

The research adopts a descriptive qualitative approach to capture social dynamics, behavioral patterns, and stakeholder interactions related to ecotourism development. This approach is considered appropriate to explore community awareness, participation levels, and the influence of environmental education on conservation behavior.

2.2 Data Collection

Data were collected through three main techniques:

1. Literature Review

A systematic review of scientific publications (2020–2025) was conducted to identify theoretical frameworks and empirical findings related to marine ecotourism, environmental education, and community-based resource management.

2. Field Observation

Direct observations were carried out in selected coastal and island communities within Togean Islands to examine:

- a) existing tourism activities,
- b) environmental conditions (coral reefs, coastal ecosystems), and
- c) community livelihood patterns, particularly dependence on extractive activities such as fishing.

3. Stakeholder Analysis

Key stakeholders were identified, including local communities, government agencies, NGOs, and tourism operators. The analysis focused on their roles, interests, and level of participation in ecotourism development.

2.3 Data Analysis

The data analysis was conducted in three stages:

(a) Qualitative Content Analysis

Qualitative data from observations and literature were analyzed using thematic coding to identify patterns related to:

- 1) community awareness and participation,
- 2) environmental education impacts,
- 3) socio-economic benefits of ecotourism.

(b) Analytical Hierarchy Process (AHP)

To determine strategic priorities, this study employs the Analytical Hierarchy Process (AHP). The AHP structure consists of three levels:

- 1) Goal: Sustainable marine ecotourism development
- 2) Criteria: Environmental impact, economic benefit, social acceptance, institutional feasibility
- 3) Alternatives:
 - (1) Environmental education
 - (2) Community empowerment
 - (3) Infrastructure development
 - (4) Institutional collaboration

Pairwise comparison matrices were constructed based on stakeholder judgments and literature synthesis. The relative weights of each strategy were calculated to determine priority rankings.

The consistency of pairwise comparisons was further validated to ensure reliability of the weighting results.

The consistency of the comparison matrix was tested using the following equation:

$$\chi^2 = (\sum (f_o - f_e)^2) / f_e \dots\dots\dots (1)$$

where:

χ^2 = consistency index / deviation value

f_o = observed preference value

f_e = expected (normalized) value

The resulting weights represent the relative importance of each strategy in supporting sustainable ecotourism.

(c) Comparative Analysis

A comparative approach was used to benchmark Togean Islands against two established marine ecotourism destinations:

- 1) Komodo National Park
- 2) Bunaken National Park

The comparison focuses on:

- 1) governance systems,
- 2) community participation,
- 3) conservation outcomes.

This analysis aims to identify best practices and gaps in Togean Islands ecotourism development.

2.4 Conceptual Framework Development

A conceptual framework was developed to illustrate the relationship between key variables identified in the study. The framework integrates:

- 1) community awareness,
- 2) environmental education,
- 3) behavioral change,
- 4) community participation,
- 5) sustainable livelihoods,
- 6) conservation outcomes.

This framework serves as an analytical guide to interpret the interconnections between social, economic, and environmental dimensions of marine ecotourism.

2.5 Research Validity

To ensure the validity and reliability of findings, this study applies:

- 1) data triangulation (literature, observation, stakeholder perspectives),
- 2) source cross-checking, and
- 3) consistency testing in AHP analysis.

These steps are essential to strengthen the robustness of qualitative interpretation and strategic prioritization.

3. Results and Discussion

3.1 Community Awareness and Participation

The findings indicate that community awareness in the Togean Islands remains uneven and generally limited, particularly in understanding the long-term ecological and economic benefits of conservation-based tourism. Field observations confirm that local livelihoods are still highly dependent on extractive marine activities, especially small-scale fisheries. This pattern is consistent with studies showing that coastal communities in developing regions often prioritize short-term income over conservation due to economic vulnerability (Bennett et al., 2021; Campbell et al., 2022).

Stakeholder analysis reveals that community participation in ecotourism planning is still relatively low. Most decision-making processes are dominated by external actors such as government agencies and NGOs, resulting in limited local ownership. This condition aligns with findings by Stone et al.

(2020), which emphasize that insufficient participation reduces the effectiveness and sustainability of ecotourism initiatives.

However, pilot ecotourism initiatives observed in several villages demonstrate a positive shift. Communities involved in homestay services, local guiding, and small-scale tourism enterprises show increased environmental awareness and reduced engagement in destructive practices such as blast fishing or coral extraction. Similar transformations have been documented in community-based ecotourism models, where participatory approaches lead to both conservation outcomes and livelihood diversification (Das & Chatterjee, 2020; Goodwin, 2021). These findings suggest that strengthening participatory mechanisms is essential to enhance community ownership and ensure long-term sustainability.

3.2 Role of Environmental Education

Environmental education emerges as a critical factor influencing behavioral change among local communities. Programs targeting school-aged children, particularly those integrating experiential and place-based learning, significantly improve ecological knowledge and pro-conservation attitudes. Field observations indicate that students exposed to environmental education programs demonstrate better understanding of coral reef protection, waste management, and sustainable tourism practices. This finding is strongly supported by previous research highlighting that early childhood and primary-level environmental education plays a crucial role in shaping long-term environmental behavior (Ardoin et al., 2020; Otto & Pensini, 2017; UNESCO, 2021). Education not only builds awareness but also fosters emotional attachment to local ecosystems, which is a key driver of stewardship behavior.

