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Sustainable Ecotourism Development Strategy for Mina-Minanga Beach in North Buton Regency

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Abstract. This study explores the sustainable ecotourism development strategies for Mina-Minanga Beach in North Buton Regency, Southeast Sulawesi. Utilizing SWOT (Strengths, Weaknesses, Opportunities, Threats) and ANP (Analytic Network Process) analyses, the research identifies key factors influencing ecotourism management and prioritizes strategic actions to enhance sustainability. The findings highlight the beach's stunning natural landscapes, including coral reefs and mangrove forests, and the strong community support for ecotourism as significant strengths. However, challenges such as poor waste management, limited infrastructure, and insufficient local tourism management knowledge must be addressed. Opportunities lie in the beach's strategic location and the growing global interest in ecotourism, which can be leveraged to develop unique cultural, educational, and adventure tourism products. Key strategies recommended include activating beach cleanliness programs, implementing sustainable conservation practices, and building disaster-resilient infrastructure. Additionally, ongoing training and education for local communities are crucial to ensure their active participation and capacity to manage tourism effectively. This research contributes to a comprehensive framework for developing sustainable ecotourism at Mina-Minanga Beach, aiming to balance environmental conservation with economic growth and community empowerment. The insights gained can inform policy-making and strategic planning, positioning North Buton Regency as a leading ecotourism destination in Indonesia while preserving its rich natural and cultural heritage.

Keywords*:* Analytic Network Process (ANP), Community Empowerment, Cultural Tourism, Ecotourism, Environmental Conservation, Sustainable Development, Tourism Management

1 Introduction

Ecotourism is emerging as a rapidly growing segment globally, integrating environmental conservation with the empowerment of local communities. In Indonesia, which is rich in both natural and cultural resources, there is significant potential for ecotourism development. The country, being an archipelago, possesses a wealth of natural resources that can be harnessed for sustainable tourism activities. Ecotourism not only helps to preserve the environment but also offers economic benefits to local communities, making it a crucial element in the national development framework.

In the context of sustainable tourism, North Buton Regency in Southeast Sulawesi stands out due to its unique combination of natural beauty and cultural richness. With its stunning marine and terrestrial biodiversity, North Buton offers a range of ecotourism attractions, including white sandy beaches, mangrove forests, and coral reefs teeming with marine life. In addition to its natural resources, the region is also known for its cultural heritage, such as traditional dances, handicrafts, and local customs. This provides an excellent opportunity for the development of ecotourism that can attract both domestic and international visitors.

One of the prime locations for ecotourism development in North Buton Regency is Mina-Minanga Beach. This beach not only offers a beautiful natural landscape but also holds significant economic potential for the local community. Through the development of tourism infrastructure and services, the region can foster economic growth by generating new industries, increasing demand for local agricultural and handicraft products, and providing

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employment opportunities in hospitality and tourism sectors. However, the region faces complex challenges in achieving sustainable ecotourism, including balancing environmental conservation with the need for economic development. These challenges include managing environmental impacts such as waste and maintaining the integrity of marine ecosystems. Tourism activities, if not properly managed, could harm the natural ecosystems, particularly in vulnerable areas such as coral reefs and mangrove forests, which are critical to marine life and coastal protection. Additionally, there is a need to involve local communities in tourism planning and management, ensuring that they benefit from ecotourism and contribute to preserving the area's natural and cultural assets. Sustainable ecotourism development in Mina-Minanga Beach must adopt a holistic approach, encompassing environmental, economic, and social dimensions. The need for sustainable ecotourism development at Mina-Minanga Beach becomes even more pressing when considering the broader environmental and socio-economic context of the region. Like many other regions in Indonesia, North Buton Regency is striving to balance the competing goals of economic growth and environmental conservation. Ecotourism offers a pathway to address these goals, but it requires careful planning and strategic management. Without a clear strategy, the region risks experiencing environmental degradation and social inequalities, as seen in other tourism hotspots around the world.

This study addresses the key potentials and challenges of developing sustainable ecotourism at Mina-Minanga Beach by formulating strategies that can guide policymakers and stakeholders. Using SWOT (Strengths, Weaknesses, Opportunities, and Threats) and ANP (Analytic Network Process) analyses, the research provides a comprehensive framework to balance environmental, economic, and social goals. The findings aim to not only preserve the natural beauty and biodiversity of Mina-Minanga Beach but also offer a replicable model for sustainable ecotourism development in other regions of Indonesia and globally.

