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A Framework of Sustainability Performance Indicators for Terrestrial Tourism Development: An Architectural Perspective

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ABSTRACT

Terrestrial nature-based tourism offers economic and empowerment benefits but also poses risks degrading ecosystems, biodiversity, and local cultures when planning tools lack contextual sensitivity. This study develops a concise set of sustainability performance indicators for terrestrial nature-based tourism from a sustainable architectural perspective. Using a mixed-method descriptive-explanatory approach, the research identified and classified 75 performance indicators into four dimensions aligned with Minister of Tourism & Creative Economy Regulation Number 9 of 2021: environmental (planet), socio-cultural (people), tourism management (management), and socio-economic (prosperity). These indicators complement and extend the Global Sustainable Tourism Council (GSTC) guidelines by addressing gaps specific to terrestrial nature-based tourism in Indonesia. The results provide a practical framework for destination managers, planners and architects, policymakers, auditors, and researchers, fostering tourism development that is more responsible, architecturally informed, and grounded in local contexts. Nevertheless, the 75 performance indicators still require expert validation to determine which criteria and indicators should be prioritized in advancing sustainable terrestrial nature-based tourism.

1. INTRODUCTION

Indonesia's tourism sector has been undergoing a significant recovery and growth trajectory, establishing itself as a vital pillar of the national economy [1]. This upward trend is characterized by increasing domestic and international mobility [2]. Notably, the data from Statistics Indonesia (BPS) [3] as published in the 2022 tourist statistics, recorded a dramatic 364.31% increase in foreign tourist arrivals in October 2022. This resurgence presents strategic opportunities for business development, particularly within nature-based tourism sectors, and calls for enhanced involvement of both government and industry stakeholders [4].

One notable example of this rapid expansion is West Java Province. According to the West Java Office of Tourism and Culture [5], the number of designated natural tourist destinations has grown significantly across administrative regions. In 2014, seven regions lacked natural tourism sites; however, by 2020, all regions had established such destinations. The overall number rose from 386 in 2020 to 624 in 2021 an increase of over 60% and reached 661 in 2022. In certain regions, this growth was particularly dramatic, such as an increase from 20 to 313 locations within two years. These figures underscore the rapid and widespread development of terrestrial nature-based tourism in the region.

Despite its economic promise, this expansion raises critical concerns regarding environmental sustainability and socio-cultural integrity. As highlighted by Gao and Song [6] and Colin Hunter and Green Howard [7], terrestrial nature-based tourism directly impacts the ecosystems upon which it depends. Empirical studies have shown that tourism-related activities can accelerate resource overexploitation, habitat degradation, pollution, soil erosion, and even the erosion of local cultural identities [8-12]. Terrestrial landscapes such as forests, savannas, and wetlands are especially susceptible to these pressures [13].

While sustainability dominates global tourism discourse, policies and practices still emphasize environmental protection and economic growth [14-16], often sidelining architectural dimensions such as spatial layout, built-environment integration, and contextual design. This neglect persists despite growing evidence that spatial and physical attributes of tourism infrastructure significantly shape ecological and socio-cultural outcomes [17]. Ineffective

spatial planning may exacerbate environmental degradation and limit equitable access [18, 19], whereas context-sensitive and culturally grounded design enhances ecological resilience and enriches visitor experiences [20, 21].

In Indonesia, several regulatory and institutional efforts have been undertaken to promote sustainable tourism. These include the adoption of international standards from the Global Sustainable Tourism Council (GSTC) [22] and national regulations specifically the Regulation of the Minister of Tourism & Creative Economy No. 9 of 2021. While these initiatives provide foundational guidance, they tend to be generalized and do not fully address the unique characteristics of terrestrial nature-based tourism, nor do they systematically incorporate architectural dimensions into sustainability assessments.

Addressing this research gap, the present study aims to develop a comprehensive set of performance indicators that encapsulate sustainability in terrestrial nature-based tourism, with particular emphasis on the integration of architectural frameworks. The core research question that guides this inquiry is: *How can context-sensitive and relevant performance indicators be developed to assess the sustainability of terrestrial nature-based tourism*?

To address this question, the study formulate performance indicators by referring to several key sources, including GSTC, Regulation of the Minister of Tourism & Creative Economy Number 9 of 2021, and the Green Building Council Indonesia (GBCI) as supporting parameters, as well as various relevant previous studies. This study is guided by predefined framework comprising four main categories: Planet (Environmental), Prosperity (Socio-Economic), People (Socio-Cultural), and Management of tourism (Management).

