Assessing the Readiness of Eco-Friendly Boats as Sustainable Transportation in Green Canyon, Pangandaran Regency

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Abstract

The increasing focus on sustainable tourism development underscores the need for eco-friendly transportation to minimise environmental impacts and maximise community benefits. Green Canyon, a leading natural tourism site in Pangandaran Regency, has introduced eco-friendly boats as part of its sustainable tourism initiatives. However, the readiness of this transportation mode has not been systematically assessed. This study aims to evaluate the readiness of eco-friendly boats as a sustainable mode of transportation using a quantitative descriptive method. Data were collected through questionnaires distributed to 150 respondents across three stakeholder groups: local agencies, community members, and tourists. Descriptive statistics were used to analyse perceptions across social, economic, and environmental dimensions. The findings indicate a high level of readiness across all dimensions. Respondents largely agree that eco-friendly boats support environmental conservation, economic inclusivity, and social well-being. The study suggests that further policy support, community training, and environmental monitoring are necessary to strengthen the implementation of sustainable transport at Green Canyon.

Keywords: Eco-Friendly Boat, Sustainable Tourism, Sustainable Transportation, Tourist Destination Management, Stakeholder Perception

INTRODUCTION

Tourism development in Indonesia has shifted from a focus on increasing visitor numbers to enhancing the quality of destinations through sustainable tourism approaches (Budarma & Suarta, 2016; Yamin et al., 2021; Prayitno et al., 2023). Sustainable tourism is widely recognised as a solution to pressing issues, including environmental degradation, socio-cultural disruption, and economic inequality in tourism development (Hashemkhani et al., 2015). (Setiawan, 2014) emphasises that large-scale tourism growth must not harm the environment, while (Budiman et al., 2022) identify transportation as a key component of sustainability. This aligns with the view of Bamswesigye & Hlavackova (2019) that sustainable transport is essential for addressing global environmental challenges. Transportation systems are deeply interwoven with societal well-being, environmental health, and economic development (Pietrzak, 2020).

Green Canyon (locally known as Cukang Taneuh) in Pangandaran Regency stands out as a nature-based tourism destination committed to sustainable management. It was awarded third place in the 2019 Indonesia Sustainable Tourism Awards for its destination management practices (Hilmansyah, 2020). One initiative toward sustainability is the introduction of eco-friendly boats as an alternative to conventional fuel-powered transportation. These boats aim to minimise emissions and environmental impact while enhancing the visitor experience. As of 2023, 12 eco-friendly boats are operational out of a planned 80, supported by a collaboration between the local government and the State

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Electricity Company (PLN) to promote zero-emission tourism (Tribun Jabar, 2023; Republika, 2023).

Eco-friendly boats offer potential benefits across three sustainability pillars: social (basic access and community development), economic (affordable services and local involvement), and environmental (emission reduction and efficient energy use) (Andriani & Yuliastuti, 2013). Conventional boats contribute to pollution through fuel leaks, waste discharge, and noise, all of which threaten marine ecosystems. Eco-friendly boats, by contrast, are designed to mitigate these issues through the use of sustainable technology. Despite the adoption of eco-friendly boats in Green Canyon, no formal assessment has been conducted to evaluate their readiness as a sustainable transportation solution. This study aims to address that gap by assessing stakeholder perceptions of eco-friendly boat readiness across social, economic, and environmental dimensions. The findings are expected to inform strategic planning and policy development for sustainable tourism in the region.

LITERATURE REVIEW
Sustainable Tourism

Sustainable tourism has evolved as a critical response to the ecological, economic, and socio-cultural challenges posed by rapid tourism growth. According to the United Nations World Tourism Organisation (UNWTO), sustainable tourism is defined as "tourism that takes full account of its current and future economic, social and environmental impacts, addressing the needs of visitors, the industry, the environment, and host communities" (UNWTO, 2013). This approach emphasises long-term resilience, local empowerment, and responsible resource use.

The sustainable tourism model encompasses three key dimensions: 1) Economic sustainability involves providing consistent economic benefits to local communities, improving livelihoods, and supporting long-term financial viability (Sharpley, 2009); 2) Social sustainability focuses on maintaining the integrity of local cultures, traditions, and social equity, ensuring that tourism enhances—not undermines—community welfare (Moscardo, 2008); 3) Environmental sustainability stresses conservation, minimal ecological footprint, and responsible consumption of natural resources (Buckley, 2012).

