



# **Strategies for Ecotourism Development at Puncak Tangke Tabu, Sempajaya Village, Berastagi, Karo Regency**

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## **Authors' contributions**

*This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.*

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## **ABSTRACT**

This study utilizes a qualitative descriptive approach with SWOT analysis to explore the development potential of Puncak Tangke Tabu, located in Sempajaya Village, Berastagi District, Karo Regency, as an ecotourism destination. The qualitative descriptive approach was chosen to capture the rich, contextual insights necessary for understanding the area's unique characteristics and development challenges. Data were collected through observation, interviews, and documentation. Findings indicate that while the site possesses strong natural and cultural appeal, such as pristine landscapes and active community involvement through the Rimba Merga Silima Cooperative, its growth is hindered by challenges like limited promotion, insufficient infrastructure,

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and low community awareness of ecotourism management. Strengths, such as its strategic location and tourist interest in nature-based attractions, can be leveraged to mitigate weaknesses and threats, including natural disasters and illegal fees. Strategic recommendations include implementing digital marketing campaigns to enhance visibility, improving accessibility and amenities to cater to diverse visitor needs, and fostering stakeholder collaboration to ensure sustainable development. Specific policy implications involve the need for government support in regulating tourism practices, providing funding for infrastructure development, and incentivizing community participation in tourism management. With effective implementation of these strategies, Puncak Tangke Tabu can serve as a model for community-based ecotourism in Indonesia, promoting environmental conservation, local cultural preservation, and economic empowerment of the local community.

**Keywords:** *Ecotourism; SWOT analysis; tourism development; Puncak Tangke Tabu; Sempajaya village.*

## 1. INTRODUCTION

Ecotourism has emerged as a tourism development approach integrating environmental conservation, local culture, and community welfare. As a nation rich in natural and cultural wealth, Indonesia holds great potential to develop ecotourism as a strategy for environmentally based economic growth (Samal & Dash, 2023). Puncak Tangke Tabu, located in Sempajaya Village, Berastagi District, Karo Regency, is one such strategic location for development. This area offers breathtaking natural panoramas, biodiversity, and unique local cultural heritage (Utomo et al., 2024). With the right approach, it can become a leading ecotourism destination.

Situated within the Bukit Barisan Forest Park, Puncak Tangke Tabu encompasses tropical forests, waterfalls, and scenic mountains, making it an ideal site for ecotourism development. Moreover, the local community's strong cultural heritage serves as an additional attraction for tourists (LPM, 2024).

However, the development of ecotourism in this area faces several challenges, including limited infrastructure, insufficient promotion, and low community awareness of sustainable tourism management (Ritonga et al., 2024; Effendi et al., 2022). Additionally, conflicts often arise between environmental conservation and short-term economic needs (Wang & Lee, 2021). Therefore, strategies focusing on sustainability and stakeholder involvement are needed.

The success of ecotourism development requires close collaboration among the government, local communities, and the private sector. The government plays a crucial role in creating

regulations supporting sustainable ecotourism (The tourism institute, 2022; Ministry of culture, arts, and tourism, 2021; Springer, 2023). Meanwhile, local communities need empowerment through training and active participation in tourism. Community involvement can enhance a sense of ownership and sustainability in area management.

The development of ecotourism at Puncak Tangke Tabu can be guided by the 4ASC concept (Attraction, Accessibility, Amenities, Ancillary, Safety, and Comfort) (Zakia, 2020). These elements encompass tourist attractions, accessibility, supporting facilities, safety, and visitor comfort. Applying this concept can attract more tourists while preserving the environment (Dalimunthe & Indriany, 2023).

Ecotourism development at Puncak Tangke Tabu has the potential to improve local community welfare. By creating jobs, increasing income, and promoting local products, ecotourism can become a driving force for regional economic growth. This aligns with previous studies demonstrating the success of similar models in other areas.

