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Analysis of The Potential and Challenges of Ecotourism in Supporting Physical Environmnetal Aspects in Tangkahan

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Abstract: This research aims to analyze the potential and challenges of ecotourism development in supporting the preservation of physical environmental aspects in the Tangkahan area, Langkat Regency, North Sumatra. The physical environment, such as soil quality, water, vegetation, and natural landscape is the main assets that support the attractiveness of ecotourism. This uses a qualitative descriptive approach through direct observation and semi-structured interviews involving local managers, tourists, and related organizations. Data analysis was conducted through data reduction, data presentation, and conclusion drawing. The research results showed that Tangkahan has great potential as a conservation-based ecotourism destination, with preserved water and air quality and high biodiversity. However, there are significant challenges such as limited infrastructure, low promotion, and environmental threats due to uncontrolled tourism activities. The implications of this study emphasize the importance of an integrated management strategy involving local communities, improved supporting facilities, and environmental education for tourists to ensure the area's sustainability. These findings can be the basis for formulating ecotourism development policies based on physical environment conservation.

Keywords: Ecotourism, Physical Environment, Conservation

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INTRODUCTION

Ecotourism is a form of tourism activity that relies on the use of natural beauty, with the main principle of preserving the environment. In this context, ecotourism not only aims to provide a different tourist experience, but also becomes an important means of supporting the preservation of the physical environment in tourist areas. The physical environment, which includes elements such as soil quality, water, vegetation, and landscape, is a key asset that must be maintained in order to maintain the attractiveness of the area. As stated by , ecotourism emphasizes the integration between environmental conservation, local community empowerment, and sustainable tourism experiences (Fandeli & Mukhlison, 2000).

Tangkahan, located in Langkat Regency, North Sumatra, is an example of an area that develops conservation-based ecotourism. Known as "The Hidden Paradise," Tangkahan presents the beauty of tropical rainforests, crystal clear rivers, natural waterfalls, and habitats for various species of rare flora and fauna. Fauna found in this area include the Sumatran Orangutan (Pongo abelii), the Sumatran Elephant (Elephas maximus sumatranus) which is managed through the Conservation Response Unit (CRU), and the Sumatran Tiger (Panthera tigris sumatrae) as the apex predator of the ecosystem. In addition, there are also primates such as kedih and long-tailed macaques, as well as endemic birds such as hornbills and kuau which are indicators of forest health. In terms of flora, this area is overgrown with tropical rainforest vegetation with typical species such as meranti, resin, keruing, forest nutmeg, and various types of orchids. Several rare plants such as Rafflesia, Amorphophallus (carrion flower), and semar pouch (Nepenthes) are also found in the TNGL area. The existence of flora and fauna shows that Tangkahan is an area that is still preserved in its authenticity and has an important role in protecting Sumatra's biodiversity.

Its location directly adjacent to the Mount Leuser National Park makes Tangkahan one of the key areas in efforts to preserve the environment on the island of Sumatra. With its crystal clear rivers, lush tropical rainforests, and high diversity of flora and fauna, Tangkahan offers a unique nature-based tourism experience. The activities offered include elephant trekking and elephant patrol which are educational and support the conservation of Sumatran elephants, as well as river tubing and swimming in natural rivers that take advantage of the water quality that is still maintained. In addition, tourists can do jungle trekking in the TNGL tropical rainforest, bird watching, and nature photography. All of these activities are generally accompanied by local guides who provide education about the importance of conservation and protecting the environment. The beauty and authenticity of the physical environment of Tangkahan is an important factor in attracting both domestic and foreign tourists. The management of Tangkahan ecotourism involving local communities and applying conservation principles has proven to be able to preserve forests and increase environmental awareness (Nasution & Lubis, 2018).

However, along with the increasing popularity of Tangkahan as a tourist destination, various challenges arise that can threaten the preservation of the physical environment of this area. Uncontrolled tourist activities, lack of environmental awareness from some tourism actors, and imbalance between tourism infrastructure development and environmental conservation have the potential to cause environmental degradation. stating that uncontrolled tourism activities can result in soil erosion, water pollution, and vegetation damage, which ultimately reduces the quality of tourist areas (Suhelmi & Nugroho, 2015). If these challenges are not anticipated immediately, then the quality of the physical environment in Tangkahan will decrease, which ultimately has an impact on the decline of the tourist attraction itself.

