



## The Development of Sustainable Ecotourism in the Biosphere Reserve of Meru Betiri National Park in Indonesia

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### Abstract

**Objectives:** Sustainable ecotourism development holds crucial impacts on global economic development, even the case in Indonesia which is renowned for its natural areas as tourism destinations.

**Methods:** This study aims to assess the potential of developing sustainable ecotourism in Meru Betiri National Park as a biosphere reserve, specifically delving into its potential environmental and cultural resources for ecotourism. The research integrates SWOT and DPSIR analysis to investigate the sustainable ecotourism model.

**Results:** The results analysis shows the internal factors (income, stakeholder policies, knowledge of biodiversity) and external factors (tourist carrying capacity, tourism policy, and human-environment spatial interaction) driving the development of ecotourism in the national park. DPSIR analysis has identified a sustainable ecotourism model. Participating stakeholders acknowledge the need for integrating SWOT and DPSIR to develop sustainable ecotourism.

**Conclusions:** Research findings show that stakeholders, policies, and regulations, human-environment interaction, conservation innovation, and promotion intensity are key elements to developing ecotourism.

**Keywords:** Sustainable ecotourism, biosphere reserve, national park, SWOT, DPSIR.

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### التنمية المستدامة للسياحة البيئية في محمية المحيط الحيوي لجنينة الوطنية ميرو بيتيري الوطنية في إندونيسيا

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### ملخص

الهدف: إن تطوير السياحة البيئية المتبعة له تأثير مهم في تطور الاقتصاد العالمي، حيث تعد إندونيسيا المشهود بجهتها أهم الوجهات السياحية.

المنهجية: يهدف هذا البحث إلى دراسة احتمال تنمية السياحة البيئية المستدامة في الحديقة الوطنية ميرو بيتيري كمحمية محيط حيوي، بتأكيد خاص على طاقتها في الموارد البيئية والثقافية للسياحة البيئية. دمج هذا البحث بين تحليل SWOT وDPSIR لتحقيق نموذج السياحة البيئية المستدامة.

النتائج: تظهر نتائج تحليل SWOT أن العوامل الداخلية (الدخل، سياسات أصحاب المصلحة، و معرفة التنوع البيولوجي) والعوامل الخارجية (القدرة الاستيعابية السياحية، السياسات السياحية، والتفاعلات المكانية بين الإنسان والبيئة) هي ما يقود تنمية السياحة البيئية في الحديقة الوطنية. حدد تحليل DPSIR نموذجاً للسياحة البيئية المستدامة. حيث أقر أصحاب المصلحة المشاركون بالحاجة إلى دمج DPSIR و SWOT لتطوير السياحة البيئية المستدامة.

الخلاصة: تظهر نتائج البحث على أن أصحاب المصلحة والسياسات، التفاعلات بين الإنسان والبيئة والابتكار في مجال الحفظ وترقية مكثفة هي عناصر أساسية في تنمية السياحة البيئية.

الكلمات الدالة: السياحة البيئية، محمية المحيط الحيوي، الحديقة الوطنية.



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## 1. Introduction

Ecotourism activities play a crucial role in sustainable conservation by restoring ecosystems. These activities attract tourists, benefiting local communities and stakeholders while preserving nature and cultural heritage. However, they are often negatively impacted by natural and anthropogenic processes such as agriculture, territorial expansion, and road network development, which can pose serious threats to forests. Therefore, the establishment of a national park necessitates a meticulous ecotourism policy that prioritizes community welfare and aims for environmental sustainability. Such a policy is believed to foster ecotourism that positively impacts the environment. Implementing a conservation strategy through sustainable ecotourism offers a new avenue for stakeholder engagement, despite the positive and negative impacts of ecotourism on destinations (Gössling, 2002). Consequently, the primary focus should be on environmental preservation, in addition to the construction of facilities and the management of tourist numbers.

Ecotourism in biosphere reserves has the potential to uncover and maintain extraordinary natural and cultural diversity, significantly impacting local and broader ecosystems (Do et al., 2015). In some areas, ecotourism can transform a national park into a pristine natural environment that attracts considerable public interest. The potential of national parks in terms of landscape, ecosystem characteristics, spatial distance, cultural heritage, and management should be prioritized to fully leverage these attributes. Effective management in developing national parks is crucial for ensuring their long-term viability as ecotourism destinations (J. Li et al., 2023). Ecotourism is also seen as a solution to economic development, nature protection, and improving the welfare of people living in national park areas. Without serious measures, various environmental problems could arise, affecting the status and land use of these areas (Ritzel et al., 2023). Ecotourism provides an opportunity to mitigate the negative impacts of tourism on the environment and culture, ensuring that future generations can enjoy these resources. Such opportunities should be used to educate the public as a form of environmental conservation. The success of ecotourism depends on factors such as accessibility, community involvement, ecosystem quality, and the availability of tourism programs like mangrove conservation in East Java (Hakim et al., 2017).

In reality, the use of land and water has often posed impacts on Meru Betiri National Park, yet the notion of geoecosystems and environmental problems due to human activities is often underestimated. While human activities around and in the national park need to be put into consideration in developing Meru Betiri National Park as an ecotourism resort, the focus also needs to overarch towards the interaction of the atmosphere, biosphere, hydrosphere, and anthroposphere (Ehlers et al., 2022). Developing ecotourism out of a natural park must highlight that this form of tourism impacts the cultural and ecological environment of the destination. Performing effective intervention requires an apt method of community participation while supporting management practices for sustainable biosphere reserve and culture promotion (König et al., 2022). Place-based protected area conservation strategies only sometimes guide how to protect aspects of nature that conflict with human interests. Ethically and aesthetically significant and long-lasting conservation goals and benefits are the main priority of sustainable ecotourism development models. This is essentially the core consideration in environmental conservation, which aims at the welfare of local communities, and stimulating collaboration for education.

The sustainable development of an ecotourism resort necessitates collaboration among stakeholders, the community, and groups invested in ecotourism. Stakeholders must devise clear plans and strategies for developing sustainable ecotourism (Lyon et al., 2017). These plans and strategies should be structured and implemented in partnership with the local community (Saveriades, 2000). While ecotourism has the potential to be transformative, it has not yet achieved its full potential due to local skepticism towards this tourism model. Thus, the development of ecotourism should be emphasized as a means to foster economic activities and cultivate a positive public perception. Engaging local communities can lead to additional financial benefits.

This study highlights five core elements essential for sustainable ecotourism development in Meru Betiri National Park: 1) natural and cultural areas, 2) environmental and ecological preservation, 3) education and research aligned with stakeholder regulations, 4) local community participation and economic impact, and 5) visitor satisfaction, both local and international. Analyzing daily local activities in national park areas must be based on cultural awareness and the community's relationship with the environment. A sustainable ecotourism model is required as a methodological tool for

improving tourism management, especially in protected areas. For sustainable ecotourism to succeed, the management of biosphere reserves must consider national park status, land degradation, the management of protected areas, and the role of tourist organizations within integrated systems (Mondino & Beery, 2019; Stojanovic et al., 2022).

Developing a sustainable ecotourism resort within Meru Betiri National Park requires considering the economic impact, environmental sustainability, and socio-cultural attributes of local communities. This initiative can employ various methods (Hoang et al., 2018; Yan et al., 2017), such as SWOT analysis (strengths, weaknesses, opportunities, and threats) and DPSIR analysis (driving forces, pressures, conditions, impacts, and responses). The present study focuses on these two methods for assessing and developing ecotourism in Meru Betiri National Park. Integrating these analytical frameworks can yield precise recommendations that align with the internal and external factors of the area (Skondras & Karavitis, 2015).

SWOT analysis is valuable for evaluating the potential of local tourism resources by considering current conditions and future impacts (Yan et al., 2017). Despite the distinct advantages of each framework, this study emphasizes the benefits of integration, given the limited exploration of internal and external factors typically associated with SWOT analysis (Kazemi et al., 2018). Previous research on sustainable ecotourism development models often used either SWOT or DPSIR analysis. In contrast, this study explores the necessity of integrating both SWOT and DPSIR analyses in the decision-making process, as this approach can help address critical environmental issues in Meru Betiri National Park. The DPSIR method is recognized for its comprehensive analysis of ecotourism development (Y. Li et al., 2023; Sobhani et al., 2023; Tsai et al., 2010).

The empirical study investigates the development of an ecotourism model using an ecosystem services approach to assess its impact on the ecological conditions of the landscape. The study is optimistic about integrating a sustainable ecotourism model into analytical practice, thereby supporting the social-ecological dynamics of Meru Betiri National Park.