Moreover, environmental education has spillover effects beyond schools. Children often act as knowledge transmitters within households, indirectly influencing community practices. This intergenerational knowledge transfer is particularly important in rural and island contexts (Evans et al., 2021). In the context of Togean Islands, integrating environmental education into local curricula and community programs can significantly strengthen conservation efforts and support ecotourism development.

3.3 AHP-Based Priority Strategy

The Analytical Hierarchy Process (AHP) results identify environmental education as the highest priority strategy, followed by community empowerment, infrastructure development, and institutional collaboration.

Table 1. Priority Strategy Based on AHP Analysis

Strategy	Weight	Priority (%)
Environmental education	0.32	32%
Community empowerment	0.27	27%
Infrastructure development	0.21	21%
Institutional collaboration	0.20	20%

The dominance of environmental education confirms that behavioral change is the most fundamental driver of sustainable ecotourism. This result is consistent with multi-criteria decision-making studies that place education and awareness as key leverage points in sustainability transitions (Saaty, 2008; Mendoza & Martins, 2021).

Community empowerment ranks second, highlighting the importance of strengthening local capacities, skills, and economic opportunities. Empowerment initiatives—such as training in tourism

services, entrepreneurship, and resource management—are widely recognized as essential components of successful ecotourism (Scheyvens, 1999; Goodwin, 2021).

Infrastructure development, while important, ranks lower, suggesting that physical investments alone are insufficient without accompanying social and institutional improvements. Similarly, institutional collaboration remains critical but requires stronger coordination mechanisms to be effective.

3.4 Comparative Discussion

Comparative analysis with other marine ecotourism destinations provides valuable insights into the development gaps in Togean Islands. In Komodo National Park, strong governance and regulatory enforcement have been key factors in ensuring conservation success. Strict zoning systems and visitor management policies contribute to ecosystem protection and tourism sustainability (Walpole & Goodwin, 2001; Ministry of Tourism, 2023).

In contrast, Bunaken National Park demonstrates the effectiveness of community-based management. Local communities actively participate in conservation and tourism activities, supported by collaborative governance arrangements involving multiple stakeholders (Elliott et al., 2020). Compared to these destinations, Togean Islands face challenges in institutional coordination and infrastructure availability. Weak collaboration among stakeholders and limited access to tourism facilities hinder the effectiveness of ecotourism implementation. This finding supports broader literature indicating that successful ecotourism requires a balance between governance, community participation, and infrastructure (Honey & Krantz, 2021).

3.5 Conceptual Framework

Based on the empirical findings and AHP results, an integrated framework is developed to explain the causal relationships among key variables. Based on the findings, this study proposes an integrated conceptual framework linking social, educational, and economic dimensions of marine ecotourism: Community Awareness → Environmental Education → Behavioral Change → Community Participation → Sustainable Livelihoods → Conservation Outcomes → Sustainable Ecotourism (Figure 2).

This framework highlights that environmental education acts as a catalyst that transforms awareness into behavior, which in turn enhances participation and supports sustainable livelihoods. Ultimately, these processes contribute to improved conservation outcomes and the long-term sustainability of ecotourism.

The framework is consistent with sustainability transition theories, which emphasize the interconnectedness of knowledge, behavior, and institutional change (Meadows, 2008; Bennett et al., 2021). It also reinforces the importance of integrating social and ecological systems in tourism development.



Figure 2. Integrated Marine Ecotourism Framework

4. Conclusion

This study demonstrates that the development of sustainable marine ecotourism in Togean Islands National Park is predominantly shaped by social and behavioral dimensions rather than physical infrastructure alone. The findings highlight that limited community awareness and low levels of participation remain critical barriers to effective ecotourism implementation.

The qualitative analysis indicates that environmental education plays a pivotal role in transforming local perspectives and encouraging pro-conservation behavior. Early-stage educational interventions, particularly those targeting younger generations, have proven to be effective in fostering long-term environmental stewardship and strengthening community engagement.

Furthermore, the results of the Analytical Hierarchy Process (AHP) confirm that environmental education constitutes the highest strategic priority, followed by community empowerment. These findings underline that human capacity development is a key driver in achieving sustainable outcomes. Insights from comparative analysis also reveal that successful marine ecotourism destinations, such as Komodo National Park and Bunaken National Park, are supported by strong governance frameworks and active community involvement.

Based on these findings, this study concludes that sustainable marine ecotourism development requires an integrated approach that simultaneously emphasizes: (1) environmental education, (2) community empowerment, and (3) inclusive and collaborative governance systems. Such an integrated pathway ensures that conservation objectives are effectively aligned with local socio-economic benefits. Ultimately, this alignment is essential for achieving long-term sustainability, where environmental protection and community welfare mutually reinforce one another.

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