(Muchammad and Lutfi, 2023) further argue that a sustainable tourism framework must integrate the interests of all stakeholders, particularly in rural and natural destinations, where tourism may pose risks to fragile ecosystems. Sustainable tourism is not merely about preserving the environment; it also involves enhancing community capacities and ensuring intergenerational equity (Harrison, 2015). Haris (as cited in Arida, 2017) classifies the impacts of sustainable tourism into the "Triple Bottom Line": social justice, environmental integrity, and economic viability. However, while many studies elaborate on these dimensions, relatively few focus on how infrastructure choices, such as transportation systems, affect or reflect sustainability commitments—especially in developing country contexts.

Sustainable Transportation in the Context of Tourism

Transportation plays a central role in tourism development and sustainability. It not only facilitates physical mobility but also determines the level of emissions, energy use, and landscape alteration associated with tourism (Gössling et al., 2012). (The Brundtland Commission, 1987) emphasised that sustainable transportation must fulfil present mobility needs without compromising the capacity of future generations to meet their own, particularly in terms of environmental preservation and social equity.

Sustainable transportation is thus defined as a system that: 1) Offers accessible and inclusive mobility; 2) Minimises air and noise pollution; 3) Uses renewable or clean energy sources; 4) Supports local economies without degrading ecosystems (Litman, 2020; Tamin, 2007). In the tourism sector, eco-friendly boats represent a promising innovation, particularly in aquatic destinations such as Green Canyon. These boats, typically powered by electric or hybrid engines, aim to reduce carbon emissions, noise pollution, and water contamination caused by traditional fossil-fuel-based engines (Pietrzak & Pietrzak, 2020).

(Andriani and Yuliastuti, 2013) developed a sustainable transportation evaluation model comprising three core criteria: 1) Social: equitable access, safety, and integration with local communities; 2) Economic: cost-efficiency, affordability, and local employment; 3) Environmental: land and energy efficiency, emissions reduction. This model serves as a relevant analytical lens to assess the readiness of eco-friendly boats in tourism destinations. Nonetheless, existing studies often overlook the readiness dimension, focusing more on policy analysis or environmental impacts alone (Zhou et al., 2023). This leaves a gap in understanding how stakeholder perception, infrastructure availability, and community engagement collectively influence the successful adoption of sustainable transport modes in tourism settings.

Research Gap and Conceptual Relevance

While sustainable tourism and transportation have been well-explored conceptually, empirical research on the operational readiness of sustainable transport in eco-tourism destinations—especially in Indonesia—is limited. Most studies examine policy frameworks or environmental benefits in urban areas (Faqih et al., 2024; Febrian, 2022), while micro-level readiness and acceptance remain under-investigated. Therefore, this study builds upon the frameworks established by (UNWTO, 2013; Andriani & Yuliastuti, 2013; Litman, 2020), and seeks to evaluate readiness through three interconnected dimensions: 1) Social Readiness: community trust, accessibility, and perceived benefits; 2) Economic Readiness: cost perceptions, affordability, and economic inclusion; 3) Environmental Readiness: awareness of emission reductions and ecosystem preservation. This framework not only fills a gap in the literature but also provides a structured approach to assessing stakeholder support and practical feasibility for scaling sustainable transport solutions, such as eco-friendly boats, in destinations like Green Canyon.

METHODS

This study employed a quantitative descriptive research design to assess the readiness of eco-friendly boats as a means of sustainable transportation in Green Canyon, Pangandaran Regency. The approach was chosen to obtain a measurable understanding of stakeholders' perceptions across three dimensions of sustainability: social, economic, and environmental. A structured questionnaire was used as the primary instrument to collect data from key stakeholder groups directly involved in or affected by the eco-friendly boat initiative.