## 2. Methods

The study was conducted in Meru Betiri National Park, Indonesia, as depicted in Figure 1. It employed a mixed-method research approach, recognized as reliable for developing sustainable ecotourism (Molina-Azorín & Font, 2016; Puhakka et al., 2014). The combination of SWOT and DPSIR analyses was used to explore the potential for sustainable ecotourism development (Swangjang & Kornpiphat, 2021). Data collection involved observations, Focus Group Discussions (FGD) with 11 pokdarwis (tourism-aware groups), 2 stakeholders, 3 managers, 5 village heads, and 14 officers from the national park service across 7 resorts. Additionally, the study included surveys of international and local tourists, comprising 382 visitors, as illustrated in Figure 2.

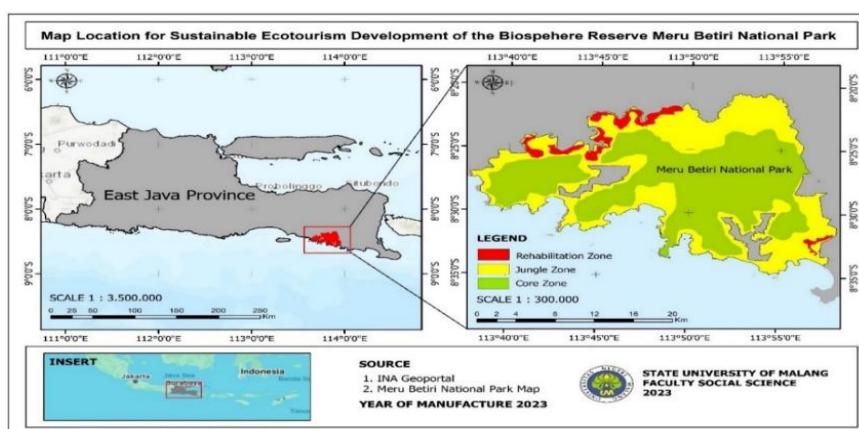


Figure 1. The Location of Meru Betiri National Park

The interview results were analyzed using both quantitative and qualitative methods. Quantitative analysis was conducted to determine the mean and standard deviation. Tourists' views were assessed using a Likert scale ranging from 1 (lowest) to 5 (highest), corresponding to the likelihood of future visits to the national park. The data showed a significant

confidence interval ( $p < 0.05$ ). These results formed the basis for the SWOT and DPSIR analyses. Quantitative analysis was instrumental in identifying unique issues in the development of sustainable ecotourism (Jacob et al., 2003).

Combining SWOT and DPSIR analyses allowed for a comprehensive exploration of all stakeholders involved in the national park. The SWOT analysis identified key issues, while the DPSIR analysis examined ecotourism development. This integrated approach facilitated the mitigation and exploration of sustainable ecotourism development in legally protected national parks (Hien et al., 2023; Mandić, 2019). The results of the SWOT analysis informed the DPSIR dimensions of ecotourism development, considering the carrying capacity of the national park.

**Table 1. The Scores of Indicators for Sustainable Ecotourism**

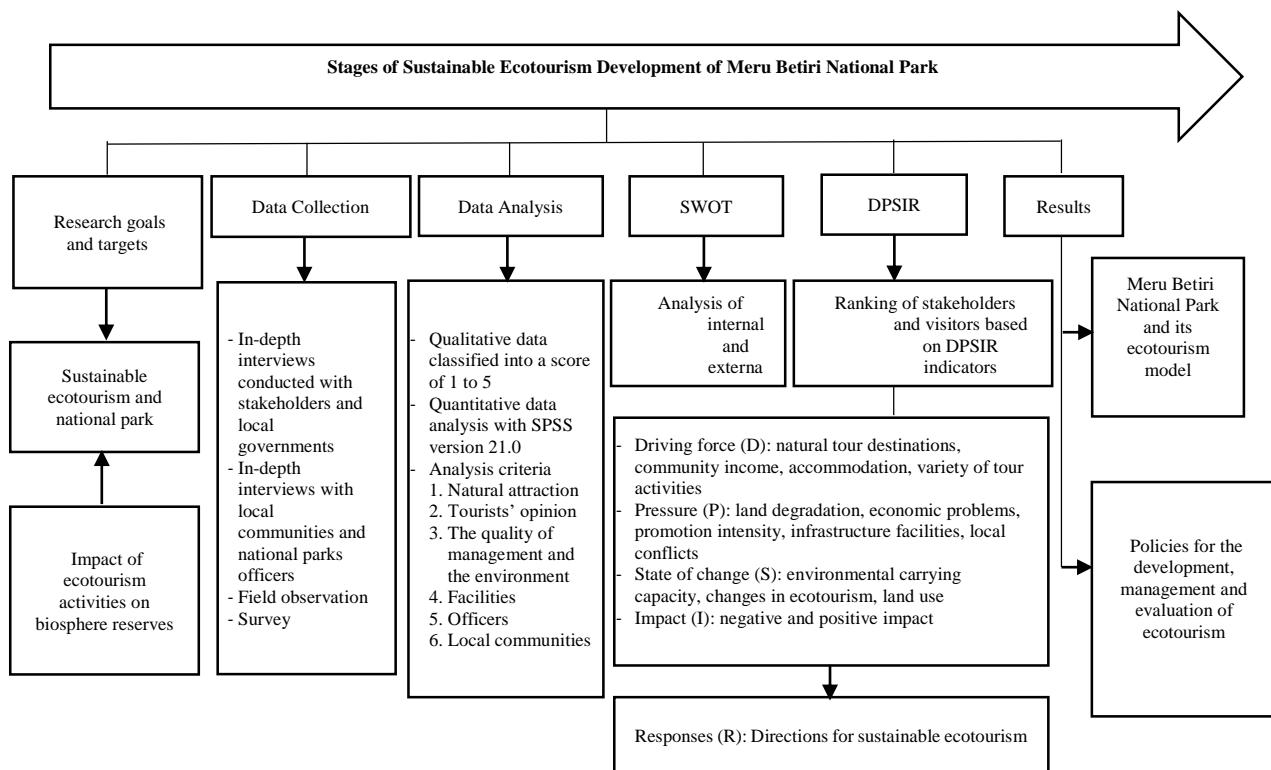
Score	Significance Level	Stakeholders	
		Locals	International Tourists
5	Highly significant	80.01 - 100	4.21 - 5.00
4	Significant	60.01 - 80.00	3.41 - 4.20
3	Fairly significant	40.01 - 60.00	2.61 - 3.40
2	Slightly significant	20.01 - 40.00	1.81 - 2.60
1	Hardly significant	0.01 - 20.00	1.00 - 1.80
0	Insignificant	No response	No response

Sustainable ecotourism in the national park, as analyzed through the SWOT framework, provided indicators for the DPSIR analysis. The procedural aspects (context, evaluation objectives, local knowledge) and analytical aspects (cause-and-effect relationships) of the DPSIR elements facilitated collaboration with stakeholders (Carnohan et al., 2023). The criteria were divided into five indicators, ranging from the least essential to the most essential, each influencing tourist satisfaction and the potential for return visits. Close-ended questions were used to gather local public responses. Field visits, observations, and in-depth interviews were classified at level 3 in the ecotourism development model. Internal information regarding strengths and weaknesses was obtained through in-depth interviews with community and village officers, as well as tourism officials, and was triangulated with the results of field visits. External factors included laws, regulations, and international tourists, which were considered as potential threats. Table 1 presents the criteria for field visits, observation results, and in-depth interviews, integrating sustainable ecotourism with SWOT and DPSIR analyses (Swangjang & Kornpiphaphat, 2021).

The innovations in this research were grounded in empirical evidence, theoretical foundations, and the development of a sustainable ecotourism framework. First, empirical evidence demonstrated that the supply and demand for sustainable ecotourism in the national park were closely linked to stakeholders. Second, the integration of SWOT and DPSIR analyses into sustainable ecotourism innovations significantly influenced social and economic conditions as well as conservation sustainability. Third, the sustainable ecotourism framework considered the environmental carrying capacity. Fourth, sustainable ecotourism development policies and strategies needed to address both economic and environmental conservation components. The strategy for sustainable ecotourism in national park areas represents an innovative approach, as reported in previous research (Dwiyahreni et al., 2021; Eddyono et al., 2021; Firman et al., 2023; Wiratno et al., 2022).

### 3. Results and Discussion

Establishing sustainable ecotourism is considered a crucial strategy for positioning Meru Betiri National Park as a leading global biosphere reserve. This approach is supported by the SWOT analysis of internal and external factors involved in sustainable ecotourism development, particularly highlighted by the tourism suitability index and the region's carrying capacity (Vipriyanti et al., 2022). The SWOT analysis revealed that the national park's biodiversity offers significant advantages and identified necessary ecotourism and educational activities (Demir et al., 2016). By focusing on spatial differentiation factors, human activities, and tourist dynamics (Ruan et al., 2019), the DPSIR analysis assessed the quality of ecological security from an efficiency perspective. The environment's carrying capacity is essential for sustainable ecotourism development, involving stakeholders through the integration of SWOT and DPSIR analyses (Swangjang & Kornpiphaphat, 2021).



