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STRATEGIES FOR DEVELOPING MARINE ECOTOURISM BASED ON TURTLE CONSERVATION IN PEKIK NYARING VILLAGE, CENTRAL BENGKULU REGENCY

Sutrisman Amei Jaya[1], Abdul Kohar Muzakir[2]*
[1]Master of Fisheries Management, Universitas Terbuka
[2]Department of Capture Fisheries, Faculty of Fisheries and Marine Sciences, Universitas Diponegoro
Corresponding author, e-mail*:* akohmud@gmail.com

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ABSTRACT

The conservation of turtles in Pekik Nyaring Village presents a unique opportunity to develop marine ecotourism, significantly enhancing local socio-economic conditions. This research aims to evaluate socio-economic aspects, assess community participation and roles, and identify strategies to advance turtle conservation-based ecotourism in the village. Using descriptive, qualitative, and quantitative methods, including questionnaires, the study focuses on the 4,162 residents of Pekik Nyaring Village, with a sample of 30 respondents. Primary and secondary data sources will be utilized, and a SWOT analysis will be conducted. The SWOT analysis indicates that the development of turtle conservation ecotourism in Pekik Nyaring falls into the WO (Weaknesses-Opportunities) quadrant. Recommended actions include establishing effective coordination between turtle conservation managers and the local government, strengthening community institutions involved in conservation efforts, and leveraging mass media to promote turtle conservation ecotourism through social media and dedicated websites. These strategies aim to inform tourists about ongoing developments and enhance the visibility of turtle conservation efforts in Pekik Nyaring Village.

Keywords: ***:*** turtle conservation, marine ecotourism, socio-economic development, SWOT analysis, central bengkulu.

INTRODUCTION

Turtles, especially the green turtle (*Chelonia mydas*), are vital marine reptiles known for their unique biological features and extended lifespan. Their shells serve as defense mechanisms, protecting their heads and limbs from predators. Turtles cannot fully retract their heads and limbs into their shells, unlike tortoises. Green turtles inhabit warm marine environments, living, feeding, and resting exclusively in water. Their diet primarily includes jellyfish, crabs, small fish, and shrimp (González Carman et al., 2014). Green turtles have significant longevity, and belong to the *Chelonidae* family. They are found in tropical and subtropical seas worldwide, particularly in the Atlantic and Pacific Oceans. The name "green turtle" is derived from the greenish color of their body fat beneath the shell. Juvenile green turtles have black dorsal carapaces, which turn brown with yellowish radiating streaks as they mature (Prihanta, 2007).

Despite their long lifespan, green turtles risk extinction due to human intervention, natural predators, environmental changes, and internal population factors. Conserving turtles is a global responsibility, requiring international community efforts to ensure survival (Juliono, 2017). Currently, many green turtles fall victim to bycatch in fishing nets. Natural threats include coastal erosion and beach abrasion, which affect their nesting grounds. Predators such as monitor lizards and crabs prey on turtle eggs and hatchlings on the beaches (Mortimer et al., 2020). Adult turtles are also at risk from predators like sharks and whales. Consequently, out of approximately 100 eggs laid, only about two hatchlings survive adulthood and return to the beaches to nest (Guntoro, 2009).

One significant breeding ground for green turtles in Indonesia is Berhala Island, located in the Malacca Strait, Tanjung Beringin Subdistrict, Serdang Bedagai Regency, North Sumatra Province. Berhala Island spans 14.75 hectares and remains relatively untouched by humans, providing an ideal habitat for green turtles to thrive and reproduce. This site offers an excellent opportunity for educational videos about green turtle conservation, documenting the process from nesting to the return of hatchlings to the sea.

Marine tourism involves coastal and aquatic activities, including land and water-based activities. This form of tourism, an extension of traditional tourism, aims to preserve coastal and marine human assets (Indarjo, 2014). Specializing in marine tourism around unique coastal elements, such as turtle nesting or protection sites, provides benefits such as educational tools and conservation efforts. Visitors can enjoy the scenery, learn about conservation, and participate in efforts to protect turtle populations. These experiences create lasting memories for tourists (Alfinda, 2017).