Seeing the potential and challenges that exist, an in-depth analysis is needed on the real condition of ecotourism in Tangkahan, especially in relation to support for physical environmental aspects. This analysis aims to identify potential that can be strengthened, challenges that must be overcome, and formulate the right strategy so that the development of ecotourism in Tangkahan remains in line with efforts to maintain the quality of its physical environment (Siregar et al., 2023).

If not managed properly, then the main purpose of ecotourism to support the preservation of the physical environment can be disrupted, even causing damage to existing ecosystems.

Based on the researcher's research, there are several previous studies related to physical environmental aspects in tourism development. Research on the Influence of the Physical Environment on Tourists' Decisions to Visit Semambu Tourism Village, Ogan Ilir Regency shows that the quality of the physical environment, such as cleanliness, comfort, and regional arrangement, has a significant effect on tourists' decision to visit (Fadillah et al., 2021). Meanwhile, the research on the Relationship between Environmental Aspects in Sustainable Tourism to Distinctiveness (Case Study of the Toba Caldera Geopark Area) explained that good management of environmental aspects contributes to the formation of characteristics and uniqueness of destinations within the framework of sustainable tourism (Ginting et al., 2020).

However, the two studies focus more on the influence of the physical environment on visiting decisions and the formation of destination uniqueness, and have not specifically examined the potential and challenges of ecotourism in supporting the preservation of physical environmental aspects in conservation-based areas such as Tangkahan. Therefore, this study is here to fill this gap by more comprehensively analyzing the potential and challenges of ecotourism in maintaining the quality of the physical environment in Tangkahan as part of the Mount Leuser National Park area.

METHODS

This research method was prepared to examine the extent to which the potential for ecotourism development in Tangkahan can contribute to the preservation of the physical environment, especially in maintaining water quality, air quality, vegetation preservation, and natural landscape integrity. In addition, this study aims to identify various obstacles that arise in the ecotourism development process, especially challenges that risk the sustainability of the region's environmental conditions. This study also analyzes the implementation of effective management strategies so that ecotourism development remains consistent with the principles of conservation and sustainable development.

This study uses a qualitative descriptive approach. According to the explanation, qualitative descriptive research aims to describe certain conditions or phenomena in detail by emphasizing the understanding of data obtained through interviews, observations, and documents. The research was conducted in the Tangkahan ecotourism area, Langkat Regency, North Sumatra Province. The data source of this research was taken based on primary data in the form of field observations, in-depth interviews with the Chairman of LPT (Tangkahan Tourism Institute), Pokdarwis (Tourism Awareness Group), HPI (Indonesian Tourist Guides Association), domestic tourists, and foreign tourists and based on secondary data in the form of literature studies from books, journals, research reports and articles related to ecotourism in Tangkahan. The data collection techniques in this study are in the form of direct observation of the physical environmental conditions and tourism activities in the Tangkahan area, and semi-structured interviews with the main resource persons (Miles & Saldana, 2014).

The data analysis technique in this study is carried out through three stages, namely data reduction, data presentation, and conclusion drawn. Data reduction is the process of selecting, focusing, and grouping data obtained from observations and interviews according to the research objectives. At this stage, the data is classified into categories such as potential, challenges, and management strategies to keep the information analyzed relevant. Furthermore, the presentation of data is carried out by compiling the results of the grouping in the form of a structured descriptive description. This preparation aims to clarify the relationship between findings and facilitate understanding of the research results. The final stage is drawing conclusions, which is formulating the main findings based on the results of the analysis that has been carried out. The conclusions were prepared by paying attention to the relationship between the data so as to provide a comprehensive picture in accordance with the purpose of the research.

RESULT AND DISCUSSION

Tangkahan, which is located in the Mount Leuser National Park (TNGL) area, has great potential in supporting aspects of the physical environment through the development of ecotourism. One of its main potentials is its high biodiversity, including the existence of rare species such as Sumatran elephants, tigers, and various endemic bird species. The natural environment that is still beautiful, such as tropical rainforests, clear rivers, waterfalls, and natural trekking trails are the main attractions for tourists looking for a conservation-based tourism experience (Febrianti et al., 2022).



Figure 1. Clear river flowing in Tangkahan
Source: Personal Documentation (2025)



Figure 2. The appearance of one of the famous fauna in Tangkahan, the Sumatran Elephant
Source: Personal Documentation (2025)

Tangkahan has a clean river flow and minimal pollution, which is one of the main charms for tourists. This good quality water not only allows for a variety of natural tourism activities such as swimming, tubing, and river exploration, but also shows that the ecosystem in this region is still in a healthy condition. The absence of industrial activities and conservation efforts from the local community and the management team also play a role in maintaining water clarity and quality in this area.