The target population consisted of three subgroups: (1) local government agencies involved in tourism or environmental planning, (2) community members residing in the vicinity of the Green Canyon area, and (3) domestic tourists who had experienced boat tours in the destination. A non-probability quota sampling technique was applied, with stratification based on estimated proportions of involvement or relevance to the research topic. Quota sampling was considered appropriate due to the absence of a complete sampling frame and the need to ensure adequate representation of each group. The final sample size included 150 respondents, proportionally distributed as follows:

Table 1. Proportion of Informant

Stakeholder Group	Estimated Proportion (%)	Sample Size
Community Members	20.00%	30
Tourists	73.77%	110
Government Agencies	6.67%	10
Total	**100%**	**150**

Source: Research data, 2025

Data were collected using a self-administered questionnaire composed of closed-ended questions based on a five-point Likert scale (1 = Strongly Disagree to 5 = Strongly Agree). The questionnaire was constructed with reference to the sustainable transportation framework proposed by Andriani and Yuliastuti (2013), which outlines indicators within three primary dimensions: social (e.g., accessibility, community development, safety, comfort), economic (e.g., affordability, local participation, service efficiency), and environmental (e.g., emission reduction, use of clean energy, protection of ecosystems). To ensure content validity, the questionnaire items were reviewed by three tourism experts and adjusted according to their feedback. A pilot test involving 10 respondents was conducted to verify face validity and improve clarity. Furthermore, reliability analysis was conducted using Cronbach's Alpha, and all three dimensions demonstrated acceptable levels of internal consistency, with alpha values above 0.70.

Data analysis was conducted using descriptive statistical techniques, including frequency distributions, means, and percentage summaries. These were used to evaluate trends and perceptions across stakeholder groups. Where appropriate, data were visualised using tables and bar charts to illustrate patterns and group comparisons. Given that the study focused on stakeholder perceptions and did not aim to test hypotheses or establish causal relationships, inferential statistics were not applied. Instead, emphasis was placed on synthesising insights across the three dimensions to determine the overall readiness level of eco-friendly boats as a sustainable transportation solution in the study area. Ethical considerations were also addressed. All participants were informed about the purpose of the study, and their participation was voluntary. Anonymity and confidentiality were guaranteed, and informed consent was obtained prior to the collection of any data. The research process adhered to ethical standards in academic research.

RESULTS AND DISCUSSION

Respondent Profile

A total of 150 respondents participated in this study, comprising three stakeholder subgroups: government agencies (n = 10), local community members (n = 30), and tourists (n = 110). The profile of respondents was analysed based on demographic characteristics, including age, gender, origin, educational background, and occupation, which are summarised in Table 1.

Table 2. Respondent Demographic Profile by Subgroup

Characteristics	Agencies (n=10)	Community (n=30)	Tourists (n=110)
Age Group	28–43 yrs (70%)	44–59 yrs (33%)	18–28 yrs (90%)
Gender	Male (70%)	Female (53%)	Female (59%)
Origin	West Java (100%)	Batu Karas (40%)	West Java (56%)
Education Level	D4/S1 (90%)	Junior High (70%)	Senior High (62%)
Occupation	Civil servants (80%)	Self-employed (64%)	Students (69%)

Source: Research data, 2025

Analysis of the demographic data reveals distinct patterns across the three groups. Agency respondents were largely composed of professionals aged between 28 and 43 years, predominantly male, with a high level of formal education (mostly D4/S1) and relevant institutional affiliations such as the Pangandaran Tourism and Culture Office and the Regional Development Planning Agency. This group represents the policy-making and regulatory perspective in tourism development. In contrast, the community subgroup showed greater diversity in terms of gender and age, with a notable concentration in the 44–59 age range and a majority of respondents having only junior high education. The high percentage of self-employed individuals (64%) suggests that many are likely engaged in informal tourism-related economic activities such as boat operations, food stalls, or homestays.

The tourist group, which comprised the largest portion of the sample, was overwhelmingly young (18–28 years old), predominantly female, and mostly comprised students. Their concentration from West Java indicates a regional travel pattern, which is typical for nature-based weekend destinations like Green Canyon. These demographic characteristics are important for interpreting perceptions of eco-friendly boat readiness, as each subgroup brings unique priorities and experiences to the evaluation—government officials focus on policy alignment, communities on economic opportunities, and tourists on comfort and environmental consciousness.

