

ECOTOURISM OF MANGROVE BEACH KAMPUNG NIPAH SERDANG BEDAGAI NORTH SUMATRA INDONESIA

Indri Lestari^{1,2}, Ernawati², Rosdianto³

¹North Sumatra Provincial Education Office-Panca Budi Private Senior High School, Medan, Indonesia

²Department of Geography, Universitas Negeri Padang, Indonesia

³Agricultural College (STIPER) Kutei Timur, Indonesia

Email: geoindrilestari@gmail.com

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ABSTRACT: The development of mangrove ecotourism in coastal areas has become an approach to maintaining ecosystem sustainability while supporting the welfare of local communities. Mangrove Beach Kampung Nipah in Serdang Bedagai Regency is a mangrove rehabilitation area that has developed into a community-based ecotourism destination. This study aims to analyze management conditions, the availability of facilities and infrastructure, and to formulate development strategies for Mangrove Beach Kampung Nipah from a sustainable tourism perspective. The research method employs a descriptive qualitative approach, with data collected through field observations, interviews, and literature review, and analyzed using descriptive analysis and SWOT analysis. The results indicate that ecotourism management is community-based through local institutions, supported by relatively adequate tourism facilities and diverse natural and educational tourism attractions. The SWOT analysis identifies strengths in mangrove rehabilitation and community-based management, as well as challenges related to accessibility, promotion, and the control of environmental carrying capacity. The implications of this study highlight the need to strengthen stakeholder collaboration, enhance human resource capacity, and implement tourism management based on environmental carrying capacity to support the sustainability of coastal ecotourism.

Keywords: Ecotourism, Mangrove, Tourism, Coastal, Environment.

1. INTRODUCTION

Indonesia's coastal regions play a strategic role in supporting ecological balance and the socio-economic activities of communities. The extensive coastline makes coastal areas a space of interaction between natural systems and human activities, particularly in regions with mangrove ecosystems [1]. Mangrove forests function as coastal protection against abrasion, buffers for tidal dynamics, providers of habitats for aquatic biota, and large-scale carbon sinks. However, coastal development pressure over the past several decades has led to widespread mangrove degradation, especially along the eastern coast of Sumatra [2].

Land-use conversion of mangrove areas into aquaculture ponds, settlements, and coastal infrastructure has triggered a decline in ecosystem quality and increased vulnerability of coastal areas. These conditions have reduced ecosystem services that previously supported the livelihoods of coastal communities [3]. Mangrove degradation is also closely associated with increased risks of coastal abrasion, tidal flooding, and declining fisheries productivity. This situation has driven the need for

coastal management approaches that integrate ecosystem protection with sustainable spatial utilization [4].

One approach that has developed in coastal management is mangrove-based ecotourism. Mangrove ecotourism is directed as a form of coastal resource utilization that places ecosystem conservation as the foundation for tourism development [5]. This activity involves direct interaction between visitors and the mangrove environment through educational tourism, conservation activities, and nature-based recreation [6]. The development of mangrove ecotourism is also closely related to the role of local communities as primary managers, positioning tourism areas as alternative economic spaces for coastal communities [7].

In North Sumatra Province, Serdang Bedagai Regency is one of the regions with a long history of mangrove conversion into aquaculture ponds since the 1980s. Kampung Nipah in Sei Nagalawan Village represents a coastal area that experienced mangrove degradation due to aquaculture activities and was subsequently rehabilitated through community initiatives

beginning in 2005 [8]. This rehabilitation process has evolved into the Mangrove Beach Kampung Nipah ecotourism area, which is managed independently by the community through a local cooperative [9]. This development reflects a transformation of coastal spatial functions from production-oriented areas to conservation and tourism areas.

Several previous studies have discussed the role of mangroves in sustainable coastal management. Alongi (2020) emphasized that mangrove ecosystems make substantial contributions to climate change mitigation, coastal protection, and the socio-economic stability of coastal communities [10]. Another study by Spalding & Leal (2021) highlighted that mangrove areas managed by local communities exhibit greater ecological resilience compared to areas managed through exploitative approaches. These studies indicate that local community involvement in mangrove management contributes to the sustainability of ecosystem functions and the economic stability of coastal regions.