**Figure 2. The Research Framework**

### 3.1 The Role of Tour Agents and Officers in Meru Betiri National Park

The partnership between tour operators and national park authorities plays a pivotal role in bolstering tourist numbers. A notable challenge arises during the turtle nesting season, when the demand for lodging surges. Sukamade Resort is a particularly favored destination among international tourists, exacerbating the challenge of aligning visitor numbers with available accommodation.

The lodging facilities in the turtle conservation area fell short of meeting tourism standards for both local and international visitors. Managed by the Meru Betiri National Park Center, the accommodations featured only basic amenities such as a fan, bed, and toilet. This lack of amenities led to numerous complaints from international tourists. The resort comprised just five rooms, all without air conditioning, with facilities centrally operated from the Meru Betiri National Park headquarters. Moreover, dining options were extremely limited on-site, leaving international tourists perplexed about where to eat, particularly given the resort's remote location, situated 15 km away from the nearest residential area within the national park. Collaborative efforts among tour agents, park officers, and local communities were deemed crucial for enhancing the lodging facilities. This collaboration, as suggested by Kodir et al., (2019), not only aimed to improve the quality of facilities but also to enhance the welfare of the local community.

**Table 2. Tourists' Responses to Meru Betiri National Park**

Component	Response	Mean	Standard Deviation
The potential of the national park	Natural attraction of protected areas	4.44	0.54
	The uniqueness of local communities	3.68	0.65
	Biodiversity of flora and fauna	3.26	0.58
	Carrying capacity of the biosphere reserve	2.06	0.26
	Planning future visit	3.34	0.34
	No plan for a future visit	3.58	0.59

The quality of management and the environment	Waste management from visitors	4.04	0.68
	The quality of the biosphere reserve	3.14	0.41
	Management of visitor data according to the resort	2.99	0.27
	Planning future visit	3.34	0.25
	No plan for a future visit	3.59	0.34
The facilities at the national park	Electricity, water, and telecommunications signals	2.83	0.38
	Direction signs and information	2.61	0.51
	Information centre for each resort	2.67	0.28
	Parking lot	2.54	0.38
	Road access to the national park	4.64	0.62
	Cleanliness of bathrooms and toilets	4.28	0.69
	Restaurant	4.25	0.63
	Health service centre	4.07	0.57
	Center for souvenirs	4.00	0.36
	Planning future visit	2.60	0.76
	No plan for a future visit	2.45	0.88
The tourists' attitudes to the local community	The attitude of local people towards tourists	4.46	0.75
	Officer of the conservation centre	3.92	0.95
	Ecotourism information officer	3.74	0.68
	Planning future visit	3.72	0.50
	No plan for a future visit	3.65	0.46
Cost	Entrance fee	4.19	0.67
	Price of food and drinks	3.81	0.58
	Accommodation costs (lodging)	3.78	0.54
	Cost of tour services	3.73	0.72
	Planning future visit	3.75	0.59
	No plan for a future visit	4.00	0.78

Note: Responses with a confidence interval at  $p < 0.01$

### 3.2 Local and International Tourists' Perspectives on Meru Betiri National Park

Tourists' perceptions were significantly shaped by their satisfaction levels, which, in turn, influenced their likelihood of making return visits. Engaging in tourism activities facilitated interactions between tourists and various stakeholders. The proficiency and communication skills of tour guides and national park officers played a crucial role in shaping tourists' knowledge and understanding. Notably, tour guides were required to possess a deep understanding of local culture and practices, as well as the ability to effectively communicate in English when providing explanations to international visitors.

Tourists' curiosity while exploring the natural attractions of the national park contributed significantly to their overall experience. Equally important was the interaction between tourists and local communities, which fostered physical, emotional, and mental engagement, creating unique experiences for both parties. However, it is crucial to maintain focus on factors such as attractiveness, accessibility, facilities, staff service, and environmental amenities, as they have a substantial impact on tourist satisfaction, as outlined in Table 2.

The information center at the national park aimed to be both informative and engaging, offering tourists an educational experience about the ecosystem. The study identified three key areas requiring immediate improvement: 1) enhancing opportunities for tourists to learn about the park's nature and wildlife, 2) ensuring the quality and professionalism of tour guide services, and 3) promoting local wisdom to tourists at a fair price. Addressing these concerns was anticipated to enhance tourists' perceptions of the national park. These findings align with earlier research emphasizing the importance of effectively managing national parks (Haukeland et al., 2013).

### 3.3 The Role of Tourism-Aware Group (Pokdarwis) in Meru Betiri National Park

The local population inhabited the area prior to the establishment of the national park, as indicated by the Besluit van den Directeur Economische Zaken on 29 July 1931. The Dutch East Indies government developed the national park after the

indigenous people had settled in the region. This led to a modification of the landscape, with the establishment of the national park covering 2,779.08 hectares, accounting for 5.08% of the total area of 52,626.04 hectares. Consequently, there is a need for sustainable ecotourism to restore the ecosystem. The development of ecotourism is influenced by geographical data, indicators of geographical scale, and policies promoting sustainable ecotourism (Ceron & Dubois, 2003). The national park office has initiated collaborations with local communities, creating job opportunities, increasing income levels, enhancing environmental awareness, and safeguarding the environment, all while mitigating overreliance on the forest.

Engaging local communities in ecosystem preservation proved challenging. Local tourism-aware groups played a pivotal role in fostering positive cultural changes and expanding the knowledge of local communities (Jamal & Stronza, 2009). Additionally, regular evaluation of ecotourism initiatives and measures aimed at ecosystem restoration must be prioritized.

### 3.4 SWOT Analysis

The SWOT analysis highlighted the critical role of internal and external factors in sustainable ecotourism. The area's natural attractions contribute significantly to its appeal among both local and international tourists. However, weaknesses in tourism activities can lead to detrimental impacts on the environment. A comprehensive understanding of these strengths and weaknesses is crucial for informing policy decisions (Khaledi Koure et al., 2023). The findings underscored the importance of developing ecotourism in alignment with protected area regulations. This necessitates a prioritization of efforts to enhance environmental carrying capacity to accommodate the growing number of tourists. While the SWOT analysis identified key areas for improvement, future ecotourism development initiatives must consider and adhere to both internal and external factors, as outlined in Table 3.

Another crucial finding relates to the opportunity associated with the natural potential and uniqueness of the national park. Figure 3 describes the quadrant position of the internal strengths of developing an ecotourism model. This implies strong relevance for the sustainable development of ecotourism grounded in the attractiveness of the national park.

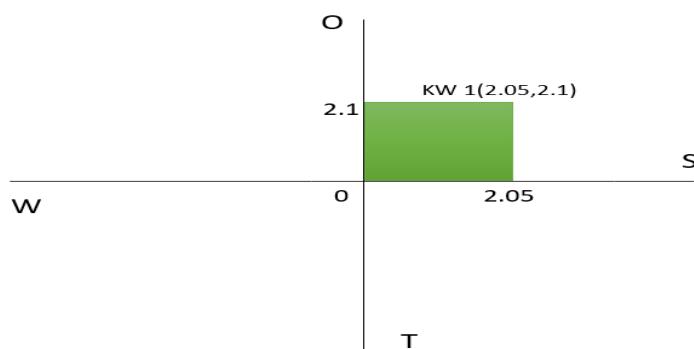


Figure 3. The Quadrant of SWOT Analysis on the Ecotourism

Table 3. Internal Factors (IFAS) and External Factors (EFAS)