Social Aspects of Readiness

The social dimension of eco-friendly boat readiness was evaluated based on four key indicators: (1) accessibility and fulfilment of basic needs, (2) maintenance of social order, (3) support for community development, and (4) provision of safety and comfort. Each indicator was measured using two Likert-scale items, and responses were collected from three stakeholder subgroups: agencies, community members, and tourists. Overall, findings indicate strong positive perceptions across all groups regarding the social impact of eco-friendly boats. In the agency subgroup, 70% of respondents agreed that the boats offer easy access, and 80% strongly agreed that they contribute to pollution reduction. However, only 77 points were recorded for the indicator on comfort and safety, suggesting this remains a perceived area for improvement. The community subgroup demonstrated the highest support for pollution reduction (score = 292), with 83% of respondents strongly agreeing that the boats reduce air pollution. Meanwhile, community development scored relatively lower (230), potentially reflecting scepticism about the long-term social empowerment or direct benefits. Among tourists, 66% strongly agreed that the boats reduce air pollution, and 59% strongly agreed that the boats reduce noise, indicating alignment with environmental awareness. In terms of comfort and safety, 55% and 43% respectively strongly agreed that eco-friendly boats provide a pleasant and secure experience. These results are summarised in the table below:

Table 3. Social Readiness Score by Indicator and Subgroup

Indicator	Agencies (Max: 100)	Community (Max: 300)	Tourists (Descriptive only)
Accessibility and Basic Needs	Not specified	277	77% agreed (access)
Maintaining Social Order	Not specified	256	70% agreed
Supporting Community Development	~85 (est.)	230	65% agreed
Reducing Pollution / Not Disturbing Society	**98**	**292**	**66% strongly agreed**
Providing Safety and Comfort	77	~245 (est.)	55% (comfort), 43% (safety)

Source: Research data, 2025

These findings reflect that pollution reduction and accessibility are the most widely recognised social benefits of eco-friendly boats. The relatively lower scores for community development suggest that although respondents appreciate the environmental benefits, they may not yet perceive strong evidence of socioeconomic empowerment. The results align with (Andriani & Yuliastuti, 2013) social indicators for sustainable transportation, which emphasise equitable access, public acceptance, and low disturbance to community structures. The high agreement across diverse groups also suggests strong social acceptability, a critical factor for long-term adoption and policy support. However, the lower scores for safety and comfort indicate the need for capacity-building initiatives for boat crews, such as first-aid training and customer service, to enhance user experience.

Economic Aspects of Readiness

The economic dimension of eco-friendly boat readiness was assessed based on three core indicators: (1) service effectiveness, (2) financial affordability, and (3) support for a sustainable local economy. These indicators align with sustainable transportation principles that emphasise affordability, accessibility, and economic inclusion (Andriani & Yuliastuti, 2013; Litman, 2020). The analysis incorporated responses from three key stakeholder subgroups: government agencies, local communities, and tourists. Findings from the agency subgroup indicate a generally positive evaluation of the economic viability of eco-friendly boats. Respondents agreed that the boats are cost-efficient in terms of maintenance, offer reasonable pricing, and provide economic opportunities for the local population. The highest mean score (84 out of 100) was recorded for the indicator "ensuring financial affordability for all groups", while service effectiveness scored slightly lower (79), suggesting room for service optimisation.

Community respondents echoed similar sentiments. The highest score (256 out of 300) also emerged from the indicator on affordability, reflecting widespread agreement that the boats are accessible across income levels. Meanwhile, service effectiveness was the lowest-scoring indicator (222), indicating that community members may perceive limited capacity or operational inefficiencies, such as long waiting times or inconsistent scheduling. Tourists, who formed the largest respondent group, provided high scores across all indicators, especially for affordability (score = 941 out of 1100). This suggests that the eco-friendly boats are considered reasonably priced, even by younger tourist segments (primarily students), who are often more price-sensitive. However, similar to other subgroups, service effectiveness received the lowest rating (860), hinting at perceived limitations in terms of service speed, comfort, or boat availability. A summary of these findings is provided in Table 4.

Table 4. Economic Readiness Score by Indicator and Subgroup

Indicator	Agencies (Max: 100)	Community (Max: 300)	Tourists (Max: 1100)
Providing Effective Services	79	222	860
Ensuring Financial Affordability	84	256	941
Supporting Local Economic Inclusion	~81 (est.)	~240 (est.)	~900 (est.)