Turtle habitats play a crucial role in maintaining the balance of seagrass beds, which provide nutrients to marine ecosystems and support diverse fish populations. Despite the high number of eggs female turtles lay, only a few hatchlings survive to adulthood due to natural predation and human activities. By grazing on seagrass, turtles help manage seagrass biomass, preventing sediment anoxia formation and promoting seagrass health. This interaction is essential for seagrass meadows' overall stability and productivity, which support diverse marine life and act as significant carbon sinks (Heithaus et al., 2014).

Ecotourism is an environmentally responsible form of

tourism that prioritizes nature conservation, economic empowerment, and socio-cultural education of local communities. Central Bengkulu Regency is actively promoting ecotourism, including turtle conservation programs. The turtle conservation center in Pekik Nyaring Village is part of these efforts to preserve marine resources. Visitors to the ecotourism area in Pekik Nyaring can witness turtle conservation efforts, enjoy the coastal scenery, and explore the extensive pine forests. In addition to turtle conservation, the Central Bengkulu Regency Government has implemented plans to develop the ecotourism area to strengthen the local economy. Successful ecotourism projects often involve local communities in decision-making processes, ensuring that the benefits of tourism are equitably distributed and contribute to the area's sustainable development (Giriwati et al., 2019). However, despite its potential as an attractive ecotourism destination, the sustainable development of turtle conservation-based ecotourism in this area must be improved. Factors such as limited local understanding of turtle conservation importance, illegal hunting and trade, and inadequate facilities and resources hinder ecotourism development in Pekik Nyaring.

This study aims to evaluate and formulate strategies for developing turtle conservation-based eco-tourism in Pekik Nyaring Village. The research employs field surveys, interviews with stakeholders (local community, eco-tourism managers, and authorities), and qualitative and quantitative data analysis. The goal is to provide relevant recommendations for the sustainable development of eco-tourism and turtle conservation in Pekik Nyaring Village.

The expected outcome of this research is to foster economic benefits for the local community, raise awareness about the importance of turtle conservation, reduce illegal hunting, and strengthen protection efforts for these vital marine species. By implementing the right strategies, marine eco-tourism in Pekik Nyaring Village can contribute to the local economy and enhance understanding and preservation of turtle populations.

RESEARCH METHODS

This research employed a field study approach, focusing on observing phenomena under scientific conditions at the research site. The study utilized a qualitative paradigm to generate descriptive data through observable individuals' written and spoken expressions. The researcher conducted direct field visits to Pekik Nyaring Village to investigate various challenges comprehensively. Observations focused on all ecotourism activities, particularly those managed by the turtle conservation ecotourism project.

Research Location

The study is conducted at the Turtle Conservation Ecotourism Area in Pekik Nyaring Village, Pekik Nyaring Subdistrict, Central Bengkulu Regency. This location was chosen because it represents the first active turtle conservation ecotourism initiative in Bengkulu province, managed by the Alun Utara Turtle Conservation Group.

Data Sources

Data represents a unit of information that can be recorded, evaluated, and associated with a specific context. The data sources for this study include subjects from which data can be collected. Based on the sources, research data is categorized into primary and secondary data.

1. Primary Data

Primary data sources involve direct observations in Pekik Nyaring Village, Pondok Kelapa Subdistrict, including interviews with 30 respondents or research subjects. These subjects include the Head of Pekik Nyaring Village, Pondok Kelapa Subdistrict officials, relevant departments, local community members around the turtle conservation area, conservation observers (Alun Utara), and local visitors/tourists. The interviews will focus on the strategies used to develop the potential of turtle conservation ecotourism.

2. Secondary Data

Secondary data refers to information obtained from other sources rather than directly from the research subjects by the researcher. This type of data often includes existing documents or reports. In this study, secondary data is collected from records, books, journals, or previous theses that discuss strategies for developing the potential of turtle conservation ecotourism relevant to this study.