Furthermore, this study contributes to aligning ecotourism development with national and local goals while safeguarding the cultural and environmental heritage of North Buton Regency. It also adds to broader discussions on sustainable tourism practices and their implications for regional and global ecotourism strategies.

2 Methodology

This study uses a combination of SWOT (Strengths, Weaknesses, Opportunities, and Threats) and ANP (Analytic Network Process). The combination of SWOT and ANP not only facilitates the identification of key challenges and opportunities but also supports the formulation of actionable strategies. Data was collected through interviews, surveys, and field observations, with a focus on local stakeholders' perceptions of tourism development.

2.1 Research Design

This study employs a mixed-method approach combining qualitative and quantitative data to develop a sustainable ecotourism strategy for Mina-Minanga Beach in North Buton Regency. The research uses two key analytical frameworks: SWOT (Strengths, Weaknesses, Opportunities, and Threats) and ANP (Analytic Network Process). The SWOT analysis provides a foundational framework to identify internal strengths and weaknesses, as well as external opportunities and threats that affect ecotourism in Mina-Minanga Beach. This analysis allows for a thorough understanding of the current landscape and helps in recognizing critical areas that require attention. On the other hand, the Analytic Network Process (ANP) offers a systematic approach to prioritize these factors and evaluate their interdependencies. This method is particularly valuable in ecotourism contexts, where multiple stakeholders have diverse interests and influences. ANP enables the integration of qualitative and quantitative data, allowing for a comprehensive evaluation of strategies that align with environmental sustainability, economic growth, and community empowerment.

2.2 Data Collection

Data for this study was gathered through both primary and secondary sources. The primary data collection involved structured interviews and surveys distributed to local stakeholders, including community members, government officials, and ecotourism experts. A total of 10 respondents were included in the survey, focusing on their perceptions of ecotourism development potential, challenges, and opportunities in the region. Secondary data was collected from government reports, scientific articles, and previous studies on ecotourism in Southeast Sulawesi. The Regional Medium-Term Development Plan (RPJM) for North Buton Regency was also analyzed to understand the local government's priorities regarding tourism development.

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2.3 SWOT Analysis

The SWOT analysis was conducted to assess internal (strengths and weaknesses) and external (opportunities and threats) factors affecting Mina-Minanga Beach. Internal factors such as the natural beauty of the beach, biodiversity, and community support were identified as key strengths, while limited infrastructure and waste management issues were recognized as weaknesses. Opportunities included the potential for ecotourism partnerships and increasing global interest in sustainable tourism. Environmental degradation and competition from other tourist destinations were identified as significant threats. The Internal Factor Analysis Strategy (IFAS) and External Factor Analysis Strategy (EFAS) tables were used to quantify these factors. Each factor was given a weight based on its importance and a rating from 1 (low importance) to 5 (high importance). The weighted score for each factor was then calculated by multiplying the weight by its rating. The total scores for both internal and external factors provided a comprehensive view of the strategic positioning of Mina-Minanga Beach .

2.4 Analytic Network Process (ANP)

The ANP methodology was employed to prioritize the strategies formulated from the SWOT analysis. ANP allows for the assessment of interdependencies among various factors and criteria. The process began with the creation of a network structure that mapped the relationships between the sub-criteria identified during the SWOT analysis. The relationship matrix was developed using Super Decision software, which calculates the weight of each criterion and sub-criterion based on the input from the pairwise comparisons completed by the respondents. The data collected from the pairwise comparison matrix were processed using the geometric mean to generate a consistent assessment of each factor's influence. The final output from the ANP model included a ranked list of strategic alternatives based on their priority weight . For example, strategies focused on improving beach cleanliness and waste management, enhancing disaster-resilient infrastructure, and promoting cultural and adventure tourism emerged as the highest-priority actions.