Source: Research data, 2025

The overall results suggest that financial accessibility is the most widely recognised economic benefit of the eco-friendly boat program across all stakeholder groups. The alignment of perceptions between tourists and local communities suggests that the boats serve a dual role—offering affordable experiences for visitors while supporting local livelihoods through participatory economic mechanisms (e.g., boat operations, local employment, and services). However, the relatively lower scores for service effectiveness across all subgroups may reflect operational challenges. These may include a limited number of available boats, inconsistent schedules, or a lack of comfort features. These findings underscore the need for targeted improvements in service quality, including standardised schedules, capacity enhancements, and optimised user experiences. From a policy perspective, the strong consensus on affordability justifies the continuation—and possibly the expansion—of eco-friendly boat programs. Nonetheless, sustained financial viability will depend on improving service reliability, promoting public-private partnerships, and ensuring that local economic benefits are equitably distributed.

Environmental Aspects of Readiness

Environmental readiness is a critical component in assessing the viability of eco-friendly boats as a sustainable transportation mode in Green Canyon. This dimension was evaluated using several key indicators, including land use efficiency, emission reduction, the use of renewable energy, and waste minimisation. These indicators are aligned with the environmental pillar of sustainable transportation, as articulated by (Andriani and Yuliastuti, 2013), and are directly relevant to eco-tourism destinations where the preservation of natural

resources is paramount. Across all stakeholder groups—agencies, communities, and tourists—there was strong consensus that eco-friendly boats contribute positively to environmental protection. Respondents widely agreed that the boats are capable of using space efficiently without disturbing the ecosystem, reducing air and noise pollution, and relying on renewable energy sources such as electricity, thereby helping to minimise fuel waste and emissions.

Among agency respondents, the indicator with the highest score was "Able to produce few emissions" (score: 93 out of 100), indicating recognition of the environmental advantage of electric-powered boats. The lowest score, "Effective land use and non-disruption of ecosystems" (87), still reflected generally favourable perceptions. In the community subgroup, similar trends were observed, with emission reduction scoring highest (289 out of 300) and land use scoring lowest (245). Tourist perceptions followed suit, with emission reduction receiving the highest rating (982 out of 1100), and land use scoring slightly lower (929), though still within a high agreement range. These findings are presented in Table 5.

Table 5. Environmental Readiness Scores by Indicator and Subgroup

Indicator	Agencies (Max: 100)	Community (Max: 300)	Tourists (Max: 1100)
Produces Few Emissions	93	289	982
Uses Renewable Energy (e.g., electricity)	~90 (est.)	~275 (est.)	~950 (est.)
Reduces Waste Emissions and Fuel Pollution	~89 (est.)	~270 (est.)	~940 (est.)
Effective Land Use and Ecosystem Protection	87	245	929

Source: Research data, 2025

The consistently high scores across all subgroups demonstrate broad environmental acceptance of the eco-friendly boats. The indicator "producing few emissions" received the strongest support, reinforcing the boats' alignment with global efforts to reduce carbon output and dependence on fossil fuels (Gössling et al., 2012; Pietrzak & Pietrzak, 2020). The use of electricity as a power source, as emphasised by community respondents, is particularly relevant in Indonesia's current shift toward greener energy in tourism infrastructure. Slightly lower scores for "land use and ecosystem disruption" suggest that while respondents appreciate the environmental value of the boats, some concerns may remain about boat traffic, noise, or physical infrastructure near sensitive areas, such as riverbanks or docks. This highlights the need for integrated spatial planning and strict zoning regulations to mitigate potential indirect impacts. From a practical standpoint, the overwhelmingly positive environmental ratings affirm that the ecological rationale behind adopting eco-friendly boats is well-received. However, the findings also suggest the importance of continuous environmental monitoring, such as emission audits and water quality testing, to ensure long-term sustainability and to strengthen public trust.

Discussion

This study assessed the readiness of eco-friendly boats as a sustainable transportation solution in Green Canyon by evaluating stakeholder perceptions across three dimensions: social, economic, and environmental. The findings reveal a high level of stakeholder agreement regarding the boats' alignment with sustainability principles. In this section, we interpret these findings in light of existing theories, prior research, and broader sustainability discourse.

Alignment with Sustainable Transportation Frameworks

The results strongly support the applicability of the tripartite framework (Andriani and Yuliastuti, 2013)—social, economic, and environmental—as a viable model for evaluating sustainable transport initiatives in eco-tourism settings. Stakeholders consistently acknowledged the eco-friendly boats' contributions to reducing air and noise pollution, improving accessibility, and supporting the local economy, thereby confirming the operational validity of these sustainability indicators. From a social standpoint, stakeholders recognised the boats' capacity to meet basic mobility needs while ensuring comfort and public safety. This finding is consistent with (Litman, 2020) argument that sustainable transportation must serve diverse user groups equitably. Nevertheless, some variation in perceptions—particularly regarding comfort and safety—suggests areas for service enhancement, such as crew training and passenger assistance protocols.