The formulation of performance indicators was conducted through an architectural perspective by incorporating supporting parameters derived from GBCI for Neighborhood and GBCI for Building. The combined criteria of these two schemes encompass four key dimensions: Socio-Economic, Socio-Cultural, Environmental, and Managerial aspects. Integrating GBCI for Neighborhood and GBCI for Building as supplementary parameters strengthens the sustainability assessment model for terrestrial nature-based tourism, as it captures both the scope of sustainable planning and development at the neighborhood scale and the performance, design, and operational aspects of buildings that collectively contribute to achieving sustainability.

This framework is intended to guide destination managers, planners & architects, policy makers, auditors, and researchers in advancing terrestrial nature-based tourism. Its expected impact includes fostering environmentally responsible design, reinforcing local cultural identity, and improving the long-term sustainability and resilience of terrestrial nature-based tourism development in Indonesia.

2. RESEARCH METHOD

This study adopts a mixed-methods approach within an explanatory-descriptive research framework to develop a comprehensive set of performance indicators for assessing the sustainability of terrestrial nature-based tourism from an architectural perspective. The combination of qualitative and quantitative methods is employed to capture various dimensions of sustainability, enabling the formulation of holistic and context-sensitive indicators. The research was carried out in five sequential stages (see Figure 1), integrating content analysis techniques with statistical evaluation.

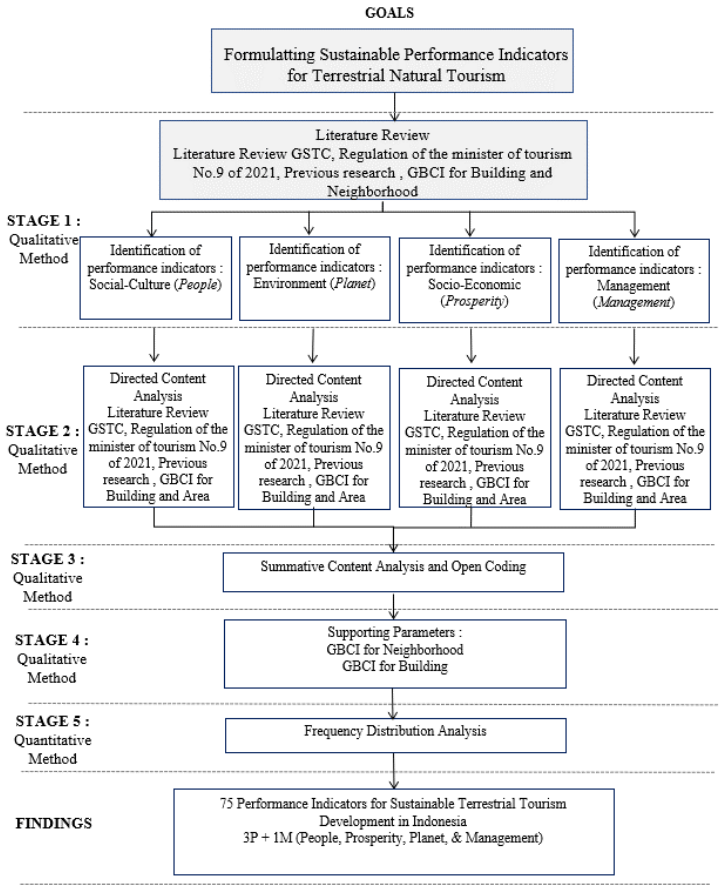

Figure 1. Stages of the research methodology framework

The first three stages employed qualitative methods. In Stage 1, a structured literature review was conducted to collect and tabulate textual data from key sources, including international guideline (e.g., Global Sustainable Tourism Criteria for Destinations [GSTC-D]) [23], national regulations (e.g., Ministerial Regulation No. 9 of 2021 [24]), and previous academic studies relevant to sustainable tourism. This stage aimed to identify conceptual foundations and initial indicator references.