Nevertheless, previous studies have largely positioned mangroves within the framework of global ecology and climate change mitigation. Research that specifically examines community-based mangrove ecotourism management at the local scale, particularly studies that integrate ecological conditions, tourism facilities and infrastructure, governance, and development challenges, remains limited. This research gap is especially evident in ecotourism areas that develop through community-driven initiatives, including Mangrove Beach Kampung Nipah.

This study is directed at examining Mangrove Beach Kampung Nipah in Serdang Bedagai as a community-based ecotourism area through analysis of management conditions, tourism potential, facilities and infrastructure, and development challenges. The novelty of this research lies in presenting an integrated analysis of mangrove ecological aspects and ecotourism governance based on recent field data. The objective of this study is to formulate a comprehensive overview of mangrove ecotourism management in Kampung Nipah as a foundation for sustainable coastal area development.

2. METHODS

2.1 Research Design

This study employs a descriptive qualitative research design supported by simple quantitative data. The descriptive design was selected to systematically describe the actual conditions of Mangrove Beach Kampung Nipah ecotourism, including area management, tourism potential, facilities and infrastructure, and challenges related to sustainable development. The qualitative

approach was used to obtain in-depth information regarding management practices and the role of local communities, while quantitative data were used to strengthen field findings through the recording of tourism activities and the characteristics of available facilities. This research is positioned as a case study conducted at a single coastal ecotourism site managed on a community-based basis.

2.2 Population and Sample

The research population includes all parties involved in and directly interacting with ecotourism activities at Mangrove Beach Kampung Nipah, including managers, local community members, business actors, and visitors. The research sample was determined using purposive sampling, namely the selection of respondents based on their direct relevance to the research object. The sample consisted of one ecotourism area manager, two local traders or business actors, and five visitors present during the data collection period. The selection of these respondents was intended to obtain diverse perspectives related to management, tourism services, and visitor experiences.

2.3 Research Location and Time

The research was conducted in the Mangrove Beach Kampung Nipah ecotourism area, located in Sei Nagalawan Village, Perbaungan District, Serdang Bedagai Regency, North Sumatra Province. This location was selected because it represents a rehabilitated mangrove area that has developed into a community-based ecotourism destination. The study was carried out in 2025, aligned with tourism visitation activities and the operational management of the area, so that the data obtained reflect current conditions of ecotourism management.

2.4 Data Collection Techniques

Data collection was carried out through field observation, interviews, and literature review.

- a) Field observations were directed at identifying the physical condition of the area, tourism facilities, visitor activities, and interactions between managers and tourists.
- b) Semi-structured interviews were conducted with managers, traders, and visitors to obtain information regarding management systems, economic benefits, perceptions of facilities, and challenges in area development.
- c) Literature review was conducted through the examination of scientific journals, research reports, and official documents related to mangrove ecotourism and sustainable coastal management.

2.5 Data Analysis Techniques

The collected data were analyzed using descriptive analysis and SWOT analysis. Descriptive analysis was used to present a narrative overview of the ecotourism conditions at Mangrove Beach Kampung Nipah based on observation and interview results. SWOT analysis was applied to identify internal factors in the form of strengths and weaknesses, as well as external factors in the form of opportunities and threats in the management of mangrove ecotourism. The results of the SWOT analysis were used as a basis for mapping area conditions and formulating directions for ecotourism development oriented

toward environmental sustainability and the welfare of local communities.

3. RESULTS AND DISCUSSION

Management Conditions and Facilities of Mangrove Beach Kampung Nipah Ecotourism

The management of Mangrove Beach Kampung Nipah ecotourism is implemented through a community-based approach with an organized division of work units. The condition of available facilities and infrastructure can be observed through an inventory of tourism-supporting facilities presented in Table 1.