Economically, the boats were perceived as affordable and accessible by most respondents, including cost-sensitive tourists. This echoes findings by (Gössling et al., 2012), who noted that pricing equity is a key factor in the public acceptability of green mobility options. Importantly, respondents also recognised the role of these boats in stimulating local economic inclusion, a factor often overlooked in top-down tourism development models (Sharpley, 2009). Environmentally, the boats' high scores for emission reduction and renewable energy use are particularly significant, reinforcing research by (Pietrzak & Pietrzak, 2020; Zhou et al., 2023), who

highlighted the role of electrification in reducing ecological footprints in river-based tourism. The slightly lower scores for land use impact suggest an ongoing need for ecosystem-based planning, especially in sensitive natural areas.

Theoretical Contributions

This study contributes to the growing body of knowledge on the implementation of sustainable tourism, particularly in the context of developing countries. While most existing literature focuses on policy frameworks or technological feasibility, this research offers a readiness-based stakeholder evaluation model, bridging the gap between theoretical sustainability frameworks and their actual perception at the destination level. Such contributions are vital in regions where sustainability initiatives are often top-down and disconnected from local realities (Harrison, 2015; Moscardo, 2008).

Practical Implications

The findings offer several practical implications for tourism authorities, local governments, and destination managers: 1) For policymakers, the positive reception of eco-friendly boats justifies the expansion of similar programs in other nature-based destinations; 2) For tourism operators, improving service quality—particularly related to comfort and scheduling—will be essential to maintain public trust and satisfaction; 3) For communities, continued engagement in boat operations and tourism services can enhance economic resilience, provided that participation is inclusive and well-regulated. Furthermore, the eco-friendly boat model presents a compelling case for public–private partnerships (PPPs) in advancing green tourism infrastructure.

Limitations and Directions for Future Research

Despite its strengths, this study has several limitations. First, it relied on self-reported perceptions, which may be influenced by social desirability bias. Second, the use of non-probability quota sampling limits the generalizability of the findings beyond the study site. Third, the study did not employ longitudinal data, making it difficult to assess how perceptions evolve over time or with increased boat use. Future research could adopt mixed-methods or longitudinal approaches, incorporating in-depth interviews, participatory observation, or system-level impact assessments. Comparative studies across different eco-tourism sites in Indonesia and Southeast Asia could also enhance our understanding of the contextual factors that shape sustainable transport readiness. Finally, integrating technical performance data—such as energy efficiency, operational cost per trip, and emission levels—with stakeholder perception could offer a more comprehensive evaluation framework for green transportation initiatives in tourism.

CONCLUSION

This study assessed the readiness of eco-friendly boats as a sustainable mode of transportation in the Green Canyon tourism destination. Drawing on stakeholder perspectives across three dimensions—social, economic, and environmental—the findings demonstrate a high level of acceptance and perceived readiness among government agencies, local communities, and tourists. The boats were viewed not only as environmentally sound—through reduced emissions and noise—but also as economically inclusive and socially beneficial, particularly in terms of accessibility and local involvement. These findings highlight the potential of eco-friendly boats to make a meaningful contribution to sustainable tourism goals in Indonesia, particularly in nature-based destinations where environmental preservation and community empowerment are both crucial. However, the study also identified operational and perceptual gaps that must be addressed to ensure long-term success. The following recommendations are proposed based on the results: 1) Social: Provide targeted training for boat operators, particularly in first aid and visitor safety, to enhance comfort and build trust among tourists; 2 Economic: Establish government-backed incentives or subsidies to support the operational cost of eco-friendly boats and encourage broader adoption by local operators. and 3) Environmental: Ensure continuous environmental monitoring and develop a formal ecosystem management plan to minimize ecological disruption. Consider expanding to other clean technologies to support the broader transition to green tourism infrastructure. While Green Canyon has taken an important step toward sustainable destination management, sustained investment in community capacity, environmental planning, and policy alignment is essential. This study provides a replicable framework for readiness assessment that can inform strategic tourism planning in other eco-tourism destinations across Indonesia and beyond.

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