Table 1. Mapping of regulation categories to GSTC pillars

Ministerial Regulations No. 9 of 2021	Global Sustainable Tourism Council (GSTC)
Management of Tourism (Management)	Sustainable Management (A)
Socio-Economic (Prosperity)	Socio-Economic (C)
Socio-Cultural (People)	Cultural Sustainability (B)
Environmental (Planet)	Environmental Sustainability (D)

Regulation of The Minister of Tourism and Creativity No.9 of 2021 is conceptually grounded in the GSTC framework, as its four sustainability-Management of Tourism (Management), Socio-Economic (Prosperity), Socio-Cultural (People), and Environmental (Planet)-parallel the GSTC pillars of Sustainable Management, Socio-economic Sustainability, Cultural Sustainability, and Environmental Sustainability (Table 1). Each category in the regulation aligns directly with its corresponding GSTC pillar, ensuring coherence between national assessment requirements and internationally recognized sustainability standards. This alignment strengthens the methodological compability of the terrestrial nature-based tourism model with global best practices.

Papers were selected based on their relevance to the keywords sustainability, sustainable tourism, and sustainable architecture. This study does not explore architecture or tourism depth, but focuses on gathering previous research that links both fields and extracting architectural aspects from tourism studies and vice versa. All collected papers were then categorized and mapped, followed by a review according to future research needs.

The reviewed papers were classified according to several categories, including publication time span, main theme, scale of study, field orientation, research contribution, and geographical context. Classification by publication period was first conducted to observe changes in research emphasis over time. The papers were then grouped based on their thematic focus, such as sustainable tourism, sustainable architecture, ecotourism, environmental sustainability, and tourism development. Variations in the scale of study were also identified, ranging from global and national to regional and local levels, while disciplinary orientations encompassed architecture, tourism management, and environmental studies. Each paper was further examined for its type of contribution, whether it introduced a model of framework, proposed a strategy, developed a set of indicators, presented a conceptual or theoretical perspective, or offered an analytical critique of practice. Geographical context was additionally recorded, demonstrating the distribution of studies across region including the Middle East, South Asia, and Eastern Europe. Collectively, these categories establish a systematic basis for mapping existing knowledge and highlighting potential directions for future research.

Stage 2 involved directed content analysis, where the extracted data quotations, definitions, or thematic categories were sorted into four main sustainability categories, as outlined in the Regulation of the Minister of Tourism and Creative Economy Number 9 of 2021: environmental (planet), socio-cultural (people), socio-economic (prosperity), and management (management). This method, as described by Assarroudi et al. [25] ensures that data interpretation remains focused and structured.

In Stage 3, a summative content analysis was used to uncover recurring patterns, keywords, and themes across documents [26]. These included themes such as conservation efforts, community involvement, destination governance, and visitor experience. A quantitative component was introduced through open coding [27], which organized indicators based on performance relevance. Each indicator was then quantified through a frequency count to identify those appearing most consistently across the data sources, reflecting their relative importance. This stage refined the conceptual mapping of performance indicators.

Stage 4 reintroduced a qualitative dimension by incorporating additional parameters from the Green Building Council Indonesia (GBCI), specifically the Greenship rating tools. These parameters supplemented the initial indicator set and ensured that the framework integrated measurable architectural sustainability criteria. Compared to GSTC-D, GBCI's indicators offer more quantifiable standards aligned with built environment performance.

The GBCI parameters were selected for their conceptual alignment with the intended performance indicators, ensuring consistency in meaning and purpose. Each indicators was evaluated for applicability at the building scale, the neighborhood scale, or both, enabling the appropriate adaptation of GBCI criteria as supporting parameters within the terrestrial nature-based tourism evaluation model.

Finally, Stage 5 applied frequency distribution analysis to evaluate the prevalence and clustering of indicators across the four main sustainability categories. This step helped to validate indicator significance and ensure balanced representation. Open coding is a qualitative process used to identify and categorize themes from textual data. In contrast, frequency distribution is a quantitative approach that counts how often each theme or indicators appears. Open coding explains what concepts exist, while frequency distribution shows how frequent or dominant each concept is. It also confirmed the strength of integration between the qualitative and quantitative findings, reinforcing the methodological rigor and reliability of the framework. Overall, the methodology facilitated the development of a data-driven, context-aware, and architecturally informed indicator system, providing a practical foundation for sustainable tourism planning, evaluation, and policymaking.