Table 1. Facilities and Infrastructure of Mangrove Beach Kampung Nipah Ecotourism

No	Type of Facilities and Infrastructure	Condition Description	Remarks
1	Parking Area	Spacious and well-organized parking area capable of accommodating two-wheeled and four-wheeled vehicles	Paid
2	Toilets and Changing Rooms	Clean condition, sufficient quantity, distributed at several points	Paid
3	Prayer Room	Fairly spacious building made of bamboo materials, located within the mangrove area	Free
4	Mangrove Wooden Bridge	Wooden bridge extending through the mangrove area as an educational and conservation tourism pathway	Free
5	Tourist Huts	Available in various sizes for visitors to rest	Rental
6	Café and Food Stalls	Managed by local communities, providing seafood and beverages	Paid
7	Accommodation	Several units of simple accommodation managed by the cooperative	Paid
8	Tourism Attractions	ATVs, boat tours, and camping area	Paid

Source: Results of data analysis, 2025.

Based on Table 1, the facilities and infrastructure at Mangrove Beach Kampung Nipah support recreational and educational tourism activities. The availability of a spacious parking area and well-organized internal access facilitates visitor mobility from the entrance to the beach area and mangrove forest. Basic facilities such as toilets, changing rooms, and the prayer room are in proper and well-maintained condition, thereby supporting visitor comfort during their stay in the tourism area.

The mangrove wooden bridge serves as the main facility for educational and conservation tourism activities. This bridge functions as an environmental interpretation pathway that guides visitors to explore the mangrove ecosystem without causing damage to vegetation. In addition to serving as an access route, the wooden bridge is also utilized as an observation space for mangrove flora and fauna, as well as a site for mangrove seedling planting activities managed by local educational groups.

Supporting facilities such as tourist huts, cafés, and food stalls play a role in extending visitor

length of stay. These facilities are directly managed by local communities through a cooperative, allowing tourism activities to generate direct economic benefits for surrounding residents. The available simple accommodation units also support group visits, particularly from students and university groups conducting educational tourism and field research activities.

Overall, the management condition of facilities and infrastructure reflects an integrated community-based management pattern. Each facility unit is managed by different working groups under the coordination of the ecotourism cooperative. This pattern supports community involvement in area management while maintaining the sustainability of Mangrove Beach Kampung Nipah's function as a conservation area and coastal tourism destination.

Tourism Potential and Development Challenges of Mangrove Beach Kampung Nipah Ecotourism (SWOT Analysis)

The tourism potential and development

challenges of Mangrove Beach Kampung Nipah Ecotourism were analyzed through the identification of internal and external factors of the area. A summary of strengths, weaknesses,

opportunities, and threats is presented in Table 2, while the formulation of development strategies is shown in Table 3.

Table 2. SWOT Analysis Matrix of Mangrove Beach Kampung Nipah Ecotourism

Internal Factor	Description
Strengths	- Well-preserved rehabilitated mangrove area; - Community-based management through a cooperative; - Diversity of natural, educational, and recreational tourism attractions; - Basic tourism facilities are available and functional; - Affordable service prices
Weaknesses	- Access roads are not fully paved; - Limited tourism promotion; - Some information facilities are beginning to deteriorate; - Uneven human resource capacity; - Dependence of income on tourism visitation
External Factor	Description
Opportunities	- Increasing interest in environmental and educational tourism; - Support from schools and universities; - Opportunities for partnerships with government and private sectors; - Development of mangrove-based processed products; - Expansion of tourism packages
Threats	- Pressure on ecosystem carrying capacity due to increasing visitor numbers; - Changes in coastal conditions; - Competition from other coastal tourism destinations; - Limited funding for infrastructure development

Source: Results of data analysis, 2025.

Based on Table 2, the main strength of Mangrove Beach Kampung Nipah Ecotourism lies in the successful rehabilitation of the mangrove ecosystem, which serves as the foundation for tourism area development. Dense and well-maintained mangrove vegetation provides visual appeal as well as ecological functions that support coastal sustainability. Area management through a community cooperative reflects a clear organizational structure, allowing tourism activities, conservation efforts, and economic enterprises to operate in a coordinated manner. This condition creates integration between environmental management and the welfare of local communities.

The diversity of tourism attractions strengthens the competitiveness of the area. Tourism activities at Mangrove Beach Kampung Nipah include beach recreation, mangrove educational tourism, conservation activities, and the utilization of environmental services through boat tours and ATV rides. Basic facilities such as toilets, prayer rooms, tourist huts, and parking areas are in proper condition and capable of supporting visitor comfort. Affordable service prices further encourage high visitation interest from various groups, particularly students and domestic tourists.