2.5 Data Analysis

The SWOT and ANP results were analyzed to determine the most effective strategies for ecotourism development. The SWOT analysis provided a clear understanding of the internal and external factors influencing Mina-Minanga Beach, while ANP helped to prioritize strategies based on stakeholder input and comparative assessments. Consistency checks were performed to ensure the reliability of the ANP results, and strategies were ranked according to their contribution to sustainable ecotourism management .

3 Results and Discussion

3.1 Result

3.1.1 SWOT Analysis

3.1.1.1 Strengths (S)

Mina-Minanga Beach in North Buton Regency boasts several natural and community-driven strengths. The beach features stunning natural landscapes, including pristine coral reefs and lush mangrove forests, making it a highly attractive destination for nature enthusiasts and ecotourists. Additionally, local community support for ecotourism is strong, with traditional leaders actively involved in promoting sustainable tourism practices. This involvement fosters a sense of ownership and responsibility among the residents, further boosting the beach's appeal as a destination that integrates conservation with tourism.

3.1.1.2 Weaknesses (W)

Despite its natural beauty, Mina-Minanga Beach faces several significant challenges. The site suffers from poor waste management, which detracts from its overall attractiveness and poses a threat to the local environment. There is also limited infrastructure, with a shortage of adequate accommodation and restaurant facilities, which limits the beach's ability to cater to tourists comfortably. Another critical weakness is the insufficient knowledge and expertise in tourism management among the local population, which hinders the effective development of ecotourism initiatives.

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3.1.1.3 Opportunities (O)

Mina-Minanga Beach holds considerable opportunities for growth and development. Its strategic location offers easy access for both domestic and international tourists, which positions it well to benefit from the growing global interest in ecotourism. The beach is ideally suited for the development of educational and adventure tourism products, appealing to tourists looking for immersive experiences. Furthermore, partnerships with international conservation organizations could enhance tourism infrastructure, promote conservation efforts, and boost the beach's profile as a sustainable ecotourism destination.

3.1.1.4 Threats (T)

However, Mina-Minanga Beach faces several external threats. Environmental challenges such as pollution and coral reef degradation caused by human activities pose serious risks to the sustainability of the ecotourism project. Additionally, the beach must contend with competition from more well-developed tourist destinations, both domestically and internationally, which could limit its ability to attract a larger visitor base. Without proper management, these threats could undermine the beach's potential as a leading ecotourism destination.

3.1.2 ANP Analysis and Strategy Formulation

The Analytic Network Process (ANP) was employed to prioritize the sustainable ecotourism strategies for Mina-Minanga Beach, particularly focusing on balancing environmental conservation, community engagement, and tourism development. This analysis helps decision-makers by allowing them to evaluate interrelated criteria and sub-criteria that influence ecotourism management. The process involved multiple stages: data collection, the creation of a network structure, comparison matrices, and the final prioritization of strategies using Super Decision software.

3.1.2.1 Creation of Network Structure

The ANP model's network structure was established by identifying key criteria—Strengths, Weaknesses, Opportunities, and Threats (SWOT)—and their associated sub-criteria. For each criterion, a matrix of interdependencies was created to reflect how they influence each other. This process aimed to understand how internal and external factors affect the sustainable development of Mina-Minanga Beach ecotourism. Sub-criteria such as beach cleanliness, infrastructure resilience, and community engagement were compared to determine their relative importance .

