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Sustainable Ecotourism Design: A Case Study of Bale-Bale Beach, Nongsa

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Abstract

Bale-Bale Beach in Batam has significant potential as a marine ecotourism destination, but it remains underutilized. Key challenges include poor road infrastructure and low tourist interest in coastal activities, largely due to the dominance of floating restaurants. This limits the use of natural assets like mangrove forests, which could support conservation and sustainable tourism. This study aims to develop a sustainable ecotourism concept that integrates natural resources, local culture, and community participation. Its novelty lies in applying a multifunctional zoning approach—conservation, education, and recreation—based on sustainable architectural principles. Using a descriptive qualitative method, the study analyzes regional potential, community needs, and ecological design principles. Data was collected through observation, interviews, and documentation. Findings suggest that Bale-Bale Beach can be developed through an integrated zoning model that connects ecological preservation with educational and recreational activities rooted in local culture. This strategy supports adaptive and participatory coastal tourism development. The proposed concept offers practical insights for stakeholders and local authorities in managing coastal areas sustainably and can serve as a model for similar ecotourism initiatives in Batam and other coastal regions.

Keywords:

Bale-bale Nongsa Beach, Ecotourism and Sustainable Tourism, Conservation, Community Empowerment

Introduction

Bale-Bale Beach is one of the coastal tourist destinations in Batam City that has great potential to be developed as an ecotourism area. This potential lies not only in its natural beauty, but also in the existence of mangrove ecosystems that are still quite well preserved. This ecosystem has an important role in maintaining the balance of the coastal environment and supporting the sustainability of nature-based tourism activities (Nurfaridah & ARNESIH, 2019). The development of this area still faces various challenges, such as limited accessibility, lack of diversification of tourist attractions, and low involvement of local communities in the management of tourist areas (Ilham et al., 2022). Based on initial observation and data from the Batam City Tourism Office (2023), the number of visits to Bale-Bale Beach is still relatively low compared to other coastal destinations in Batam, with an average visit of only around 150-200 people per week.

The concept of ecotourism and mangrove conservation has been widely used as an alternative approach in the management of environmentally-based tourist destinations. Ecotourism not only emphasizes environmental sustainability, but also the social and economic aspects of local communities, such as through capacity building and empowerment in tourism management (Gobel & Wunarlan, 2023).However, research that specifically discusses ecotourism development strategies oriented towards mangrove conservation and community empowerment at Bale-Bale Beach is still very limited. Previous research tends to focus on other more popular coastal areas, without

examining Bale-Bale's local characteristics in depth. Therefore, there is a research gap that needs to be filled to produce a contextualized and sustainable development approach.

These constraining factors need to be analyzed comprehensively to formulate appropriate and sustainable development strategies. In addition, it is important to understand how the potential of this area can be maximized through environmental approaches, including mangrove conservation efforts which are an important part of the coastal ecosystem. Based on data from the Watershed Management Center (BPDAS), about 65% of mangrove vegetation in the Batam area is under ecological pressure due to development, but the Bale-Bale Beach area still has relatively intact mangrove cover, making it a strategic area for conservation and environmental education (Riau, 2023).

This research aims to analyze the problems that hinder the development of ecotourism at Bale-Bale Beach and formulate an environmental and conservation-based development strategy. In addition, this research also seeks to explain the important role of the community in supporting sustainable tourism area management. Theoretically, the results of this study contribute to the development of science in the field of tourism, especially about the concept and implementation of conservation-based ecotourism in coastal areas. This research can also be a reference for similar studies that integrate tourism and environmental conservation (Mirza et al., 2022).

On the other hand, practically, the results of this study are expected to be an input for local governments, tourism managers, and communities in designing ecotourism development strategies that are not only oriented towards economic growth, but also pay attention to environmental sustainability. Furthermore, this research is also expected to be able to create new economic opportunities for local communities through strengthening the tourism sector based on natural potential and local wisdom.

This research was conducted in the Bale-Bale Beach area, with a scope that includes identifying the main obstacles such as limited infrastructure and accessibility, examining the level of participation and empowerment of local communities, and examining the role of mangrove ecosystems in supporting tourism sustainability. The approach used in this research is qualitative, with data collection methods through field observations, in-depth interviews with communities and stakeholders, and visual documentation. Through this approach, the research not only evaluates existing conditions, but also offers applicable solutions that can support the development of an inclusive, environmentally friendly and sustainable ecotourism area.