3. RESULTS

The performance indicators for sustainable terrestrial nature-based tourism were formulated based on a review of several key literature, including the *Global Sustainable Tourism Criteria for Destinations* (GSTC-D), the *Regulation of the Minister of Tourism and Creative Economy No. 9 of 2021*, and nine relevant previous academic literature. The following nine relevant previous academic literature are considered to this research:

1) Baloch et al. [28]: "Impact of tourism development

upon environmental sustainability: a suggested framework for sustainable ecotourism".
2) Chang et al. [29]: "Sustainability".
3) Aall [30]: "Sustainable tourism in practice: Promoting or preventing the quest for a sustainable development".
4) Pratheep [31]: "Sustainable architecture and tourism management".
5) AbuSada and Thawaba [32]: "Multi criteria analysis for locating sustainable suburban centers: A case study from Ramallah Governorate, Palestine".
6) WTO [33]: "Indicators of Sustainable Development for Tourism Destinations".
7) P3TB [34]: "Program Pembangunan Pariwisata Terintegrasi dan Berkelanjutan".
8) Sharma and Krishna [35]: "Sustainable Tourism Architecture Bangladesh".
9) Mazilu and Draguleasa [36]: "Sustainable Tourism Development - an applied model of the Bucegi Mountains".

The formulation of these performance indicators is guided by four main categories that form the basis of sustainable tourism, as defined in national policy through the regulation of the Minister of Tourism and Creative Economy Number 9 of 2021: Environmental (Planet), Management tourism (Management), Socio-Cultural (People), and Socio-Economic (Prosperity).

3.1 Identification of performance indicators through literature review using directed content analysis

In the Directed Content Anlysis stages, the analytical process began with the identification and systematic elaboration of sustainable nature-based tourism performance indicators derived from a wide range of literature and relevant policy documents. Each performance indicators was analyzed to interpret its meaning and contextual relevance in relation to sustainability principles. Rather than employing a fully exploratory approach, this analysis was guided by a predetermined categorization framework consisting of four main categories, as outlined in the Regulation of the Minister of Tourism and Creative Economy Number 9 of 2021. These categories include environmental (Planet), socio-economic (Prosperity), socio-cultural (People), and management of tourism (Management). Through the Directed Content Analysis, all indicators were examined and classified into the categories that best represent their conceptual meaning. As a result of this process, a total of 281 performance indicators were identified, each representing key aspects of sustainability in the context of terrestrial nature-based tourism. These indicators were then mapped into four predetermined dimensions derived from Regulation of the Minister of Tourism and Creative Economy Number 9 of 2021: Planet (Environmental), Prosperity (Socio-Economic), People (Socio-Cultural), Management of Tourism (Management) based on thematic patterns, key terms, and semantic alignment. The categorized resulted in 98 Planet (Environmental) performance indicators, 57 Prosperity (Socio-Economic), 45 People (Socio-Cultural) Performance Indicators, and 81 Management of Tourism (Management).

3.2 75 performance indicators identified through summative content analysis

The Summative Content Analysis stage was conducted to identify recurring keywords, thematic patterns, and shared core meanings across the 281 performance indicators. This step served to refine the dataset into a more concise and conceptually coherent set of indicators representing the sustainability dimensions of terrestrial nature-based tourism. Through this manual semantic review, the initial 98 Environmental indicators were consolidated into 33 indicators, the 57 Socio-Economic indicators into 13 performance indicators, the 45 Socio-Cultural indicators into 16 performance indicators, and the 81 Management of Tourism indicators into 13 performance indicators.

As a result of the analysis, 75 performance were identified as having similar keywords, patterns, and meaning with the overall set. These include: 33 indicators for environmental category (Planet), 13 indicators for management of tourism (Management) category, 16 indicators for socio-cultural (People) category, and 13 indicators for socio-economic (Prosperity) category. A comprehensive summary of the 281 performance indicators into 75 performance indicators is provided in the appendix of this article. Subsequently, these 75 performance indicators were subjected to a literature-based mapping process to visualize the distribution of literature involved in the formulation of these 75 performance indicators. Table 2 presents the literature-based mapping.

Table 2. Literature based mapping

Publication Year		2019	2021	2022	2011	2022
Geographical Context		Global	Indonesia	South Asia	South Asia	Europe
Research Contribution		Framework	Framework/Government Standard	Framework	Architectural Strategies/Framework	Applied Sustainability Model
Literature		[23]	[24]	[28]	[35]	[36]
Environment (Planet)	L1	✓				
	L2	✓				
	L3	✓				
	L4	✓				
	L5	✓				
	L6	✓				
	L7	✓		✓		
	L8	✓	✓			
	L9	✓	✓			
	L10	✓	✓			
	L11	✓	✓			