Geographically, Tangkahan is surrounded by lush tropical rainforests. The existence of this dense vegetation is very effective in filtering the air from pollutants and producing abundant oxygen, making the air in Tangkahan feel cool, clean, and refreshing. This condition provides added value for tourists who want a pure and healthy natural atmosphere. Thus, the maintenance of air and water quality in Tangkahan shows success in managing aspects of the physical environment, as well as being an important pillar in encouraging sustainable ecotourism growth in this region.



Figure 3. Tropical rainforest in Tangkahan
Source: Personal Documentation (2025)

This potential is strengthened by the active involvement of local communities in the management of tourist areas through the Tangkahan Tourism Institute (LPT), which reflects the principles of community-based ecotourism. The active role of this community not only improves the local economy, but also strengthens environmental conservation efforts through forest monitoring, waste management, and environmental education to visitors (Regina & Butarbutar, 2021).

However, behind this great potential, there are a number of challenges that have a direct impact on the physical environment. The first challenge is the limited infrastructure, including difficult road access, damaged bridges, lack of public facilities such as information boards and security posts, and limited electricity and communication networks. This makes it difficult for tourists to access and can limit the sustainable growth of the tourism sector. The second challenge is the low promotion and marketing which causes Tangkahan to not be widely known in the national and international arena. This lack of promotion contributes to the low number of visits (Yusnikusumah & Sulistyawati, 2016).



Figure 4. Road access to Tangkahan is still not good.
Source: Personal Documentation (2025)

To overcome challenges and optimize existing potential, it is necessary to implement a comprehensive and integrated strategy. The first step that needs to be taken is to strengthen the capacity of local institutions, where the empowerment of institutions such as the Tangkahan Tourism Institute (LPT) is very important so that the community has adequate knowledge, skills, and authority in managing tourism in a sustainable manner. This can be realized through continuous training in the fields of tourism management, environmental conservation, and services to tourists (Ginting Yosia et al., 2010).

Furthermore, improving infrastructure is also a priority, with a focus on providing decent road access, as well as clean, comfortable, and affordable public facilities for all groups. The success of this strategy certainly requires multi-stakeholder collaboration, namely synergy between communities, local governments, non-governmental organizations (NGOs), academics, and the private sector to formulate and implement policies that favor environmental sustainability and the welfare of local communities (Siregar, 2022).

In addition, environmental education to tourists must continue to be improved so that they understand and appreciate conservation values, so as not to take actions that are detrimental to nature (Sandy, 2022). On the other hand, the promotion of sustainable tourism needs to be expanded through the use of social media, cooperation with travel agents, and active participation in various tourism exhibitions both at the national and international levels to attract tourists who care about sustainability and environmental conservation (Abbas Yunus, n.d.).

The results of this study are in line with the findings of several previous studies that highlight the importance of managing aspects of the physical environment as the foundation of ecotourism success. For example, Fandeli (2002) and Kusumaningrum (2016) emphasized that the preservation of the physical environment, which includes habitat conditions, air and water quality, and the availability of supporting infrastructure are key factors in supporting sustainable ecotourism development. In the context of Tangkahan, the discovery of the potential of the physical environment that is still well maintained strengthens this argument.

CONCLUSION

Tangkahan as part of the Mount Leuser National Park area has great potential in supporting the development of ecotourism based on physical environmental conservation. Beautiful natural

beauty, such as tropical rainforests, clear rivers, and high biodiversity, are the main attractions that are able to present a conservation-based tourism experience. The success of physical environment management, especially water and air quality that is maintained, is also inseparable from the active role of local communities through community-based tourism institutions that contribute to the preservation and empowerment of the local economy.

However, there are significant challenges such as limited infrastructure and low promotion that hinder the optimal development of ecotourism. To address this, strategies are needed that include strengthening local institutional capacity, improving facilities and accessibility, environmental education for tourists, and multi-stakeholder collaboration in area management. Thus, the development of ecotourism in Tangkahan can continue to run sustainably, maintaining the preservation of the physical environment, while improving the welfare of the local community and attracting tourists who care about nature conservation.

Suggestions for further research that can be developed from this study are in-depth studies to identify potential risks such as water pollution, vegetation damage, and animal habitat disturbance due to tourism activities, as well as formulate mitigation measures. In addition, further research can specifically examine the carrying capacity of the environment (carrying capacity) on the quality of soil, water, and vegetation due to the increase in the number of tourists, so that the management of visits can be more controlled.

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