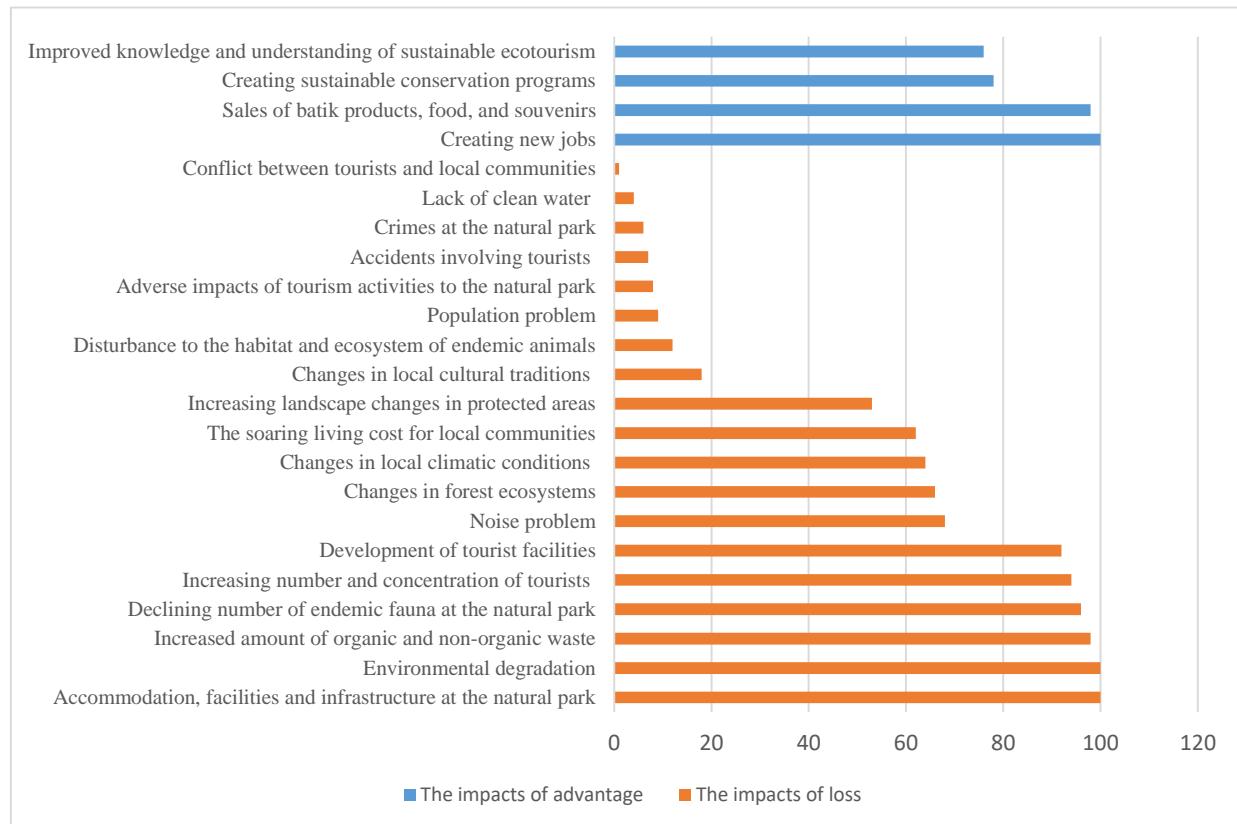
		Internal Factors (IFAS)		
Strengths (S)		Weight	Rating	Score
1.	The biodiversity of flora and fauna	0.10	5	0.80
2.	Legal conservation areas in Indonesia	0.15	5	0.75
3.	The existence of Bimblingsari Airport in Banyuwangi City	0.10	5	0.50
4.	Natural tour destination	0.15	5	0.75
5.	Roads within the national park	0.10	4	0.60
6.	A region with unique weather and climate ecosystems	0.15	4	0.50
7.	The community supporting ecotourism	0.10	4	0.50
8.	Lodging facilities	0.15	4	0.40
9.	Different alternatives through ecotourism	0.10	4	0.40

<b>Internal Factors (IFAS)</b>						
10.	Improved income for locals	0.10	4	0.60		
11.	Regular promotion and maintenance	0.15	4	0.40		
Total				6.2		
<b>Weaknesses (W)</b>						
1.	Inadequate investment in accommodation	0.40	5	1.25		
2.	Lack of collaboration with stakeholders	0.20	5	0.80		
3.	Lack of community education and ongoing promotion	0.20	4	2.00		
Total				4.05		
Strengths-Weaknesses		2.05				
<b>External Factors (EFAS)</b>						
<b>Opportunities (O)</b>						
1.	High potential for education and research	0.10	5	0.80		
2.	Preservation of natural ecosystems	0.20	4	0.40		
3.	Creation of new jobs for the community	0.20	5	0.40		
4.	Feasibility of ecotourism development	0.10	4	0.50		
5.	High tourist interest in ecotourism and natural tourism	0.10	4	0.60		
6.	Cheap ticket costs for tourists	0.20	5	1.00		
7.	Tourist satisfaction	0.20	4	0.40		
8.	The constant development of tourism	0.10	5	0.50		
Total				4.6		
<b>Threats (T)</b>						
1.	Inadequate accommodation	0.25	5	1.25		
2.	Unsatisfactory emergency medical service and infrastructure	0.25	5	0.75		
3.	Conflict between national park officers and local deforestation actors	0.10	4	0.50		
Total				2.50		
Opportunities-Threats		2.1				

(Source: Research data in 2023)

The analysis has underscored both positive and negative properties of the management, conservation, visitor management, conservation dimensions, infrastructure, and ecosystem carrying capacity, as reported in Figure 4. Innovation in environmental conservation models and sustainable ecotourism foster economic growth at both micro and macro levels. For this impact to take effect on the local communities, investment and support from all stakeholders need to be in place.

The development of ecotourism significantly influences vulnerability to climate change, particularly for local communities reliant on maintaining their livelihoods (Agyeman & Resources, 2020). Ecotourism activities can exacerbate climate change, leading to environmental degradation, altering tourist arrival patterns, and affecting the livelihoods and lifestyles of local communities. Addressing the consequences of ecotourism vulnerability requires a holistic consideration of its social, economic, and environmental impacts, offering a comprehensive understanding of the tourism system. Knowledge of climate dynamics, landscape features, and social transformations forms the foundation for community survival and adaptation to environmental changes.