Research Instruments

The researcher utilizes questionnaires to collect information from respondents. These questionnaires consist of written questions allowing respondents to report their experiences or knowledge. This instrument is mainly targeted at the managers or observers of marine ecotourism (turtle conservation), specifically the Alun Utara community, which actively promotes turtle conservation activities on Pekik Nyaring Beach, Pondok Kelapa Subdistrict, Central Bengkulu Regency. The collected data will be analyzed and interpreted using a Likert scale, with each score value as follows:

a. Very Interesting: score 5
b. Interesting: score 4
c. Quite Interesting: score 3
d. Less Interesting: score 2
e. Not Interesting: Score 1

To assess the overall scores from the questionnaire distributed to several informants in this research, the following class intervals are established:

Table 1. Questionnaire Scores

Score Range	Category
30-54	Not interesting
55-79	Less interesting
80-104	Quite interesting
105-129	Interesting
130-150	Very interesting

Data Collection Procedure

In this research, three primary tools are employed for data collection: observation, interviews, and documentation. These methods are used exclusively within the framework of qualitative research methodology. The researcher utilizes the following methods to gather data:

1. Observation: This process requires careful and structured observation. In the context of this research, the observation method is conducted through narrative or descriptive presentations of the subjects' behavior in their natural environment. Observations are done by directly witnessing and recording phenomena around the Turtle

Conservation Ecotourism Area in Pekik Nyaring Village.

2. Interviews: The researcher interviews subjects or participants involved in the study. An open interview method allows informants to understand that they are being interviewed and the purpose behind the process. Structured questionnaires are used during these interviews. Participants include heads of households living around the research location, relevant institutional representatives, and visitors, who are interviewed comprehensively.
3. Documentation: The documentation method involves collecting data through relevant documents pertinent to the research topic. This process occurs in the Turtle Conservation Ecotourism Area in Pekik Nyaring Village, Pondok Kelapa Subdistrict, Central Bengkulu Regency. Documents such as Alun Utara conservation group profiles, village-related documents, and records of ecotourism activities are gathered. These documents cover various aspects related to the research focus.

Data Evaluation and Strategic Analysis

The study utilizes SWOT analysis with a mixed qualitative and quantitative approach to identify significant internal and external factors for strategy formulation. SWOT systematically identifies critical aspects, focusing on leveraging potential and minimizing challenges.

Internal and external factor analyses are conducted as initial steps to develop turtle conservation efforts through ecotourism in Pekik Nyaring Village. First, internal factor analysis aims to identify strengths and weaknesses that will impact the strategy for developing turtle conservation ecotourism in Pekik Nyaring Village, Pondok Kelapa, Central Bengkulu. Strengths include the natural tourist attractions, the prominent turtle biota, and the easily accessible location. Weaknesses include suboptimal community and local government involvement and deficiencies in road infrastructure.

Next, external factor analysis aims to identify opportunities and threats that can shape the strategy for developing turtle conservation ecotourism in Pekik Nyaring Village, Pondok Kelapa, Central Bengkulu. Opportunities encompass factors that can support the growth of turtle conservation ecotourism at the location. Threats include factors that can hinder the success of ecotourism development.

The next step in determining the appropriate strategic direction involves analyzing the business or institution's position using a quadrant approach. Comparing the internal and external factors scores results in alternative strategies based on their position in the quadrant. These four quadrants help in recognizing the company's situation:

1. Quadrant I: This situation is highly favorable as the company possesses internal strengths and external opportunities. In this condition, an aggressive growth strategy is suitable.
2. Quadrant II: The company has internal strengths that can be leveraged despite external threats. A diversification strategy might be suitable to utilize long-term opportunities.
3. Quadrant III: The company faces internal constraints despite significant market opportunities. The appropriate strategy might involve balancing opportunities and overcoming constraints.
4. Quadrant IV: This less favorable situation involves external threats and internal weaknesses. Actions are necessary to address these challenges.

With this approach, appropriate strategies can be formulated based on quadrant analysis, helping the organization address internal and external conditions more effectively. The SWOT analysis diagram can be illustrated as follows:

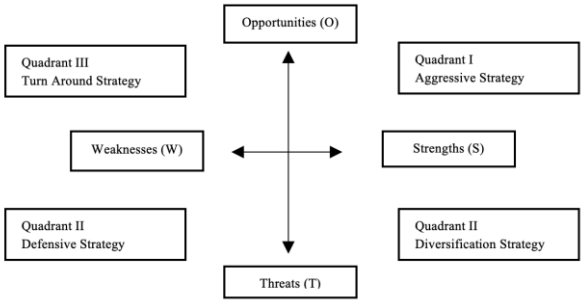

Figure 1. SWOT Diagram

After gathering crucial information about ecotourism development in Pekik Nyaring Village, the next step is to utilize this data for strategic planning. A detailed SWOT analysis requires a SWOT framework to support formulating various strategies by categorizing each aspect of the problem. This framework matrix serves as a tool to summarize the crucial factors of the project using SWOT principles. Through this, it becomes clearer how external opportunities and challenges the project faces can be integrated with existing internal strengths and weaknesses. From this matrix, four boxes emerge, containing various potential strategic options.