Literature Review

Bale-Bale Beach is one of the beach attractions located in Batam City, precisely in Nongsa District, not far from Hang Lekiu KM 4 Road. The location of this beach is in Kampung Tua, Batu Besar Village, Nongsa District, Batam City. At first, Bale-Bale Beach provided various facilities, such as several photo spots in the mangrove forest area and games such as soccer, archery, flying fox, ball throwing, and canoeing. However, in order to maintain the safety of visitors and because the games were considered not meeting the visitor operational standards (SOP), the manager decided to stop the games.

Until now, the community continues to make improvements, develop, and innovate facilities to increase the attractiveness of tourists who come to Bale-Bale Beach, so that it is expected to be able to encourage community economic growth. The attractiveness of this beach is also increasingly supported by the availability of quite complete facilities, such as prayer rooms, small and large gazebos, nine bathrooms, art stages, food and snack stalls, seafood restaurants, parking areas, camping areas with a capacity of up to 1000 people, and a 450-meter bridge.

Ecotourism and Sustainable Tourism

Indonesia, with its extraordinary natural and cultural wealth, has great potential for developing ecotourism. According to the Ministry of Environment and Forestry, in 2022, nature tourism visits to conservation areas were recorded at a total of 5.29 million people. This number consists of 5.1 million domestic tourists and 189 thousand international tourists. This tourism concept, which prioritizes nature conservation, not only offers unique experiences for visitors but also contributes to conservation efforts. One way to achieve sustainable tourism is through ecotourism, which enhances the ability of communities to manage tourist destinations while preserving local nature

and culture. Environmental conservation, economic and social improvement for local communities, and tourist education are the main components of ecotourism (Amali, 2019). Ecotourism in Indonesia is not just about enjoying the beauty of nature; it also involves local communities in managing tourist areas, creating positive social and economic impacts. Through this article, we will explore in depth how ecotourism can serve as an effective instrument in supporting nature conservation in Indonesia or, on the contrary, how its implementation might pose a risk to natural wealth, potentially leading to environmental ecological losses.

Comparative Case Study

To enrich the analysis, it is important to examine comparisons with similar cases in Indonesia. One example is the Angke Kapuk Nature Tourism Park (TWA), North Jakarta, a conservation-based tourism area that combines educational, recreational, and mangrove ecosystem preservation functions. According to research by Putri Adinda Trisia and Rizki Nurul Nugraha (2022), the management of ecotourism at TWA Angke Kapuk is carried out through cooperation between the private sector (PT Murindra Karya Lestari) and the government, with the involvement of local communities as labor in operational activities, tour guides, and ecotourism service providers. The study also emphasizes that the success of TWA Angke Kapuk is inseparable from the application of strict conservation principles, where tourism activities are directed to minimize environmental damage.

The Mangrove Nature Tourism Park area has a seedling program, a waste management program, especially for plastic waste, and a liquid waste reduction program. To manage incoming waste, a buffer net is installed at the river mouth. Then, to maintain water quality, the managers create a dam to hold back water in and out, especially water contaminated by factory waste.

Relevance to Bale Beach – Bale, the multifunctional zoning concept applied at TWA Angke Kapuk is very relevant to the development strategy of Bale Bale Beach. An approach that combines conservation zones (mangroves), education zones (interpretation trails and environmental activities), and recreation zones (camping areas and art stages) can enhance the functional value of the tourism area while maintaining ecosystem sustainability. In addition, the collaborative model between the government, communities, and the private sector in managing TWA Angke Kapuk can be adopted to create participatory governance at Bale Bale Beach.

Mangrove Conservation

Mangroves are forest vegetation that grows between high and low tide lines, thus mangrove forests are also called tidal forests. Mangrove forests are found in coastal areas that are continuously or sequentially submerged in seawater and influenced by tides, with soil consisting of mud and sand (Anugoro et al., 2019). Mangrove forests play an important role in maintaining the balance of coastal ecosystems. In addition to functioning as a barrier against abrasion and a buffer against storms, mangroves also serve as habitats for various species of flora and fauna. The ecotourism approach in mangrove conservation not only focuses on environmental preservation but also provides economic and social benefits to surrounding communities through the development of nature-based tourist destinations (Majid et al., 2016).