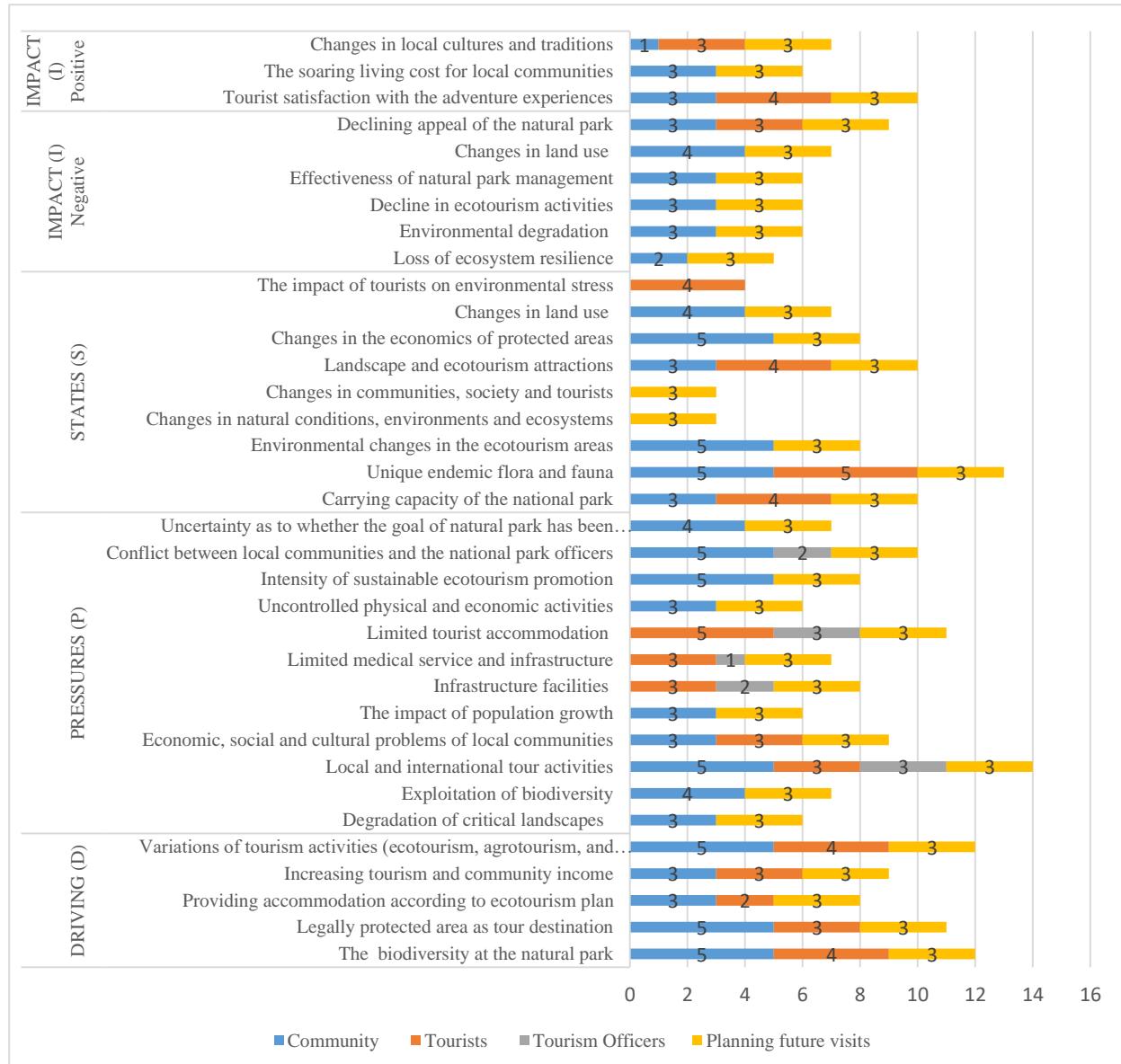


**Figure 4. The Advantages and Disadvantages of the Ecotourism Development**

### 3.5 DPSIR Analysis

The DPSIR analysis of local and international tourists' responses highlighted issues regarding inadequate accommodation within the national park. DPSIR, which emphasizes an inductive approach and basic ecosystem theory, is considered a priority for ecotourism development (Mandić, 2019). The DPSIR framework proved beneficial for subsequent analyses by focusing on weaknesses in ecotourism development while allowing for temporal flexibility (Carnohan et al., 2023). The highest driving support score (D) for ecotourism is associated with factors such as flora and fauna diversity, legal conservation areas in Indonesia, and natural destinations, encompassing environmental, social, and regional demographic aspects crucial for maintaining the ecosystem. The natural potential score is notably high according to the ecotourism development model. However, pressure (P) points to serious issues, including inadequate accommodation, conflicts among stakeholders, poor synergy, and insufficient sustainable promotion. Despite innovations in ecotourism development, significant changes have not been observed. Conditions for restoring critical ecosystems (S) focus on biodiversity conservation as the main environmental requirement, yet changes in the landscape of the national park have led to concerning physical, environmental, biological, and chemical threats. The impact analysis (I) reveals both positive and negative changes in ecotourism activities, with positive factors reflecting the social and economic welfare improvements for local communities due to ecotourism activities. The development strategy for ecotourism requires informed management that integrates a holistic and participatory approach (Mandić, 2019). This analytical emphasis on holistic cause-and-effect relationships helps clarify ecotourism development by considering the area's geographical properties. Table 4 provides the DPSIR ranking of ecotourism development at the national park.

The increase in the number of tourists has an impact on *Pokdarwis* and tourism officers. Direct and indirect impacts have considerably affected local communities and ecosystems. Figure 5 shows the priority indicators driving ecotourism in the national park.



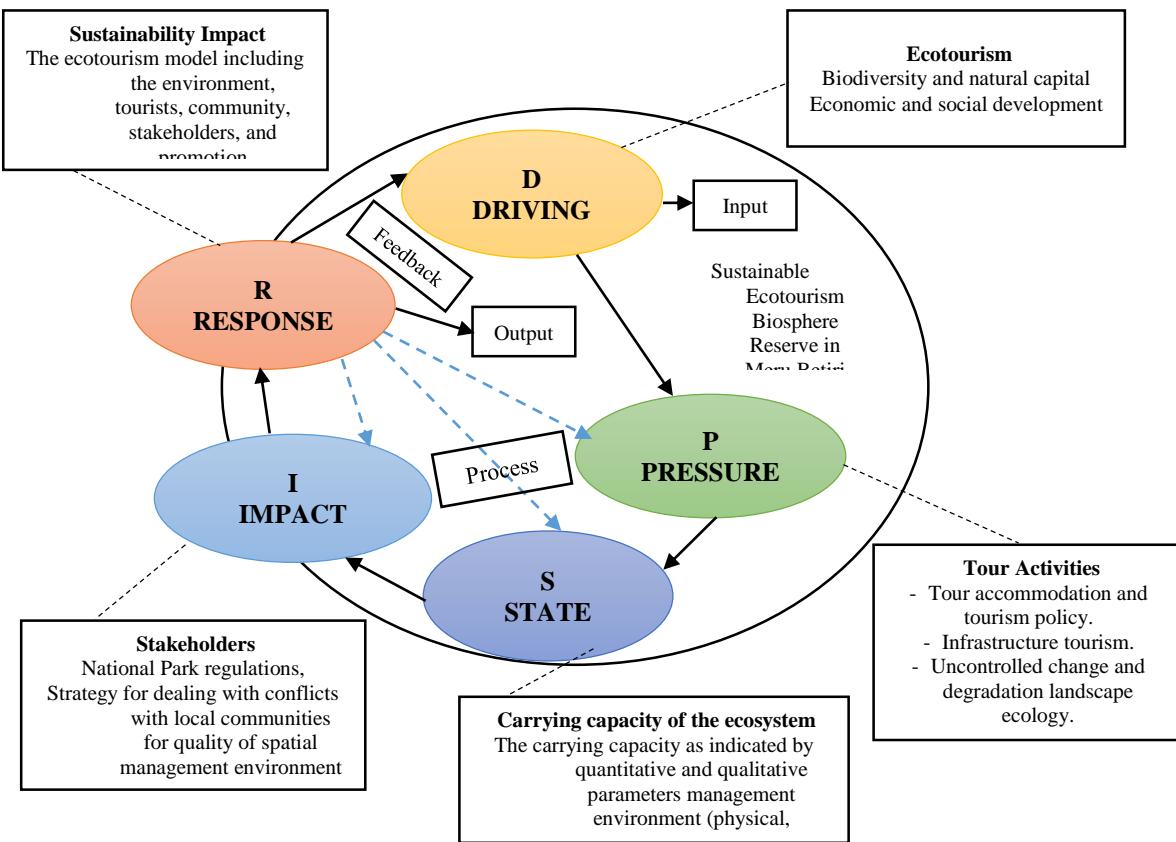
**Figure 5. The Ranking of DPSIR Analysis for Sustainable Ecotourism Development**

The DPSIR analysis provides a framework for restoring critical ecosystems within the natural park. Response (R) actions, such as policy implementation and environmental carrying capacity control, must align with ecotourism objectives. In the initial phase, understanding the Driving forces (D) behind sustainable ecotourism is crucial. A thorough comprehension of the landscape, nature, and environment significantly influences the essence and characteristics of ecotourism. Addressing the Pressure (P) from tour activities requires meticulous planning to mitigate conflicts between local communities and national park authorities. Disseminating knowledge about ecotourism should be prioritized through intensive promotion via social media platforms (Facebook, Instagram, TikTok, YouTube) and traditional media outlets. The State (S) refers to the unique biodiversity in the natural park, and maintaining a balance between physical and ecological aspects is essential for driving the economic activities of local communities, which should align with forest conservation. The Impact (I) aspect focuses on the dynamics among stakeholders, including local communities, national park authorities, academics, interest groups, and tourism officials.

**Table 4. DPSIR analysis on Sustainable Ecotourism at Meru Betiri National Park**

DRIVING (D)	RESPONSES (R)
<ul style="list-style-type: none"> <li>• Biosphere reserve biodiversity.</li> <li>• The legally protected area as a tour destination.</li> <li>• Providing accommodation according to the ecotourism plan.</li> <li>• Increasing tourism and community income.</li> <li>• Variations of tourism activities (ecotourism, agrotourism, and creative economy).</li> </ul>	<ul style="list-style-type: none"> <li>• Sustainable ecotourism model.</li> <li>• Increased environmental awareness of the community.</li> <li>• Improving education in the surrounding community.</li> <li>• Proper planning and management.</li> </ul>
<b>PRESSURE (P)</b>	<ul style="list-style-type: none"> <li>• Degradation of critical landscapes.</li> <li>• Exploitation of biodiversity.</li> <li>• Local and international tour activities.</li> <li>• Economic, social and cultural problems of local communities.</li> <li>• The impact of population growth.</li> <li>• Infrastructure facilities.</li> <li>• Limited medical service and infrastructure.</li> <li>• Limited tourist accommodation.</li> <li>• Uncontrolled physical and economic activities.</li> <li>• Intensity of sustainable ecotourism promotion.</li> <li>• Conflict between local communities and the national park officers.</li> <li>• Uncertainty as to whether the goal of the natural park has been achieved.</li> </ul>
<b>STATE (S)</b>	<ul style="list-style-type: none"> <li>• Carrying capacity of the national park.</li> <li>• Unique endemic flora and fauna.</li> <li>• Changes in the ecosystem.</li> <li>• Changes in communities, society, and tourists.</li> <li>• Landscape and ecotourism attractions.</li> <li>• Changes in the economics of protected areas.</li> <li>• Changes in land use.</li> <li>• The impact of tourists on environmental stress.</li> </ul>
<b>IMPACT (I)</b>	<ul style="list-style-type: none"> <li>• Loss of ecosystem resilience.</li> <li>• Degradation of protected area ecosystems.</li> <li>• Decline in ecotourism activities.</li> <li>• Effectiveness of protected area management.</li> <li>• Changes in land use and degradation.</li> <li>• Degradation of the biosphere reserve.</li> <li>• Tourists' satisfaction with the adventures.</li> <li>• The increased cost of living.</li> <li>• Changes in local culture and traditions.</li> </ul>

This study engages the DPSIR analysis to explore the procedures, risks, and sustainability of ecotourism development (Carnohan et al., 2023). The qualitative and quantitative findings have pointed to essential keys to the development and implementation of policies for sustainable ecotourism. The findings from DPSIR analysis have underlined the potential for sustainable ecotourism, as confirmed in a previous study by (Carnohan et al., 2023). Sustainable ecotourism development was guided by DPSIR analysis, as presented in Figure 6.



**Figure 6. DPSIR Analysis of Sustainable Ecotourism in Meru Betiri National Park**

The framework emphasizes the relationship between humans and the national park as the core of the ecotourism concept. The concepts of sustainable ecotourism, sustainable environment, natural conservation, tourist education, and advantage to the community have always played focal roles in developing sustainable ecotourism. In the long run, managerial performance and policy hold immense contributions to the success of ecotourism.