Table 2. SWOT Matrix

Internal Factors / **External Factors**	**Strengths (S)**	**Weaknesses (W)**
	Identify 5-10 internal strengths.	**Identify 5-10 internal weaknesses.**
Opportunities (O)	**S-O Strategies**	**W-O Strategies**
Identify 5-10 internal opportunities.	Identify strategies that use strengths to capitalize on opportunities	Identify strategies that minimize weaknesses to take advantage of opportunities.
Threats (T)	**S-T Strategies**	**W-T Strategies**
Identify 5-10 internal threats.	Identify strategies that use strengths to counter threats	Identify strategies that minimize weaknesses and avoid threats.

The priority of strategies is determined by summing the weighted values from the SWOT matrix. The strategy with the highest total value is prioritized.

RESULT AND DISCUSSION

The research findings indicate the strengths, weaknesses, opportunities, and threats (SWOT) related to the turtle conservation eco-tourism in Pekik Nyaring Village. The strengths and opportunities suggest significant potential, while the weaknesses and threats highlight areas for improvement.

Table 3. Summary of Strengths and Weaknesses Calculation Results (IFAS)

NO	Internal Factor	Weight	Rating	Score
Strengths				
1	The turtle conservation eco-tourism site in Pekik Nyaring Village is a prime attraction with beautiful marine natural tourism.	0.17	3.50	0.596
2	The area's attraction appeals to visitors of all ages.	0.16	3.37	0.551
3	The location is easily accessible.	0.16	3.37	0.551
Total		**0.50**		**1.698**
Weaknesses				
1	Government institutions are not focused on tourism development.	0.17	3.50	0.596
2	The cleanliness of the tourist site is not optimal.	0.17	3.43	0.573
3	Promotion of the tourist site is inadequate.	0.17	3.43	0.573
Total		0.50		**1.742**
	TOTAL IFAS	**1.0**		**3.440**

Source: Processed Primary Data, 2024

Table 4. Summary of Opportunities and Threats Calculation Results (EFAS)

NO	External Factor	Weight	Rating	Score
Opportunities				
1	Becoming a conservation and preservation site for various fauna, especially turtles.	0.17	3.40	0.562
2	There is high interest from local tourists who want to visit.	0.17	3.53	0.607
3	Potential for developing and preserving tourism by leveraging local community capabilities.	0.17	3.40	0.562
Total		**0.50**		**1.731**
Threats				
1	Presence of more attractive tourist destinations.	0.16	3.37	0.551
2	Declining interest from tourists.	0.16	3.37	0.551
3	Lack of awareness among tourists about maintaining the cleanliness of the tourist site.	0.17	3.50	0.596
Total		**0.50**		**1.698**
	TOTAL EFAS	**1**		**3.429**

Source: Processed Primary Data, 2024

The next step is to determine the quadrant coordinates after identifying the internal and external factors affecting the turtle conservation eco-tourism in Bengkulu Tengah Regency using the SWOT matrix. This involves summarizing the weighted scores and ratings from the Internal Factors Analysis Summary (IFAS) and External Factors Analysis Summary (EFAS). The coordinates are calculated by subtracting the total weakness score from the total strength score for IFAS and subtracting the total threat score from the total opportunity score for EFAS.

Internal Factors Analysis Summary (IFAS) : Strengths (S): 1.698; Weaknesses (W): 1.742.

X-axis Calculation: X-axis= Strengths−Weaknesses ; X-axis = 1.698−1.742; **X-axis = −0.044**

External Factors Analysis Summary (EFAS): Opportunities (O): 1.731; Threats (T): 1.698

Y-axis Calculation: Y-axis=Opportunities−Threats; Y-axis=1.731−1.698; **Y-axis=0.033**

The coordinates (-0.044, 0.033) fall into Quadrant III of the SWOT matrix, which suggests a **Turn Around Strategy**.