Community Empowerment in Ecotourism

Conceptually, empowerment comes from the word "power." A study defines empowerment as a personal and social process; which includes the liberation of personal abilities, competencies, creativity, and freedom to act. Meanwhile, Ife (1995) states that empowerment refers to the term "Empowerment," which means giving power, giving "power" to those who are less empowered (Bhanu Prawirasworo, Tri Yuniningsih, n.d.). The government has issued Law No. 1 of 2014, which is an amendment to Law No. 27 on coastal area management. Article 63 states "The government and regional governments are obliged to empower coastal communities to improve their welfare. The government and regional governments are responsible for encouraging businesxs activities among coastal communities through capacity building, access to technology and information, capital funding, infrastructure development, market guarantees, and other productive economic assets." (JASMINE, 2014). The above law emphasizes that the government plays an important role in regularly monitoring the quality of coastal environments, including terrestrial, brackish, and marine/coastal areas where communities engage in cultural activities.

Local community empowerment is key to the development of sustainable tourism. Active community involvement in the planning, management, and development of ecotourism can enhance economic well-being while preserving cultural and environmental sustainability. Sutawa (2012) states that community empowerment in tourism development can improve welfare through capacity building and increased participation in tourism activities.

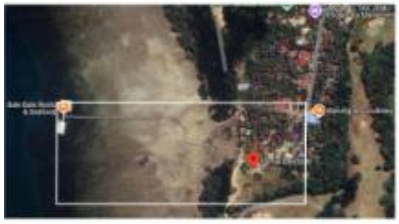
Research Methods

Research Approaches and Types of Research

Using a qualitative method with a descriptive approach. The qualitative method was chosen because it allows researchers to deeply understand phenomena within a natural setting, this method is based on postpositivist philosophy, where the researcher serves as the primary instrument for extracting data from the actual conditions of the subject. This approach is used to examine various aspects related to the development of mangrove conservation-based ecotourism in Bale-Bale Beach, such as the challenges faced, the existing potential, and possible solutions that can be implemented. This study is not only aimed at describing field facts, but also at uncovering the meaning and perceptions of the community regarding green open spaces and educational areas around the beach (Ilham et al., 2022).

Location

Conducted in Bale-Bale Beach, Nongsa District, Batam City, Riau Islands Province, this area was selected due to its great potential for development as a mangrove ecotourism destination. However, it also faces several challenges, such as limited accessibility, lack of supporting facilities, and the need for a conservation-oriented approach in its development.



Picture 1. Location
(Source : Google Earth, 2025)

Research Informants

In this study, the informants consist of visitors and community members who have direct or indirect involvement with Bale-Bale Beach. The selection of informants was carried out using non-probability sampling, specifically employing a purposive sampling approach. With this approach, respondents were deliberately chosen based on their relevance and connection to the research issues and objectives.

Data Collection Techniques

Data is collected through several techniques, including direct observation of the physical conditions of the area, such as access, facilities, and tourism activities; in-depth interviews with local communities and managers to explore challenges and development opportunities; questionnaire distribution to residents and visitors to understand their perceptions and expectations; and documentation, such as field photos, field notes, and other supporting documents that reinforce observations and interviews.

Research Instruments

This research relies on the researcher as the primary instrument, supported by interview guides and systematically prepared questionnaire forms. The questionnaire includes both closed and open-ended questions, covering various aspects such as: Accessibility to the location, available tourism facilities. interesting tourism activities, interest in environmental tourism, understanding and attitudes toward mangrove conservation, and expectations and suggestions regarding the design of educational and environmentally friendly open spaces.