### 3.6 DPSIR Analysis of Sustainable Ecotourism in Meru Betiri National Park

The application of the DPSIR analysis in evaluating ecological security contributes to the protection of biodiversity and natural resources (Sobhani et al., 2023). The delineation of regional spaces helps determine the focal points for ecotourism development. However, it is essential to recognize that ecotourism is intricately linked to physical and economic infrastructures, such as roads, accommodations, and restaurants, extending beyond regional boundaries. This approach provides a nuanced understanding of the strategies and cycles necessary for sustainable ecotourism. Such an understanding is crucial, given that tourism development is intertwined with vast natural-ecological-socio-economic systems (Bordun et al., 2020).

The DPSIR analysis contributes significantly to the advancement of sustainable ecotourism by shaping strategies for ecotourism development. These strategies include exploration, development, consolidation, socialization, and FGD. Achieving optimal results from these strategies necessitates sustained collaboration among stakeholders, Pokdarwis (local ecotourism groups), and the local communities in Banyuwangi regency (Sumarmi et al., 2021). It is imperative to maintain a balance between environmental carrying capacity and the influx of local and international tourists. Additionally, understanding the impacts and benefits of global and local tourist flows is crucial. To achieve this, efforts should focus on enhancing the knowledge and awareness of local communities regarding environmental conservation. Sustainability in non-environmental aspects must also be balanced with environmental conservation efforts. Studies by Wiesli et al. (2022)

emphasize that the sustainable development of national parks hinges on social, sustainable mobility, and economic factors. Therefore, ensuring sustainable environmental management will directly influence conservation strategies (Sumarmi, Ensiyawatin, et al., 2022).

### **3.7 The Development of Sustainable Ecotourism at Meru Betiri National Park**

Both SWOT analysis and DPSIR analysis are instrumental in evaluating the viability of sustainable ecotourism that considers both human and environmental factors. The management of ecotourism has implications for both natural protected areas and stakeholders (Esparza-Huamanchumo et al., 2023). Planning and strategies aimed at maximizing the potential of tourism areas must take into account the social and economic conditions of the community, while also emphasizing the significance of community culture within the natural park. However, this can be a complex endeavor, as the use of land for sustainability purposes has been identified as a challenge in ecotourism development (Sørensen & Grindsted, 2021).

The proliferation of tourism frequently causes disruptions in ecosystems and generates conflicts between managerial entities and indigenous populations. The advocacy for ecotourism has notably enhanced local communities' financial prosperity, employment prospects, cultural advancement, and political engagement (Firman et al., 2023). However, the expansion of sustainable ecotourism necessitates robust governmental support in tourism policies. The theoretical and empirical ramifications of research outcomes on the sustainable development of ecotourism are shaped by factors such as innovation, tourism policies, and the impact of social media (Firman et al., 2023).

Sustainable ecotourism objectives encompass various dimensions: environmental (targets 1 and 2), social and cultural (target 3), economic (targets 4, 5, and 6), and policy-related dimensions pertaining to protected areas (target 7). Conservation values are promoted as a strategy aligned with ecotourism principles and involving local community engagement (Sumarmi, Bachri, et al., 2022). This study examines the policy and management implications of sustainable ecotourism targets for national parks.

#### **Target 1: Contribution of sustainable ecotourism to Meru Betiri National Park**

Ecotourism development has an impact on Meru Betiri National Park. The research results show that *Pokdarwis* has sufficient knowledge about the environment in ecotourism activities, which drives the success of restoring critical ecosystems and protecting rare endemic animals. The second group of stakeholders is the national park officers and local governments. The results also revealed the process of manifesting local knowledge and sustainable conservation efforts involving government institutions, universities, and the community.

Comprehensive comprehension of conservation regulations and policies aimed at safeguarding national parks is essential among stakeholders, local communities, and park personnel. These regulations are designed to mitigate drastic landscape alterations stemming from ecotourism activities. The collaborative efforts of village authorities, national park management, and local communities are crucial for fostering sustainable ecotourism. The effectiveness of conservation strategies within national parks hinges on the active involvement and support of local communities (Acquah et al., 2017).

#### **Target 2: Contribution to restoring the ecosystem and mitigating the negative impacts of ecotourism in Meru Betiri National Park**

The environmental impact on the natural park, particularly evident at the Sukamade Resort, is closely linked to waste management issues, notably concerning food waste and disposable bottles. Mitigating these impacts is crucial for preserving the cleanliness of the natural park. By reducing the use of disposable plastic bottles, a more harmonious relationship between human culture and the environment can be achieved (Sejati et al., 2023). Effective waste management practices are vital for the conservation of turtle habitats within the park. Implementing legal regulations to oversee tourism activities and curb potential waste, especially from plastic bottles, is imperative. Furthermore, supporting regulations and policies, such as providing funding and training for local communities, is essential for fostering sustainable ecotourism in alignment

with the Sustainable Development Goals for 2030 (Sumarmi, Bachri, et al., 2022).

**Target 3: Contribution to social welfare, education and benefits for *Pokdarwis* or communities living in Meru Betiri National Park**

Sustainable ecotourism initiatives have had a significant impact on social dynamics and community knowledge, as exemplified by the experiences of the King Betiri herbal medicine producers and the Kehati Merbeti batik artists. Guided by the Meru Betiri National Park, the chairman of King Betiri, whose education had been limited to elementary school, successfully attained a bachelor's degree. He pursued higher education viewing it as a tool for engaging in scientific discussions, particularly through seminars focused on the sustainable conservation of Javanese chili, a key ingredient in herbal medicine. Similarly, the Kehati Merbeti batik artists utilize natural-colored ingredients sourced from the forest. Their batiks are priced between IDR 750,000 to IDR 1,000,000. The shift towards creative economy endeavors serves the dual purpose of education and maintaining environmental carrying capacity, thus mitigating forest-based economic activities. Many local *Pokdarwis* groups acknowledge the positive impact of ecotourism due to their active participation in sustainable conservation efforts. Park officers emphasize that the active involvement of the surrounding community is crucial for enhancing both social and economic well-being.

The park officers consistently strive to enhance local knowledge and the capacity of *Pokdarwis*, emphasizing the need for extensive environmental education and conservation efforts integrated into local culture through the creative economy. The success of ecotourism development hinges on the preservation of unique local cultures and lifestyles within their distinct environmental contexts. The overarching goal is to implement a sustainable conservation program for ecosystem restoration, engaging community groups in the national park to improve their skills and reduce their dependence on protected areas. These findings align with those of Khaledi Koure et al., (2023), which underscore the positive impacts of active community participation on social and economic outcomes.

**Target 4: Contribution to the local economy from sustainable ecotourism in Meru Betiri National Park**

The number of tourists visiting the national park not only escalates the local community's economy but also raises the quality of farming activities. The results of FGD with *Pokdarwis* and forest farmers show that ecotourism activities improve the local economy, such as through the production of batik business, Javanese herbal medicine, and various snacks. These represent the indirect impact of sustainable ecotourism on the creative economy.

**Target 5: Improving the quality of sustainable ecotourism management and tour activities in Meru Betiri National Park**

The involvement of local informants in national park development is currently limited. A critical area for improvement is the English proficiency of local guides, who often struggle to convey tourism information in English, including those affiliated with *Pokdarwis*. Given the importance of language in enhancing the attractiveness of destinations for future visits (Tian-Cole et al., 2002), urgent steps are needed, such as providing language training. Local knowledge and community activities, particularly those suited to tropical climates, significantly support ecotourism endeavors. Disseminating knowledge and information on biodiversity and conservation potential to local communities is crucial, as local guides play a pivotal role in promoting and educating visitors about ecotourism (Poponi et al., 2020).

**Target 6: Guaranteed quality of homestay services for local or international tourists at Meru Betiri National Park**

Visitors expressed satisfaction with the basic attractions of fauna and the natural environment, yet they were dissatisfied with lodging accommodations and food services. Sustainable ecotourism necessitates partnerships among tourist tour operators, national park authorities, and local communities to offer environmentally-friendly lodging options. Accommodation and food services are crucial infrastructure components for ecotourism development in national parks (Acquah et al., 2016). Tourists highlighted their expectations for future visits, citing the allure of adventure and unique local cultures. One particularly memorable experience is witnessing turtles laying eggs, facilitated by night patrols from

19:30 to 22:30. There is a high expectation among tourists for improved homestay facilities to ensure comfortable lodging during their nature-centric visits, especially at the Sukamade Resort.