Identified weaknesses are closely related to infrastructure and tourism information management aspects. Access roads to the coastal area that are not fully paved affect visitor mobility, especially under certain weather conditions.

Limited tourism promotion results in suboptimal dissemination of information about the area, so visitation potential has not been fully maximized. In addition, some tourism information facilities, such as pamphlets and directional signage, have begun to deteriorate due to exposure to the coastal environment, which affects the quality of information services for visitors.

Opportunity factors in Table 2 indicate that Mangrove Beach Kampung Nipah has broad development potential in line with increasing interest in environmental and educational tourism. Existing cooperation with schools and universities contributes to the sustainability of educational and mangrove conservation activities. Additional opportunities arise through the development of mangrove-based processed products and integrated tourism packages, which can extend visitor length of stay and increase local community income.

The main threats in area development are related to pressure on environmental carrying capacity due to increasing numbers of visitors. Continuously growing tourism activities may affect mangrove ecosystem quality if visitor regulation and area activities are not managed in a planned manner. Furthermore, changes in coastal conditions and competition from other coastal tourism destinations present external challenges that need to be anticipated through strengthening destination identity and management quality.

Table 3. Development Strategies of Mangrove Beach Kampung Nipah
 Ecotourism Based on SWOT Analysis

Strategy	Strategy Formulation
SO (Strengths–Opportunities)	• Development of community-based mangrove educational tourism packages; • Strengthening cooperation with educational institutions; • Diversification of mangrove-based processed products to support the local economy
WO (Weaknesses–Opportunities)	• Enhancement of digital promotion and tourism information media; • Strengthening human resource capacity through training programs; • Improvement of road access through partnerships with government and private sectors
ST (Strengths–Threats)	• Regulation of visitor numbers based on area carrying capacity; • Strengthening conservation regulations within tourism activities; • Routine maintenance of tourism facilities based on community participation
WT (Weaknesses–Threats)	• Preparation of long-term management plans; • Development of alternative income sources beyond entrance fees; • Improvement of the quality of tourism information facilities

Source: Results of data analysis, 2025.

Based on Table 3, the SO strategy is directed toward utilizing internal strengths to capture external opportunities. The development of mangrove educational tourism packages and diversification of processed mangrove products serve as primary strategies to strengthen the added value of the area. This strategy is supported by the active involvement of local communities as managers and business actors, allowing tourism activities to contribute directly to the coastal community economy.

The WO strategy emphasizes improving internal weaknesses by utilizing available opportunities. Enhancing tourism promotion through digital media and strengthening human resource capacity through training are directed at improving service quality and area attractiveness. Improving area accessibility through partnerships with government and private sectors also forms part of this strategy to enhance visitor comfort and safety.

The ST strategy is designed to protect area strengths from various external threats, particularly those related to pressure on the mangrove ecosystem. Regulation of visitor numbers based on area carrying capacity and strengthening conservation rules within tourism activities are directed at maintaining balance between utilization and environmental preservation. Meanwhile, the WT strategy focuses on long-term risk reduction through the preparation of structured area management plans and the development of alternative income sources beyond entrance fees.

Mangrove ecotourism management in various coastal areas of Indonesia indicates that the involvement of local communities in management processes is a key factor in maintaining the sustainability of coastal resources while simultaneously creating economic activities. At Mangrove Beach Kampung Nipah, community involvement within the management structure through a cooperative plays a role in directing

tourism activities, conservation efforts, and micro-enterprises in the area. This condition is consistent with the findings of [10] in Poreang Village, North Luwu Regency, which emphasize that the development of community-based mangrove ecotourism promotes social, economic, and ecological empowerment through the active role of communities in managing mangrove tourism potential in a sustainable manner [11].

Active community involvement in mangrove ecotourism management is also reflected in capacity-building and training activities aimed at equipping local residents with knowledge related to nature-based tourism destination management. Similar training initiatives were implemented by [12-14] in Kampung Dompok Lama, Tanjungpinang City, where improvements in community capacity for implementing mangrove ecotourism enhanced community readiness to manage structured and environmentally friendly tourism activities. Such activities strengthen community capacity in facility management, visitor services, and the routine implementation of conservation activities.