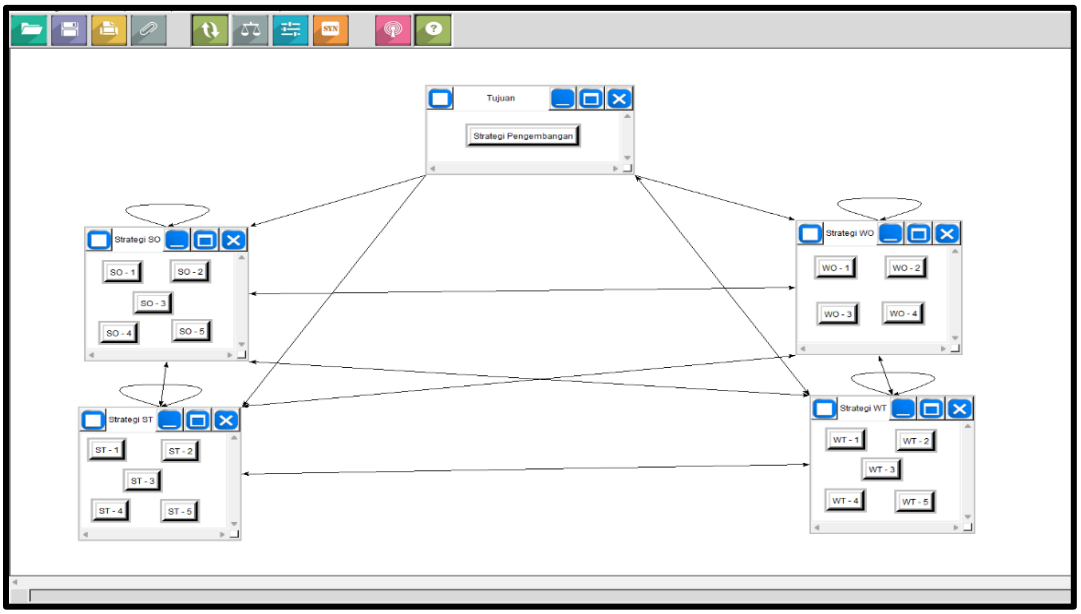

Figure 1. Network of *Structure Between Cluster* and *Subcitreria*

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3.1.2.2 Paired Comparison Matrices and Consistency Checks

Respondents were asked to perform pairwise comparisons between criteria and sub-criteria, which were then averaged using the geometric mean. The results were inputted into the Super Decision software to generate a paired comparison matrix. The Consistency Ratio (CR) was checked to ensure that the comparisons were reliable, with a CR ≤ 0.1 being considered acceptable. For Mina-Minanga Beach, the CR was calculated at 0.023, confirming that the respondents' assessments were consistent.

Table 1. Average Comparative Assessment Pairs Criteria

Criterion	SO Strategy	ST Strategy	WO Strategy	WT Strategy
SO Strategy	1	0.33	2.000.000	2.000.000
ST Strategy	3.000.003	1	3.000.003	3.000.000
WO Strategy	0.5	0.33	1	1.000.000
WT Strategy	0.5	0.33	1	1
Inconsistency	0.02271			

Source : Data processed, 2024

Table 2. Average Comparative Assessment of SO Strategy Subcriteria

Subkriteria	SO1	SO2	SO3	SO4	SO5
SO1	1	3442943	2000000	3000000	2000000
SO2	0.29	1	1000000	2000000	1000000
SO3	0.50	1	1	2000000	1000000
SO4	0.33	0.50	0.50	1	0.50
SO5	0.50	1.00	1.00	2.00	1
Inconsistency	0.0131				

Source : Data processed, 2024

Table 3. Average Comparative Assessment of Paired Pairs of WO Strategy Subcriteria

Subkriteria	WO1	WO2	WO3	WO4
WO 1	1	0.5	1000000	2000000
WO2	2	1	2000000	3000000
WO3	1	0.5	1	2000000
WO4	0.5	0.33	0.5	1
Inconsistency	0.00388			

Source : Data processed, 2024

Table 4. Average Comparative Assessment of Paired Strategies Subcriteria of ST

Subkriteria	ST 1	ST2	ST3	ST4	ST5
ST 1	1	0.70	0.39	0.25	0.61
ST 2	1422222	1	0.42	0.27	0.66

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ST 3	2.54	2.34	1	0.5	1559611
ST 4	3.92	3.62	2	1	2000000
ST 5	1.62	1.50	0.64	0.5	1
Inconsistency	0.00556				

Source : Data processed, 2024

Table 5. Average Comparative Assessment of Paired Comparative Criteria of WT Strategy Subcriteria

Subkriteria	WT1	WT2	WT3	WT4	WT5
WT 1	1	2	2000000	3000000	3000000
WT 2	0.50	1	1000000	2000000	2000000
WT 3	0.50	1	1	2000000	2000000
WT 4	0.33	0.50	0.50	1	1000000
WT 5	0.33	0.50	0.50	1	1
Inconsistency	0.00296				