Experiences from other regions in Indonesia, such as Kertomulyo Mangrove and Kinarum Village, show that ecotourism success heavily depends on synergy among the government, communities, and private sectors (Lubis et al., 2024). Community-based management, effective promotion, and adequate infrastructure are key factors in sustainable ecotourism development.

This section provides the background, potential, challenges, and strategic approaches to ecotourism development at Puncak Tangke Tabu. Previous research serves as a reference

for formulating applicable and relevant. With this approach, the study aims to contribute to sustainable tourism development in Karo Regency.

The study aims to analyze the ecotourism potential of Puncak Tangke Tabu and formulate its development strategies. By adopting a sustainability-based approach, this research is expected to provide strategic recommendations for competitive tourism development at national and international levels.

## 2. RESEARCH METHODOLOGY

### 2.1 Research Location

This study was conducted at Puncak Tangke Tabu, located in Sempajaya Village, Berastagi District, Karo Regency. Sempajaya Village is an administrative area in Berastagi District with significant potential for ecotourism development. The research site was selected due to its unique natural environment and local wisdom, aligning with the objectives of this study.

### 2.2 Conceptual Framework

The 4ASC model (Attraction, Accessibility, Amenities, Ancillary, Safety, and Comfort) provides a foundational framework for analyzing the development potential of Puncak Tangke Tabu as an ecotourism destination. In this study, each component is critically examined to demonstrate its interrelation and relevance:

- **Attraction:** Highlights the area's natural beauty, cultural heritage, and engaging activities such as flying fox rides and outbound activities.
- **Accessibility:** Evaluates the ease of access to the site and identifies areas for improvement, such as pathways for disabled visitors.
- **Amenities:** Reviews existing facilities, including food stalls and rest areas, while suggesting the addition of clinics, souvenir shops, and other supportive infrastructure.
- **Ancillary:** Discusses the role of the Rimba Merga Silima Cooperative in managing and promoting the site, emphasizing the need for digital marketing and professional development.
- **Safety:** Identifies existing safety measures and proposes enhancements like emergency facilities and security personnel.

- **Comfort:** Explores ways to enhance visitor experience through infrastructure upgrades, cleanliness, and inclusivity.

This framework ensures a holistic understanding of the area's potential and guides the strategic recommendations provided.

### 2.3 Research Informants

The informants were selected using a purposive sampling technique, a method that identifies participants based on specific criteria relevant to the research. The informants consisted of:

1. The head of the Rimba Forest Farmers Cooperative.
2. Five members of the Rimba Forest Farmers Cooperative.
3. Ten residents of Sempajaya Village living within a 2 km radius of Puncak Tangke Tabu.
4. Fifteen visitors present at the site during field observations.

### 2.4 Types and Sources of Data

This study utilized qualitative data from two primary sources:

1. **Primary data:** Collected directly from the field through observation, interviews, and questionnaires. This data includes the perceptions, aspirations, and participation of local residents and visitors.
2. **Secondary data:** Gathered from official documents, reports, books, and relevant publications. Secondary sources include government records, village archives, and social media related to the study area.

### 2.5 Data Collection Methods

1. **Observation:** Direct observation was conducted to gather information about activities, natural conditions, and social interactions in and around Puncak Tangke Tabu.
2. **Interviews:** In-depth interviews were carried out with informants to explore the potential and challenges of ecotourism development.
3. **Documentation:** This involved collecting documents, photographs, and archives relevant to the management of ecotourism in the study area.

## 2.6 Data Validity

To ensure credibility, the study employed data triangulation through multiple sources and methods. Observations were corroborated with interviews and documentation, allowing for cross-verification of findings. For instance, community insights gathered from interviews were compared with observed activities and relevant documents to validate their consistency. The integration of these sources enhances the reliability and depth of the analysis.

## 2.7 Data Analysis Methods

### 1. Qualitative descriptive analysis:

- Used to analyze observational and interview data.
- Aimed at providing an in-depth description of the ecotourism potential at Puncak Tangke Tabu.