Data Analysis Techniques

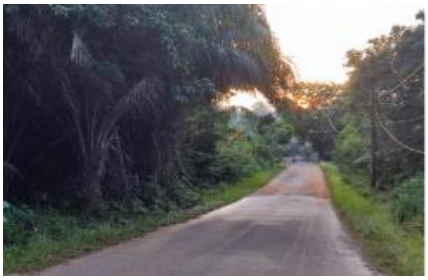
The collected data is analyzed using content analysis for qualitative data from open-ended questions and interviews, as well as descriptive analysis for quantitative data from closed-ended questionnaires. The analysis process involves categorizing data by theme, identifying patterns and trends, and drawing conclusions relevant to both theory and field realities. The findings are presented narratively and reinforced with direct quotes from respondents to enhance understanding.

Data Validity

The data in this study is maintained through triangulation techniques, which involve comparing results from various data sources such as questionnaires, observations, documentation, and secondary data related to the development plans of Bale-Bale Beach. Validation is further strengthened by aligning respondent expectations with the fundamental principles of conservation-based ecotourism, ensuring that the research findings are credible and scientifically accountable.

Results and Discussion

Bale-Bale Beach has great potential as an ecotourism destination due to its rich coastal ecosystem, particularly its relatively pristine mangrove forests, which can be utilized as an attractive tourism feature. The presence of a popular floating restaurant indicates that the area already has strong tourism appeal, although it has not yet been fully developed. This restaurant could serve as a starting point for integrated tourism development, combining culinary experiences, natural beauty, and local culture into a comprehensive tourism experience.



Gambar 2.1. The road to Bale-Bale Beach (Source : Google Earth, 2025)

Gambar 2.2. The road to Bale-Bale Beach (Source : Google Earth, 2025)

The main obstacle is accessibility, as the road leading to the location is narrow and damaged, affecting visitor comfort and safety. This issue highlights that ease of accessibility is an essential component in the development of sustainable ecotourism. Visitor preferences show greater interest in the floating restaurant's culinary offerings rather than nature-based activities, indicating low appeal for ecotourism. This is due to the lack of nature-based attractions that can effectively capture visitor interest. Additionally, poorly structured conservation programs pose another challenge to sustainable ecotourism development. The mangrove area, which should serve as an educational and environmental conservation space, has not been fully utilized to support an educational and sustainable tourism experience.

To overcome these obstacles while optimizing the potential of Bale-Bale Beach, a targeted and sustainable ecotourism development strategy is required. The development strategy for Bale-Bale Beach should adhere to sustainable ecotourism principles, incorporating educational, conservation, and local community empowerment values.

a. First, infrastructure improvements carried out by the government and management meet community expectations and attract visitors. When traveling, visitors will at least consider road access as well as the

availability of facilities and services. Therefore, since visitors require comfort, the infrastructure in villages near Bale-Bale Beach must be upgraded (Ridlwan et al., 2017).

b. Second, the development of mangrove conservation-based tourism attractions, such as mangrove trails, mangrove planting activities, and environmental education classes for the community and visitors, can strengthen educational value and sustainable tourism (Ridlwan et al., 2017).
c. Third, implementing environmentally friendly architectural principles by utilizing local materials, such as wood, and adopting structures that adapt to tidal conditions in coastal areas. This approach not only maintains ecological balance but also creates a distinctive and sustainable tourism identity (Ridlwan et al., 2017).

Efforts to develop ecotourism will not be optimal without the active involvement of local communities as an essential part of the planning, implementation, and sustainability of the tourism area.

Gambar 3. Empowerment of the Local Community at Bale-Bale Beach
(Source : Authors, 2025)

Community involvement in development includes their participation in the planning and implementation of development programs. Empowerment means providing communities with resources, opportunities, knowledge, and skills that enable them to shape their future and actively influence their own community life. At Bale-Bale Beach, the local community can be involved as tour guides, conservation facilitators, or local economic actors, such as culinary business operators, accommodation service providers, or cultural event organizers. This participation will create economic opportunities, improve community welfare, and strengthen their sense of ownership over the area. The local community has demonstrated positive behavior toward ecotourism development at Bale-Bale Beach, particularly in terms of cleanliness and the maintenance of infrastructure, which remains in good condition. This indicates that the community has a strong connection to their environment, making them attentive to environmental changes (Wisatawan et al., 2024).