Source : Data processed, 2024

3.1.2.3 Strategy Prioritization

The ANP analysis revealed a clear prioritization of strategies based on their relative weight in supporting sustainable ecotourism. The Diversification Strategy (ST) emerged as the most important approach, particularly aimed at leveraging the beach's strengths to overcome external threats. The top five strategic priorities identified for sustainable ecotourism development at Mina-Minanga Beach are as follows: First, the Beach Cleanliness Programs (ST-1) aim to activate regular cleanliness initiatives with community involvement, promoting education on waste management and providing recycling facilities, thus fostering a sense of ownership and responsibility among residents. Second, Sustainable Conservation (ST-3) emphasizes comprehensive efforts like coral reef rehabilitation, no-fishing zones, and mangrove reforestation to protect the coastal ecosystem and ensure long-term ecological sustainability. Third, Unique Tourism Development (ST-4) focuses on creating and promoting high-quality, distinctive tourism products, such as cultural, educational, and adventure tours, leveraging the beach's natural and cultural assets to stand out from other destinations. Fourth, the Disaster-Resilient Infrastructure (ST-2) initiative prioritizes building infrastructure that can withstand natural disasters, implementing risk mitigation strategies like mangrove planting, establishing early warning systems, and organizing evacuation training. Finally, Skill Development for Local Communities (ST-5) emphasizes enhancing the skills and engagement of local communities in ecotourism management through ongoing training and educational programs, ensuring the long-term sustainability of the tourism sector by equipping locals with the necessary knowledge to manage tourism effectively. The next sequence can be seen in Figure 2.

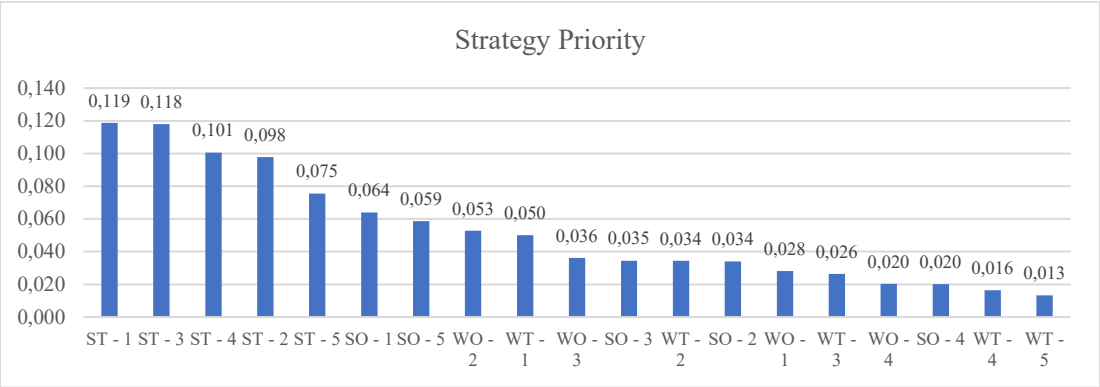

Figure 2. Alternative Strategy Priority Chart

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The ANP analysis highlighted the Diversification Strategy as the overarching approach to managing Mina-Minanga Beach's sustainable ecotourism. By focusing on community involvement, environmental conservation, infrastructure development, and unique tourism experiences, the local government can create a sustainable ecotourism model that supports both environmental and economic goals. Furthermore, continuous monitoring and evaluation of these strategies are essential to ensure their effectiveness and adaptability to changing conditions .

3.2 Discussion

Based on the SWOT and ANP analysis, the grand strategy for the sustainable management of Mina-Minanga Beach tourism is the Diversification Strategy (ST), with five priority actions. First, activating beach cleanliness programs by involving the local community in regular cleanups, waste education, and providing recycling facilities is essential for maintaining environmental quality. By actively involving the local community in regular cleaning activities, the beach can be kept clean, providing a pleasant tourist experience for visitors. Waste management education is an important component of this strategy. The community is given an understanding of the importance of maintaining beach cleanliness and the negative impact of waste on marine ecosystems. This education is expected to increase public awareness and responsibility for the environment, as well as create positive behavioral changes in maintaining beach cleanliness. A community-based approach to waste management not only improves environmental quality, but also strengthens social relations and a sense of community ownership of their tourist destination [1]. Moreover, the development of recycling facilities in nature tourism destinations is not only important from an environmental perspective but can also enhance the image of the destination as an environmentally friendly place [2].