2. **SWOT analysis:** The SWOT analysis is integrated with broader ecotourism theories and comparative studies. Successful case studies, such as Kertomulyo Mangrove and Kinarum Village, are referenced to draw parallels and derive actionable insights. For example, the role of community-based management and effective digital promotion in these destinations informs the strategies proposed for Puncak Tangke Tabu.

- Compared internal factors (strengths and weaknesses) with external factors (opportunities and threats).
- The analysis was mapped into four quadrants to determine appropriate strategies:

- **Quadrant 1:** Supports aggressive strategies.
- **Quadrant 2:** Optimizes internal strengths to leverage opportunities.
- **Quadrant 3:** Minimizes internal weaknesses to capitalize on opportunities.
- **Quadrant 4:** Addresses external threats by mitigating internal weaknesses.

## 2.8 Operational Definitions

1. **Tourism potential:** Refers to the natural and cultural attractions in the Bukit Barisan Forest Park, such as scenic beauty and local cultural heritage.

2. **Development of facilities and infrastructure:** The process of improving amenities supporting tourism activities, including accessibility and infrastructure.

3. **Attraction:** Tourist draws encompassing natural beauty, local cultural traditions, and unique tourism activities.

4. **Accessibility:** Ease of access to tourism sites, including road and transportation infrastructure.

5. **Amenity:** Supporting facilities such as accommodations, restaurants, souvenir shops, and healthcare services.

6. **Ancillary:** Organizations or groups managing and supporting the sustainability of the tourism destination.

7. **Safeness:** Measures to protect tourists from physical or criminal threats.

8. **Comfort:** Environmental conditions supporting tourist comfort, including cleanliness, tranquility, and aesthetics.

This methodology is designed to produce applicable and sustainable ecotourism development strategies, delivering both economic and ecological benefits to local communities and the tourism area.

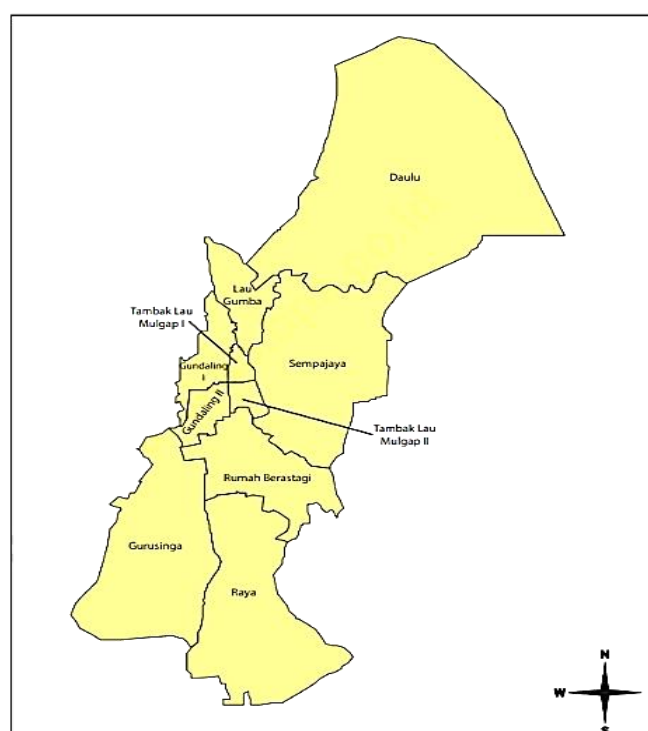
## 3. RESULTS AND DISCUSSION

### 3.1 Results

**General overview of the research location:** Sempajaya Village is located in Berastagi District, Karo Regency, North Sumatra. Covering an area of 5.12 km<sup>2</sup>, the village is divided into nine hamlets. Sempajaya Village is categorized as a *Swakarya* Village, indicating its capability to innovate and create added value from its local resources. This potential plays a significant role in supporting the development of Puncak Tangke Tabu as an ecotourism-based destination.

**Population overview:** The total population of Sempajaya Village in 2023 was 6,489 people, with a balanced gender ratio. The village is one of the most populous in Berastagi District, providing a substantial labor force to support tourism-related activities and developments.