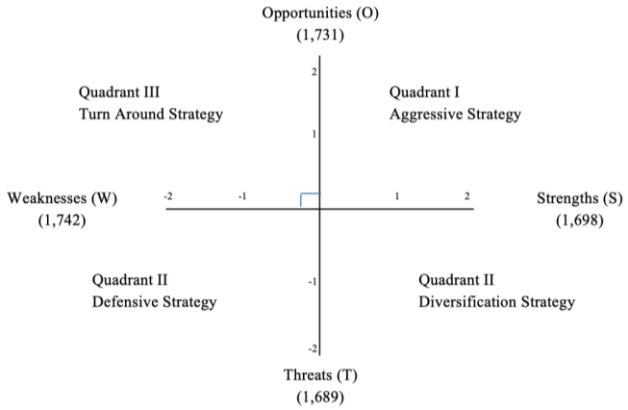

Figure 2. Cartesian SWOT Diagram

SWOT Analysis Result

Table 5. SWOT Analysis Result

Internal Factors	Strengths (S)	Weaknesses (W)
	1. The turtle conservation eco-tourism site in Pekik Nyaring Village is a prime attraction with beautiful marine natural tourism. **2. The area's attraction appeals to visitors of all ages.** **3. The location is easily accessible.**	1. **Government institutions are not focused on tourism development.** 2. **The cleanliness of the tourist site is not optimal.** 3. **Promotion of the tourist site is inadequate.**

External Factors		
Opportunities (O) **1. Becoming a conservation and preservation site for various fauna, especially turtles.** **2. High interest from local tourists who want to visit.** **3. Potential for developing and preserving tourism by leveraging local community capabilities.**	**Strategi S-O** 1. Explore the natural and artificial tourism potentials in Pekik Nyaring to enhance tourist appeal. 2. Develop tourism potential by arranging natural and artificial attractions. 3. Promote through electronic/mass media or exhibitions.	**Strategi W-O** 1. Establish good coordination and communication between turtle conservation managers and the local government. 2. Strengthen community institutions involved in conservation development. 3. Utilize mass media to increase promotion on social media or dedicated websites.
Threats (T) **1. The presence of more attractive tourist destinations.** **2. Declining interest from tourists.** **3. Lack of awareness among tourists about maintaining the cleanliness of the tourist site.**	**Strategi S-T** 1. Motivate community tourism businesses by providing capital or necessary equipment. 2. Improve management quality to face competition with other tourist attractions by offering discounts for turtle hatchling adoption/release.	**Strategi W-T** 1. Maximize supporting tourism infrastructure by improving roads, adding tree houses for research visitors, and providing parking areas. 2. Increase promotion to attract tourists and investors to overcome turtle conservation eco-tourism management funding limitations.

a. S-O Strategies

The S-O strategy leverages the organization's strengths to capitalize on available opportunities, supporting an aggressive growth-oriented strategy. Such strategies have been successfully implemented in Costa Rica, where regions like Monteverde and Tortuguero have seen significant increases in tourism by promoting ecological conservation and leveraging media exposure (Aylward et al., 1996; Harrison & Troëng, 2005).

Based on field research using survey techniques, alternative S-O strategies for developing turtle conservation in Pekik Nyaring Village include exploring the natural and artificial tourism potential to enhance tourist appeal, arranging tourism attractions, and promoting the site through electronic media and exhibitions at provincial and national levels. Strong promotion can increase tourist interest and provide information about turtle conservation developments in Pekik Nyaring. This example aligns with the proposed S-O strategy for turtle conservation in Pekik Nyaring Village.

b. S-T Strategies

Despite facing threats, the organization retains internal strengths. The strategy is to use these strengths to capitalize on long-term opportunities through diversification (products/markets). Based on field research using questionnaires, alternative S-T strategies for turtle conservation development in Pekik Nyaring include motivating community tourism businesses by providing capital or necessary equipment and optimizing accessibility to the tourist site. Improving management quality to compete with other tourist attractions by offering discounts for turtle hatchling adoption/release can also be effective.

According to a study by Khalid et al. (2019), community empowerment and support are critical for sustainable tourism development (STD). Their research highlights the importance of community involvement in tourism projects, emphasizing that empowered communities can effectively support and sustain tourism initiatives (Khalid et al., 2019). Similarly, a study by Darcy et al. (2010) discusses how accessible tourism and sustainability can be achieved through strategic community engagement and infrastructure improvements (Liberato et al., 2024).