Strategi Pengembangan Ekowisata Pantai Mangrove Kampung Nipah dalam Perspektif Pariwisata Berkelanjutan

The development of mangrove ecotourism oriented toward sustainable tourism principles requires strategies that align environmental conservation with community empowerment. Strategies that consider ecological, social, and economic sustainability form the basic framework for formulating mangrove tourism destination development initiatives. The findings of [15] indicate that the integration of conservation and tourism activities can enhance destination value while maintaining ecological functions. Strategic planning grounded in ecosystem preservation and improvement of community quality of life can serve as a guiding framework for development at Mangrove Beach Kampung Nipah.

One of the primary strategies involves strengthening collaboration among stakeholders, including local communities, village governments, tourism authorities, and the private sector. The ecotourism development model in Batu Lumbang, Bali, demonstrates that collective participation between local communities and external actors contributes positively to ecosystem restoration and the diversification of tourism products based on local resources, such as mangrove-based processed products that provide added economic and educational value. Such collaboration creates opportunities for training programs, joint marketing initiatives, and the development of more diverse tourism attractions.

Enhancing human resource capacity represents an essential aspect of implementing sustainability strategies. Continuous training and skill development for local managers in tourism services, environmental interpretation, and facility management strengthen the quality of visitor experiences. The findings of [16] in Pagatan Besar show that community-based training involving village administrators, tour guides, and residents in financial management, tourism safety, and marketing establishes a strategic foundation for inclusive ecotourism development. Capacity enhancement promotes professionalism in destination governance while reinforcing the role of local communities as primary managers.

Effective marketing strategies also play a crucial role in the context of sustainable tourism. Promotional efforts designed to attract domestic and international tourists through digital platforms, cooperation with travel agents, and the provision of educational information regarding mangrove conservation values can expand market reach. [17] emphasizes that strong destination branding through conservation values and unique visitor experiences enhances tourist appeal while building a positive image as a sustainable tourism area.

Environmentally friendly infrastructure management forms an integral component of sustainable development strategies. Improvements in road access, sanitation facilities that adhere to environmental standards, and the construction of ecological interpretation facilities that are compatible with mangrove ecosystems require careful planning. The implementation of such strategies supports the physical integrity of the area while enhancing visitor comfort. [18] highlight the importance of infrastructure arrangements that are sensitive to conservation needs and visitor comfort.

Sustainable ecotourism development strategies also include innovation in tourism products that emphasize educational and

conservation-oriented experiences. Tourism packages incorporating mangrove planting activities, coastal biodiversity observation, mangrove-based handicraft workshops, and field school programs can enhance visitor engagement while increasing local economic value. This approach provides opportunities for communities to share knowledge about mangrove ecosystems while creating more diversified income sources.

4. CONCLUSION

Mangrove Beach Kampung Nipah ecotourism has developed as a community-based coastal ecotourism area that integrates mangrove conservation functions with tourism activities. Area management is carried out through local institutions that involve the community in various activity units, ranging from conservation and education to tourism-related businesses, thereby contributing to the socio-economic welfare of coastal residents. The condition of tourism facilities and infrastructure generally supports recreational and educational tourism activities, particularly through the presence of mangrove boardwalks, visitor huts, worship facilities, and supporting recreational attractions. The results of the SWOT analysis indicate that the main strengths of the area lie in the successful mangrove rehabilitation efforts and community-based management, while weaknesses and development challenges are related to accessibility, tourism promotion, human resource capacity, and the potential pressure on environmental carrying capacity due to increasing visitor numbers.

The development of Mangrove Beach Kampung Nipah ecotourism is directed toward strengthening governance based on sustainable tourism principles through enhanced collaboration among local communities, local governments, and the private sector. Efforts to improve access infrastructure to the area, strengthen digital-based tourism promotion, and enhance the quality of tourism information facilities need to be implemented in a planned and integrated manner. In addition, continuous improvement of human resource capacity through training in destination management, tourism services, and environmental interpretation is required to support professional management practices. The regulation of tourism activities based on environmental carrying capacity, along with the development of educational tourism products and mangrove-based creative economic activities, is expected to

maintain a balance between tourism utilization and the long-term sustainability of coastal ecosystems.

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