**Healthcare facilities:** Sempajaya Village is equipped with one *poskesdes* (village health post) and six *posyandu* (integrated health posts). However, advanced healthcare services such as public health centers (*puskesmas*) and hospitals are available only in neighboring villages. This limitation in healthcare access is a crucial area for improvement, especially considering the potential influx of tourists.



**Fig. 1. Map of Berastagi district**

Source: Berastagi district in numbers, 2024

**Table 1. Population distribution by gender in Berastagi district, 2023**

No.	Village	Male Population	Female Population	Total Population
1	Gurusinga	2,820	2,879	5,699
2	Raya	3,147	3,068	6,215
3	Rumah Berastagi	5,191	5,122	10,313
4	Tambak Lau Mulgap II	1,300	1,354	2,654
5	Gundaling II	2,381	2,416	4,797
6	Gundaling I	3,760	3,793	7,553
7	Tambak Lau Mulgap I	1,083	1,082	2,165
8	Sempajaya	3,206	3,283	6,489
9	Doulu	1,166	1,091	2,257
10	Lau Gumba	706	684	1,390
<b>Berastagi</b>		<b>24,760</b>	<b>24,772</b>	<b>49,532</b>

Source: Berastagi district in numbers, 2024

**Table 2. Healthcare facilities by village in Berastagi district, 2023**

No.	Village	Hospital	Health Center	Pustu	Poskesdes	Posyandu
1	Gurusinga	0	1	1	2	4
2	Raya	2	0	0	3	3
3	Rumah Berastagi	0	0	0	4	8
4	Tambak Lau Mulgap II	0	0	1	0	2
5	Gundaling II	0	0	0	1	3
6	Gundaling I	0	1	0	1	6
7	Tambak Lau Mulgap I	0	0	0	1	3
8	Sempajaya	0	0	0	1	6
9	Doulu	0	0	2	2	2
10	Lau Gumba	0	0	1	1	1
<b>Berastagi</b>		<b>2</b>	<b>2</b>	<b>5</b>	<b>16</b>	<b>38</b>

Source: Berastagi district in numbers, 2024



**Fig. 2. Flying fox attraction at Puncak Tangke Tabu**  
Source: Field documentation, 2024



**Fig. 3. Outbound activities at Puncak Tangke Tabu**  
Source: Field documentation, 2024

**Table 3. Details of costs and facilities for the camping ground**

No.	Cost	Facilities
1	Rp. 150,000 (tent rental)	<ul style="list-style-type: none"> <li>• Tent for 4-5 people</li> <li>• 3 mattresses</li> <li>• 2 sleeping bags</li> <li>• Entrance ticket to the tourist site</li> <li>• Toilet</li> </ul>
2	Rp. 50,000 (site rental)	<ul style="list-style-type: none"> <li>• Entrance ticket</li> <li>• Parking</li> <li>• Toilet</li> </ul>

Source: Field documentation, 2024



**Attraction:** Puncak Tangke Tabu provides unique attractions such as flying fox rides, outbound activities, photo spots, and treehouses. These features are well-suited to the ecotourism concept and present opportunities for educational and cultural tourism elements.

**Accessibility:** The accessibility to Puncak Tangke Tabu is facilitated by asphalted roads, directional signage, and its location on Google

Maps. However, further enhancements are needed, such as pathways for disabled visitors, a central information center, and improved signage durability.

**Amenity:** Current amenities include food stalls, prayer facilities, and clean toilets. Opportunities for development include the addition of souvenir shops, healthcare clinics, and accommodation options tailored to elderly visitors.