In response to initial findings regarding the potential and challenges of the area, a questionnaire was distributed to local residents who have visited Bale-Bale Beach. The results indicate that, although culinary tourism, such as the floating restaurant, remains the main attraction, there is significant potential to develop environmental education-based tourism, provided it is contextually, functionally, and attractively designed for visitors. Based on the results of the questionnaire, it can be concluded that although interest in culinary tourism, such as the floating restaurant, remains dominant, there is great potential to develop educational tourism concepts. If properly designed, the environment can achieve balance between recreational and educational functions. Therefore, the area design strategy is directed toward creating this equilibrium. Mangrove boardwalks, educational information boards, and interactive zones for children serve as key elements in the design, directly responding to community preferences.

Additionally, comfort and cleanliness are addressed through efficient spatial planning, the provision of adequate sanitation facilities, and the use of natural materials to maintain harmony with the coastal environment. The design also prioritizes the use of local vegetation as an aesthetic and ecological element. Local community involvement is accommodated through SME areas, conservation information centres, and tourism facilitator training, reinforcing the empowerment concept in ecotourism. The existing mangrove area is designed as a conservation and

education zone, not only for ecosystem protection but also as an open learning space. Thus, the area design not only meets visitor needs but also promotes environmental awareness and active community involvement, aligning with sustainable tourism principles.

Gambar 4. Top View
(Source : Authors, 2025)

Gambar 4.1. Design Concept
(Source : Authors, 2025)

Based on the identified potential and challenges, Bale-Bale Beach requires a design approach that integrates education, natural aesthetics, and ecology. The proposed design preserves existing spaces while optimizing them for sustainable tourism. Key zones include beaches, campsites, and an amphitheater for interactive learning. Improved accessibility is addressed through pedestrian pathways and parking. Facilities like prayer rooms, toilets, and cafeterias are placed near SME areas to support both visitor needs and local economic participation. By incorporating natural elements and empowering the community through integrated business spaces, the design promotes sustainability, conservation, and social engagement—creating a tourism area that is environmentally friendly, community-driven, and educational.

Conclusions

This study emphasizes the importance of establishing Bale-Bale Beach in Nongsa, Batam, as a sustainable ecotourism destination. Based on observations, interviews, questionnaires, and data analysis, several conclusions have been drawn as:

a. Untapped Tourism Potential

Bale-Bale Beach has a rich coastal ecosystem, particularly its mangrove forests, which hold high potential as educational and conservation tourism attractions. However, this potential has not been fully utilized, as environment-based tourism has lower appeal compared to culinary attractions, such as the floating restaurant.

b. Issues with Accessibility and Facilities

Accessibility is a major obstacle in the development of the area. The damaged and narrow roads reduce visitor comfort, hindering the increase in tourist numbers. Additionally, the existing facilities do not yet fully support the needs of education- and conservation-based tourism.

c. The Important Role of Local Communities

Empowering local communities is a key aspect in realizing sustainable tourism. The community plays a major role in maintaining cleanliness, safety, and environmental preservation. They can also be involved in tour guiding activities, conservation education, and the development of local businesses (SMEs) that support the regional economy.

d. Holistic Development Strategy

The strategy that needs to be implemented includes infrastructure improvements, strengthening conservation-based attractions (such as mangrove trails and environmental education), applying environmentally friendly architecture, and integrating tourism zones that support educational, ecological, and social functions in a sustainable manner.

e. Area Design as a Form of Implementation

The proposed area design concept integrates educational value, natural aesthetics, and community empowerment. The placement of facilities and activity zones is designed to support accessibility, environmental conservation, and local economic participation. Thus, this design serves as a concrete step toward the development of Bale-Bale Beach as a sustainable ecotourism destination.

The key findings of this study emphasize that a multifunctional zoning approach, integrating conservation, education, and recreation, is essential for optimizing the sustainable potential of Bale-Bale Beach. The proposed area design not only responds to ecological conditions but also creates opportunities for community empowerment and enhances tourism quality. Practically, this concept can be adopted by local governments as a foundation for coastal tourism planning and serve as a guide for managers and communities in developing adaptive and environmentally conscious tourism activities. The study's limitations lie in the lack of technical design testing and comprehensive multi-stakeholder participation, highlighting the need for further research to examine implementation and sustainability aspects.

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