Implementing these strategies can significantly enhance the local community's involvement in turtle conservation efforts, thereby creating a robust, sustainable tourism model that benefits both the environment and the local economy.

c. W-O Strategies

In this scenario, the organization faces significant opportunities but also internal weaknesses. According to field research using questionnaires, alternative W-O strategies for developing turtle conservation in Pekik Nyaring include establishing good coordination and communication between turtle conservation managers and the local government. This coordination should be conducted regularly, both formally and informally, to discuss developments. This study highlights the critical role of coordination and communication between conservation managers and local government for successful ecotourism development. This aligns with existing literature, such as Graci (2013), which emphasizes the importance of collaboration and partnerships in sustainable tourism. Graci's work supports this study's strategy of establishing regular, formal, and informal communication channels to enhance conservation and tourism management efforts (Graci, 2013).

Strengthening community institutions involved in turtle conservation development, such as the Community Empowerment Institution and Environmentalist Groups, is crucial. This aligns with Osman, Shaw, and Kenawy's (2018) study that underscores the necessity of stakeholder collaboration in ecotourism planning, reinforcing the recommendation for involving community institutions like the Community Empowerment Institution and Environmentalist Groups in conservation efforts (Osman et al., 2018). Their study highlights that regular and effective communication between stakeholders is essential for the success of ecotourism initiatives, echoing the strategies identified for addressing internal weaknesses and leveraging opportunities in Pekik Nyaring.

Additionally, utilizing mass media to increase promotion on social media or dedicated websites can keep tourists informed about turtle conservation eco-tourism developments in Pekik Nyaring.

d. W-T Strategies

Implementing defensive strategies for turtle conservation in Pekik Nyaring involves addressing internal weaknesses and mitigating external threats. This approach aligns with broader conservation efforts aimed at protecting sea turtle populations. For instance, improving supporting infrastructure, such as roads, tree houses for research visitors, and parking areas, is crucial for enhancing accessibility and facilitating tourism and research activities. Such improvements can significantly contribute to better management and conservation outcomes.

Moreover, increasing promotion to attract tourists and investors is essential for overcoming funding limitations in managing turtle conservation eco-tourism. Effective communication and marketing strategies can raise awareness and support for conservation initiatives. According to research, strategic infrastructure development and targeted promotion can significantly boost conservation efforts by enhancing site accessibility and increasing public engagement and financial support (National et al. Foundation, 2024).

The SWOT matrix analysis indicates that the urgent strategy for developing turtle conservation eco-tourism in Pekik Nyaring is the W-O strategy (Weaknesses-Opportunities). The recommended actions include establishing effective coordination and communication between turtle conservation managers and the local government, strengthening community institutions involved in turtle conservation, and utilizing mass media to enhance promotion on social media or dedicated websites. These efforts aim to ensure tourists are well-informed about the ongoing developments and information regarding turtle conservation eco-tourism in Pekik Nyaring.

CONCLUSION

The study on alternative strategies for developing turtle conservation in Pekik Nyaring Village reveals several key findings. Challenges in collaboration between management and the local community mark the village's current state of eco-tourism and turtle conservation. The community primarily focuses on economic aspects, while ecological and social aspects, crucial for sustainable development, receive less attention. This disparity leads to a significant gap between the goals of the management and the local community. Additionally, the research indicates that community participation in environmental conservation efforts is meager. The development of turtle conservation eco-tourism does not adequately involve the local community, with all activities managed by a turtle conservation observer community. This community handles tourist guidance and the provision of eco-tourism support materials.

The study suggests several strategies based on the W-O (Weaknesses-Opportunities) framework to address these issues. These include establishing good coordination and communication between turtle conservation managers and the local government, strengthening community institutions in developing turtle conservation, and utilizing mass media to enhance promotion on social media or dedicated websites to keep tourists informed about developments and information regarding turtle conservation eco-tourism.

Further recommendations emphasize the need for improved coordination and communication between turtle conservation managers, the local government, and the community to strengthen institutions involved in turtle conservation. Additionally, enhancing the management of turtle conservation tourism, particularly in planning and promotional activities, is essential. Increased collaboration between the government and the local community is necessary to implement tourism management programs, develop tourism products, and improve tourist attractions. The local government should also improve infrastructure and facilities supporting tourism management activities. Finally, it is crucial to empower the local community within the turtle conservation area by involving them in development activities, such as providing training for business and service skills and offering facilities to support community business activities.

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