Second, sustainable conservation efforts, including coral reef rehabilitation, no-fishing zones, and mangrove reforestation, are key to preserving biodiversity and supporting tourism activities like snorkeling and diving. Coral reef rehabilitation not only improves the health of marine ecosystems but also supports tourist activities such as snorkeling and diving by restoring the beauty and function of these ecosystems [3]. Well-managed no-take zones can improve conditions for fish populations and support healthy marine ecosystems. Implementation of these zones also contributes to more sustainable management of marine resources, reduces pressure on threatened fish species, and supports a healthy ecosystem-based tourism industry [4]. Mangrove reforestation is also an important strategy to protect coasts and prevent erosion. The mangrove reforestation program will not only protect the coastline from erosion damage but also support the improvement of the quality of the mangrove ecosystem, which in turn supports the attractiveness of ecotourism by offering a more natural and stable environment [5].

Third, developing unique, high-quality cultural, educational, and adventure tourism products will differentiate Mina-Minanga Beach from other destinations. Integrated tourism development based on local wealth can increase destination competitiveness and provide significant economic benefits [6]. Targeted and creative promotions can increase a destination's visibility and communicate the uniqueness of the experiences on offer [7].

Fourth, building disaster-resilient infrastructure and implementing risk mitigation systems, such as mangrove planting and early warning systems, will protect the beach and ensure long-term tourism viability. Finally, improving the skills and participation of the local community through continuous training in tourism management, customer service, and environmental conservation is crucial for sustainable development. From a development perspective, an ecotourism venture can only be considered 'successful' if local communities have control over the venture and if they can equitably enjoy the benefits generated from ecotourism activities [8]. Community-based ecotourism is fundamental to sustainable development. Community development provides essential resources for people to improve their lives, safeguard their natural and cultural heritage, and provide them with economic prospects [9]. Together, these strategies aim to balance environmental preservation, community involvement, and economic growth, positioning Mina-Minanga Beach as a sustainable ecotourism destination.

The findings and strategies developed for Mina-Minanga Beach in North Buton Regency hold significant relevance for broader ecotourism development in Indonesia and similar regions globally. By leveraging the SWOT and ANP analyses, this research identifies a sustainable, community-centered approach that can be applied to other ecotourism destinations facing similar challenges of balancing environmental conservation with local economic growth. Key strategies, such as community involvement in beach cleanliness and environmental conservation efforts, serve as replicable models for other regions that depend on maintaining natural attractions as a core part of their tourism appeal. Coral reef rehabilitation, no-fishing zones, and mangrove reforestation, as outlined in this study, offer practical solutions for preserving fragile ecosystems, not only in North Buton but in other coastal and archipelagic regions worldwide.

Moreover, the diversification strategy, focusing on creating unique tourism experiences while preserving local culture, can be adapted by other ecotourism destinations seeking to integrate sustainable development into their

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tourism frameworks. These approaches provide a template for responsible tourism that encourages both regional and global policymakers to adopt similar methods for protecting natural and cultural assets.

4 Conclusion

The development of sustainable ecotourism at Mina-Minanga Beach in North Buton Regency offers a unique opportunity to harmonize environmental preservation, local community empowerment, and economic growth. This study emphasizes the necessity of a comprehensive approach that utilizes SWOT analysis and prioritizes strategies through the Analytic Network Process (ANP), with the Diversification Strategy (ST) as the foundational framework. Active community engagement in initiatives like beach cleanliness programs is essential, as it not only enhances the beach's attractiveness but also fosters a sense of ownership and improves waste management. Sustainable conservation practices, including coral reef rehabilitation, no-fishing zones, and mangrove reforestation, are crucial for protecting marine ecosystems and boosting ecotourism appeal. The research indicates that healthy ecosystems attract visitors and provide economic benefits to the community. Successful implementation of these strategies necessitates collaboration among stakeholders, including local communities, government agencies, and tourism operators. By promoting sustainable ecotourism, North Buton Regency can achieve social, economic, and environmental gains, serving as a model for responsible tourism development in other regions. Ultimately, a commitment to sustainability will cultivate a thriving ecotourism industry that preserves Mina-Minanga Beach's natural and cultural resources for future generations.

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