**Fig. 4. Food Stall at Puncak Tangke Tabu**

*Source: Field documentation, 2024*



**Fig. 5. Resting huts at Puncak Tangke Tabu**

*Source: Field documentation, 2024*



**Fig. 6. Rimba Merga Silima cooperative team**  
Source: Field documentation, 2024



**Fig. 7. Clean environment at Puncak Tangke Tabu**  
Source: Field documentation, 2024

**Table 4. Summary of EFAS (External factor analysis system) SWOT analysis**

Factor	Description
<b>Opportunities</b>	<ul style="list-style-type: none"> <li>- Developing ecotourism at Puncak Tangke Tabu introduces a new tourism attraction in the Berastagi area, creating opportunities to attract more visitors.</li> <li>- Widespread use of gadgets and active social media users can ease the promotion of Puncak Tangke Tabu's tourism products.</li> <li>- Proximity to universities offers opportunities for tourism managers to gain business insights from university students through internship programs.</li> </ul>
<b>Threats</b>	<ul style="list-style-type: none"> <li>- Frequent natural disasters such as landslides.</li> <li>- Illegal levies (<i>pungli</i>).</li> <li>- Erosion of local wisdom and cultural heritage.</li> </ul>

Source: Research findings, 2024



**Ancillary:** Management by the Rimba Merga Silima Cooperative has contributed to the organized development of Puncak Tangke Tabu. Expanding the cooperative's reach through content creators and digital marketing strategies could significantly boost its promotional efforts.

**Safeness:** The site provides basic safety features, such as fences and first aid kits. Enhancing these features by using more durable materials, appointing security personnel, and installing sanitation facilities like hand sanitizers can further ensure visitor safety.

**Comfort:** Visitors currently benefit from a clean and tranquil environment. Additional efforts to upgrade infrastructure, such as repairing food stall roofs and improving children's play areas, will enhance the overall comfort of tourists.

**Ecotourism development strategies:** Based on the SWOT analysis, the proposed strategies focus on improving human resources, digital promotion, waste management, and enhancing safety and comfort for visitors.

#### Proposed Development Strategies:

##### 1. Strength-opportunity (SO) strategies:

- Leverage the expansive area of Puncak Tangke Tabu to develop additional attractions such as educational and cultural activities, including bee harvesting tours and cultural performances.
- Utilize the Rimba Merga Silima Cooperative to support sustainable and technologically advanced promotional strategies.

##### 2. Weakness-opportunity (WO) strategies:

- Partner with nearby universities to engage students in internships, providing knowledge transfer and skill development to local human resources.
- Form technology-savvy tourism awareness groups (*kelompok sadar wisata*).
- Secure funding from external donors, government grants, or private partnerships to support development efforts.

##### 3. Strength-threat (ST) strategies:

- Collaborate with the government to establish robust disaster mitigation plans to address frequent landslides.

- Enhance training programs for local human resources to preserve and promote local cultural wisdom.

##### 4. Weakness-threat (WT) strategies:

- Conduct regular training sessions and workshops to improve local management skills in ecotourism development.
- Establish and enforce policies to safeguard local cultural practices and provide penalties for violations that harm cultural integrity.

These strategies aim to capitalize on strengths and opportunities while addressing weaknesses and mitigating potential threats, ensuring sustainable and impactful ecotourism development at Puncak Tangke Tabu.

### 3.2 Discussion

Sempajaya Village has geographical advantages and natural resources that support the development of ecotourism. With a total area of 5.12 km<sup>2</sup> and a population of 6,489, the village is strengthened by an innovative community capable of managing local resources. Puncak Tangke Tabu, as one of the key tourist attractions in the village, offers natural attractions and supporting facilities aligned with the ecotourism concept.

The 4ASC framework is a critical tool for analyzing the potential and limitations of Puncak Tangke Tabu. In the aspect of attraction, the site boasts engaging features like flying fox rides and outbound activities, which can enhance its appeal to visitors. However, additional facilities such as cultural and educational attractions, like honey harvesting tours or horseback riding, need to be developed. These would enrich the visitor experience and highlight the ecotourism value of the destination.

While the accessibility to Puncak Tangke Tabu is already sufficient, certain facilities are not yet inclusive for elderly and disabled visitors. The construction of disability-friendly pathways and the provision of wheelchairs are essential to increase inclusivity. Furthermore, professional signage and clear area maps would assist visitors in navigating the destination more effectively.