#### **Target 7: Stakeholder support for policy implementation for sustainable ecotourism in Meru Betiri National Park**

Tourism policy serves as a strategic development approach formulated by the government and stakeholders to foster the growth of the tourism industry. Sustainable tourism development aims to mitigate its adverse impacts, as mandated by the Minister of Tourism and Creative Economy Regulation Number 9 of 2021 (Haribudiman et al., 2023). Understanding the causal relationships is crucial in shaping tourism management strategies. In practice, addressing environmental issues at different scales requires a scalable and transferable approach in policy design, utilizing the DPSIR (Drivers, Pressures, State, Impacts, Responses) analysis through qualitative and quantitative research to synthesize policy recommendations (Carnohan et al., 2023). The components encompassing area dimensions, governance, economic factors, social factors, and environmental and policy regulations form the foundation for relevant regulations. This approach aligns with Haribudiman et al., (2023), who assert that the DPSIR analysis serves as a strategic tool for structuring comprehensive policies for environmental restoration while enhancing environmental awareness among visiting tourists.

#### **4. Conclusion**

This research aims to assess the adherence of ecotourism in Meru Betiri National Park to sustainability principles. Utilizing a SWOT analysis, the study provides an overview of internal and external factors influencing the development of sustainable ecotourism in the park. The park's potential biodiversity is a significant draw for tourists, particularly from overseas. However, several concerning weaknesses persist, including the impact of human activities on the ecosystem. The DPSIR analysis reveals that natural resources rank lowest due to insufficient attention from stakeholders and the local population.

Secondly, sustainable ecotourism has implications for stakeholders, leading to conflicts, particularly regarding the balance between economic development and environmental conservation. Thirdly, sustainable tourism aims to safeguard the ecosystem for future generations through conservation efforts. Ecotourism activities influence the environmental carrying capacity and biodiversity prevalence. These three aspects of sustainable ecotourism create economic and social impacts on the communities surrounding the national park.

Therefore, the findings underscore the importance of managing conflicts and mitigating the ecological, economic, and social impacts of sustainable ecotourism. The study also highlights the value of integrating SWOT and DPSIR analyses for informing the planning, strategy, development, and management of sustainable ecotourism in alignment with government regulations. Recommendations for further research suggest exploring natural and environmental disaster mitigation strategies based on the spatial structure and topography of the Meru Betiri National Park area.

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**REFERENCES**

Acquah, E., Dearden, P., & Rollins, R. (2016). Nature-based tourism in Mole National Park, Ghana. *African Geographical Review*, 35(1), 53–69. <https://doi.org/10.1080/19376812.2015.1088389>

Acquah, E., Rollins, R., Dearden, P., & Murray, G. (2017). Concerns and benefits of park-adjacent communities in Northern Ghana: the case of Mole National Park. *International Journal of Sustainable Development and World Ecology*, 24(4), 316–327. <https://doi.org/10.1080/13504509.2016.1221480>

Agyeman, Y. B., & Resources, N. (2020). Handbook of Climate Change Resilience. *Handbook of Climate Change Resilience, October*. <https://doi.org/10.1007/978-3-319-71025-9>

Bordun, O. Y., Romaniv, P. V., & Monasryrskyy, W. R. (2020). Tourism geography: functional structure and role in tourismology. *Journal of Geology, Geography and Geoeocology*, 29(2), 233–242. <https://doi.org/10.15421/112021>

Carnohan, S. A., Trier, X., Liu, S., Clausen, L. P. W., Clifford-Holmes, J. K., Hansen, S. F., Benini, L., & McKnight, U. S. (2023). Next generation application of DPSIR for sustainable policy implementation. *Current Research in Environmental Sustainability*, 5(December 2022), 100201. <https://doi.org/10.1016/j.crsust.2022.100201>

Ceron, J. P., & Dubois, G. (2003). Tourism and sustainable development indicators: The gap between theoretical demands and practical achievements. *Current Issues in Tourism*, 6(1), 54–75. <https://doi.org/10.1080/13683500308667944>

Demir, S., Esbah, H., & AKGÜN, A. A. (2016). Quantitative SWOT analysis for prioritizing ecotourism-planning decisions in protected areas: Igneada case. *International Journal of Sustainable Development and World Ecology*, 23(5), 456–468. <https://doi.org/10.1080/13504509.2015.1136709>

Do, Y., Kim, S. B., Kim, J. Y., & Joo, G. J. (2015). Wetland-based tourism in South Korea: who, when, and why. *Wetlands Ecology and Management*, 23(4), 779–787. <https://doi.org/10.1007/s11273-015-9418-2>

Dwiyahreni, A. A., Fuad, H. A. H., Muhtar, S., Soesilo, T. E. B., Margules, C., & Supriatna, J. (2021). Changes in the human footprint in and around Indonesia's terrestrial national parks between 2012 and 2017. *Scientific Reports*, 11(1), 1–14. <https://doi.org/10.1038/s41598-021-83586-2>

Eddyono, F., Darusman, D., Sumarwan, U., & Sunarminto, F. (2021). Optimization model: the innovation and future of e-ecotourism for sustainability. *Journal of Tourism Futures*, 1–18. <https://doi.org/10.1108/JTF-03-2021-0067>

Ehlers, T. A., Chen, D., Appel, E., Bolch, T., Chen, F., Diekmann, B., Dippold, M. A., Giese, M., Guggenberger, G., Lai, H. W., Li, X., Liu, J., Liu, Y., Ma, Y., Miehe, G., Mosbrugger, V., Mulch, A., Piao, S., Schwalb, A., ... Zhu, L. (2022). Past, present, and future geo-biosphere interactions on the Tibetan Plateau and implications for permafrost. *Earth-Science Reviews*, 234(December 2021), 104197. <https://doi.org/10.1016/j.earscirev.2022.104197>

Esparza-Huamanchumo, R. M., Llonto Caicedo, Y., Gamarra Flores, C. E., Romo Román, P. C., & Mougenot, B. (2023). Perceptions of stakeholders and challenges faced by ecotourism management in a natural protected area in Peru. *Environment, Development and Sustainability*, June. <https://doi.org/10.1007/s10668-023-03501-9>

Firman, A., Moslehpoor, M., Qiu, R., Lin, P. K., Ismail, T., & Rahman, F. F. (2023). The impact of eco-innovation, ecotourism policy and social media on sustainable tourism development: evidence from the tourism sector of Indonesia. *Economic Research-Ekonomska Istrazivanja*, 36(2). <https://doi.org/10.1080/1331677X.2022.2143847>

Gössling, S. (2002). Global environmental consequences of tourism. *Global Environmental Change*, 12(4), 283–302. [https://doi.org/10.1016/S0959-3780\(02\)00044-4](https://doi.org/10.1016/S0959-3780(02)00044-4)

Hakim, L., Siswanto, D., & Makagoshi, N. (2017). Mangrove Conservation in East Java: The Ecotourism Development Perspectives. *Journal of Tropical Life Science*, 7(3), 277–285. <https://doi.org/10.11594/jtls.07.03.14>

Haribudiman, I., Berliandaldo, M., & Holman, A. W. (2023). Implications of the Role of Tourism Carrying Capacity in the Development of Sustainable Tourism Destination. *Jurnal Kepawisataan Indonesia*, 17(2), 272–292.

Haukeland, J. V., Veisten, K., Grue, B., & Vistad, O. I. (2013). Visitors' acceptance of negative ecological impacts in national parks: Comparing the explanatory power of psychographic scales in a Norwegian mountain setting. *Journal of Sustainable Tourism*, 21(2), 291–313. <https://doi.org/10.1080/09669582.2012.692685>

Hien, L. T. D., Phung, P. Van, & Hoang, T. H. L. (2023). Sustainable Eco-Tourism Development in National Parks: an Approach

from Local Community's Support. *Journal of Law and Sustainable Development*, 11(9), e1146. <https://doi.org/10.55908/sdgs.v11i9.1146>

Hoang, H. T. T., Truong, Q. H., Nguyen, A. T., & Hens, L. (2018). Multicriteria evaluation of tourism potential in the Central Highlands of Vietnam: Combining Geographic Information System (GIS), Analytic Hierarchy Process (AHP) and Principal Component Analysis (PCA). *Sustainability (Switzerland)*, 10(9), 1–20. <https://doi.org/10.3390/su10093097>

Jacob, M., Tintoré, J., Aguiló, E., Bravo, A., & Mulet, J. (2003). Innovation in the tourism sector: Results from a pilot study in the Balearic Islands. *Tourism Economics*, 9(3), 279–295. <https://doi.org/10.1177/135481660300900303>

Jamal, T., & Stronza, A. (2009). Collaboration theory and tourism practice in protected areas: Stakeholders, structuring and sustainability. *Journal of Sustainable Tourism*, 17(2), 169–189. <https://doi.org/10.1080/09669580802495741>

Kazemi, F., Abolhassani, L., Rahmati, E. A., & Sayyad-Amin, P. (2018). Strategic planning for cultivation of fruit trees and shrubs in urban landscapes using the SWOT method: A case study for the city of Mashhad, Iran. *Land Use Policy*, 70(September 2017), 1–9. <https://doi.org/10.1016/j.landusepol.2017.10.006>