Supporting facilities, including food stalls, huts, and an assembly hall, are adequate but not yet optimized. Adding amenities like clinics, souvenir

shops, and small villas can improve visitor comfort while supporting the local economy. The introduction of cashless payment systems, such as QRIS, aligns with the growing preference of tourists for digital payment convenience.

The presence of the Rimba Merga Silima Cooperative as the managing body reflects local commitment to maintaining the ecological integrity of the destination. However, this role needs to be supported by digital marketing strategies and professional content creation to enhance tourism promotion. Collaborations with educational institutions could also improve the capacity of human resources in ecotourism management.

Currently, the safety measures at Puncak Tangke Tabu require significant improvement, especially in high-risk areas such as photo spots without barriers. Employing trained security personnel and establishing emergency facilities, such as a small clinic and first aid stations, would enhance visitor safety and confidence.

The clean and lush environment of Puncak Tangke Tabu provides a basic level of comfort for tourists. However, certain aspects, such as modernizing the assembly hall, improving the safety and appeal of children's play areas, and adding waiting chairs for parents, need to be addressed to enhance the overall visitor experience. Comfort is a vital factor in maintaining tourist loyalty and ensuring repeat visits.

The SWOT analysis highlights Puncak Tangke Tabu's primary strengths, including its natural beauty and the potential for community-led management. However, weaknesses such as limited promotion and insufficient human resource capacity pose challenges that must be addressed. Opportunities, such as the growing interest in ecotourism and advancements in digital technology, can be leveraged to expand the destination's market.

Based on the SWOT analysis, proposed strategies include human resource training, collaborations with educational institutions, and aggressive digital promotion. Additional strategies involve improving disability-friendly infrastructure, better waste management, and educating the community about ecotourism. Synergy among the government, managers, and the community is crucial to implementing these strategies successfully.

The development of ecotourism at Puncak Tangke Tabu not only contributes to the local economy but also supports environmental and cultural preservation. By integrating educational, social, and cultural aspects, the destination has the potential to become a sustainable ecotourism model in Indonesia. With a holistic and ecotourism-based management approach, Puncak Tangke Tabu could emerge as a leading tourism destination.

#### **4. CONCLUSION AND RECOMMENDATIONS**

Puncak Tangke Tabu in Sempajaya Village possesses substantial potential to emerge as a premier ecotourism destination in North Sumatra. Its pristine natural beauty, engaging attractions, and the active involvement of the local community through the Rimba Merga Silima Cooperative provide a solid foundation for sustainable tourism development. However, to realize this potential, attention must be directed toward improving infrastructure, supporting facilities, digital promotion, and human resource capacity-building to overcome existing challenges. With collaboration between the government, local community, and management, Puncak Tangke Tabu can serve as a model of ecotourism that emphasizes environmental preservation, cultural conservation, and local economic empowerment.

To maximize this potential, it is recommended that management enhances digital promotion efforts through social media platforms to increase visibility and attract diverse visitors. Collaborating with educational institutions to improve local human resources' skills in tourism management is equally critical. Developing inclusive infrastructure, such as wheelchair-accessible paths and facilities, is essential to accommodate all visitors. Moreover, local government support through enabling regulations and funding for the development of key facilities like clinics, souvenir shops, and mini villas can significantly boost the destination's appeal. By integrating sustainable practices, fostering waste management systems, and raising community awareness about ecotourism principles, Puncak Tangke Tabu can establish itself as a competitive and sustainable tourism destination that contributes to environmental preservation, cultural enrichment, and local economic growth.

## DISCLAIMER (ARTIFICIAL INTELLIGENCE)

Author(s) hereby declare that NO generative AI technologies such as Large Language Models (ChatGPT, COPILOT, etc.) and text-to-image generators have been used during the writing or editing of this manuscript.

## COMPETING INTERESTS

Authors have declared that no competing interests exist.

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