Khaledi Koure, F., Hajjarian, M., Hossein Zadeh, O., Alijanpour, A., & Mosadeghi, R. (2023). Ecotourism development strategies and the importance of local community engagement. *Environment, Development and Sustainability*, 25(7), 6849–6877. <https://doi.org/10.1007/s10668-022-02338-y>

Kodir, A., Tanjung, A., Sumarmi, A., & Simanjuntak, R. (2019). Tourism Governance in Komodo National Park, Indonesia: Blessing or Curse ?. *GeoJournal of Tourism and Geosites*, 27(4), 1663–1667. <http://gtg.webhost.uoradea.ro/> <https://doi.org/10.30892/gtg.27424-443>

König, H. J., Uthes, S., Ostermann-Miyashita, E. F., Eufemia, L., Hemminger, K., Hermanns, T., Bethwell, C., Stachow, U., & Helming, K. (2022). UNESCO biosphere reserves show demand for multifunctional agriculture. *Journal of Environmental Management*, 320(August). <https://doi.org/10.1016/j.jenvman.2022.115790>

Li, J., Fu, J., Zhang, Z., Guo, X., Hong, W., Yuan, F., Cong, Y., & Gao, J. (2023). Spatial pattern and screening framework of national park agglomerations in the Greater Shangri-La region, China. *Ecological Indicators*, 154(July), 110552. <https://doi.org/10.1016/j.ecolind.2023.110552>

Li, Y., Liu, Z., & Liu, G. (2023). *Evaluation of Tourism Ecological Security Based on Driving Force – Pressure – State – Influence – Response Framework and Analysis of Its Dynamic Evolution Characteristics and Driving Factors in Chinese Province Territory*.

Lyon, A., Hunter-Jones, P., & Warnaby, G. (2017). Are we any closer to sustainable development? Listening to active stakeholder discourses of tourism development in the Waterberg Biosphere Reserve, South Africa. *Tourism Management*, 61, 234–247. <https://doi.org/10.1016/j.tourman.2017.01.010>

Mandić, A. (2019). Nature-based solutions for sustainable tourism development in protected natural areas: a review. *Environment Systems and Decisions*, 39(3), 249–268. <https://doi.org/10.1007/s10669-019-09718-2>

Molina-Azorín, J. F., & Font, X. (2016). Mixed methods in sustainable tourism research: an analysis of prevalence, designs and application in JOST (2005–2014). *Journal of Sustainable Tourism*, 24(4), 549–573. <https://doi.org/10.1080/09669582.2015.1073739>

Mondino, E., & Beery, T. (2019). Ecotourism as a learning tool for sustainable development. The case of Monviso Transboundary Biosphere Reserve, Italy. *Journal of Ecotourism*, 18(2), 107–121. <https://doi.org/10.1080/14724049.2018.1462371>

Poponi, S., Palli, J., Ferrari, S., Filibeck, G., Forte, T. G. W., Franceschini, C., Ruggieri, A., & Piovesan, G. (2020). Toward the development of sustainable ecotourism in Italian national parks of the Apennines: Insights from hiking guides. *Ecology and Society*, 25(4), 1–13. <https://doi.org/10.5751/ES-11996-250446>

Puhakka, R., Cottrell, S. P., & Siikamäki, P. (2014). Sustainability perspectives on Oulanka National Park, Finland: mixed methods in tourism research. *Journal of Sustainable Tourism*, 22(3), 480–505. <https://doi.org/10.1080/09669582.2013.839690>

Ritzel, C., Hoop, D., Portmann, M., Wallner, A., & Mack, G. (2023). Swiss Parks of National Importance as model regions of sustainable development – An economic success story for farmers? *Land Use Policy*, 124(December 2021), 106441. <https://doi.org/10.1016/j.landusepol.2022.106441>

Ruan, W., Li, Y., Zhang, S., & Liu, C. H. (2019). Evaluation and drive mechanism of tourism ecological security based on the DPSIR-DEA model. *Tourism Management*, 75(May), 609–625. <https://doi.org/10.1016/j.tourman.2019.06.021>

Saveriades, A. (2000). Establishing the social tourism carrying capacity for the tourist resorts of the east coast of the Republic of Cyprus. *Tourism Management*, 21(2), 147–156. [https://doi.org/10.1016/S0261-5177\(99\)00044-8](https://doi.org/10.1016/S0261-5177(99)00044-8)

Sejati, A. E., Sumarmi, S., Astina, I. K., Susilo, S., & Kurniawati, E. (2023). the Environmental Conservation Value of Tengger Tribe'S Traditional Ceremony in Supporting the Mount Bromo Tourism Area. *Geojournal of Tourism and Geosites*, 46(1), 315–326. <https://doi.org/10.30892/gtg.46135-1029>

Skondras, N. A., & Karavitis, C. A. (2015). Evaluation and comparison of DPSIR framework and the combined SWOT – DPSIR analysis (CSDA) approach: Towards embracing complexity. *Global Nest Journal*, 17(1), 198–209. <https://doi.org/10.30955/gnj.001480>

Sobhani, P., Esmaeilzadeh, H., Wolf, I. D., Deljouei, A., Marcu, M. V., & Sadeghi, S. M. M. (2023). Evaluating the ecological security of ecotourism in protected area based on the DPSIR model. *Ecological Indicators*, 155(June), 110957. <https://doi.org/10.1016/j.ecolind.2023.110957>

Sørensen, F., & Grindsted, T. S. (2021). Sustainability approaches and nature tourism development. *Annals of Tourism Research*, 91. <https://doi.org/10.1016/j.annals.2021.103307>

Stojanovic, V., Demonja, D., Mijatov, M., Dunjic, J., & Tisma, S. (2022). Concept of Ecotourism Development in Unesco Biosphere Reserves: Case Studies From Croatia and Serbia. *Sumarski List*, 146(5–6), 243–253. <https://doi.org/10.31298/sl.146.5-6.6>

Sumarmi, Bachri, S., Irawan, L. Y., Sholeha, A. W., & Aliman, M. (2021). Ecotourism Development Strategies of Pulau Merah Beach, Banyuwangi, Indonesia. *IOP Conference Series: Earth and Environmental Science*, 747(1). <https://doi.org/10.1088/1755-1315/747/1/012006>

Sumarmi, Bachri, S., Purwanto, Sholiha, A. W., Zubaidah, S., & Shrestha, R. P. (2022). Assessing Bedul Mangrove Ecotourism Using Green and Fair Strategy Empowerment to Fulfill SDGs 2030 Agenda for Tourism. *Environmental Research, Engineering and Management*, 78(2), 73–87. <https://doi.org/10.5755/j01.erem.78.2.31006>

Sumarmi, S., Ensiyawatin, A. Z., Astina, I. K., Kurniawati, E., & Shrestha, R. P. (2022). the Management of Bangsring Underwater As Conservation - Based Ecotourism for International Tourism Destination. *Geojournal of Tourism and Geosites*, 41(2), 393–399. <https://doi.org/10.30892/gtg.41208-842>

Swangjang, K., & Kornpiphat, P. (2021). Does ecotourism in a Mangrove area at Klong Kone, Thailand, conform to sustainable tourism? A case study using SWOT and DPSIR. *Environment, Development and Sustainability*, 23(11), 15960–15985. <https://doi.org/10.1007/s10668-021-01313-3>

Tian-Cole, S., Crompton, J. L., & Willson, V. L. (2002). An empirical investigation of the relationships between service quality, satisfaction and behavioral intentions among visitors to a wildlife refuge. *Journal of Leisure Research*, 34(1), 1–24. <https://doi.org/10.1080/00222216.2002.11949957>

Tsai, H., Tzeng, S., Fu, H., & Wu, J. C. (2010). *Managing multinational sustainable development in the European Union based on the DPSIR framework*. 4(5), 1–9.

Vipriyanti, N. U., Semadi, I. G. N. M. D., & Fauzi, A. (2022). Developing mangrove ecotourism in Nusa Penida Sacred Island, Bali, Indonesia. *Environment, Development and Sustainability*, 0123456789. <https://doi.org/10.1007/s10668-022-02721-9>

Wiesli, T. X., Hammer, T., & Knaus, F. (2022). Improving quality of life for residents of biosphere reserves and nature parks: management recommendations from Switzerland. *Sustainability: Science, Practice, and Policy*, 18(1), 601–615. <https://doi.org/10.1080/15487733.2022.2100128>

Wiratno, W., Withaningsih, S., Gunawan, B., & Iskandar, J. (2022). Ecotourism as a Resource Sharing Strategy: Case Study of Community-Based Ecotourism at the Tangkahan Buffer Zone of Leuser National Park, Langkat District, North Sumatra, Indonesia. *Sustainability (Switzerland)*, 14(6). <https://doi.org/10.3390/su14063399>

Yan, L., Gao, B. W., & Zhang, M. (2017). A mathematical model for tourism potential assessment. *Tourism Management*, 63, 355–365. <https://doi.org/10.1016/j.tourman.2017.07.003>