	L12	✓	✓					
	L13	✓						
	L14							
	L15				✓			
	L16	✓						
	L17							
	L18				✓			
	L19				✓			
	L20	✓						
	L21	✓	✓					
	L22	✓	✓					
	L23	✓						
	L24	✓						
	L25	✓						
	L26		✓					
	L27	✓	✓					
	L28	✓	✓					
	L29	✓	✓					
	L30	✓	✓		✓			✓
	L31	✓						
	L32							
	L33				✓			
Socio-Economic (Prosperity)	S1	✓						
	S2	✓	✓		✓			
	S3							✓
	S4	✓					✓	
	S5		✓					
	S6						✓	✓
	S7	✓						
	S8	✓	✓					
	S9	✓	✓				✓	
	S10		✓		✓			
	S11	✓	✓					
	S12	✓	✓					
	S13	✓	✓					
Socio-Cultural (People)	B1		✓					
	B2	✓						
	B3		✓		✓			
	B4	✓						
	B5	✓						
	B6	✓						
	B7	✓						
	B8	✓	✓				✓	
	B9	✓	✓				✓	
	B10	✓	✓				✓	
	B11	✓			✓			
	B12	✓	✓					
	B13				✓			
	B14	✓						
	B15				✓			
	B16	✓	✓				✓	
Management (Management)	M1						✓	
	M2	✓						
	M3	✓	✓					
	M4	✓	✓				✓	
	M5	✓	✓					
	M6	✓						
	M7	✓						
	M8	✓	✓					
	M9	✓	✓					
	M10	✓	✓				✓	
	M11	✓	✓					

	M12	✓				
	M13	✓	✓			
Publication Year		**2019**	**2013**	**2013**	**2011**	**2004**
Geographical Context		Global	South Asia	Indonesia	Asia	Global
Research Contribution		Thematic Analysis	Integrative Framework	Policy Guideline for Integrated Sustainable Development	Model/Framework	Indicator Framework
Literature		[29]	[31]	[34]	[32]	[33]
Environment (Planet)	L1					
	L2					
	L3					
	L4					
	L5					
	L6					
	L7					
	L8					
	L9					
	L10					
	L11					
	L12	✓	✓			
	L13					
	L14					
	L15					
	L16					
	L17				✓	
	L18					
	L19					
	L20		✓			
	L21					
	L22					
	L23				✓	
	L24					
	L25					
	L26				✓	
	L27		✓			
	L28					
	L29					✓
	L30			✓		
	L31					
	L32		✓			
	L33					
Socio-Economic (Prosperity)	S1					
	S2			✓		
	S3	✓				
	S4	✓				✓
	S5					
	S6					✓
	S7					
	S8		✓			
	S9					
	S10				✓	
	S11					
	S12					
	S13					
Socio-Cultural (People)	B1					
	B2					
	B3			✓		✓
	B4					
	B5					
	B6				✓	
	B7					
	B8					
	B9					
	B10					✓
	B11					
	B12					
	B13					
	B14					
	B15					

Management (Management)	B16					
	M1					
	M2					
	M3					
	M4	✓				✓
	M5					✓
	M6					
	M7					
	M8					
	M9					
	M10	✓				
	M11					✓
	M12					
	M13	✓				✓

During the directed and summative content analysis stages, the 281 performance indicators were not assigned any coding. Coding was applied only after the final set of 75 performance indicators was established, consisting of 33 Planet (Environmental) performance indicators (L1-L33), 13 Management of Tourism (Management) performance indicators (M1-M13), 16 People (Socio-Cultural) performance indicators (B1-B16), and 13 Prosperity (Socio-Economic) performance indicators (S1-S13). Details regarding the categorization and performance indicator grouping can be found in Appendix 7.

Furthermore, the involvement of architects is evident in the integration of parameters established by the Green Building Council Indonesia (GBCI). This integration reinforces the indicator framework by embedding sustainability standards that address both building-level and neighborhood-scale considerations. These parameters reflect professional architectural perspectives and contribute to aligning the framework with nationally recognized green certification systems, thereby enhancing its relevance and applicability built environment assessments.

Although GBCI for Building and GBCI for Neighborhood are designed with different inclusion criteria according to their respective scales, their application to terrestrial nature-based tourism areas remains relevant without requiring specific adaptations. This is because such destinations inherently consist of both buildings and broader site areas. Therefore, GBCI criteria at the building level can be applied to assess the sustainability of physical facilities, while neighborhood-level criteria support the evaluation of environmental and spatial aspects at the larger area scale. In this way, the two schemens complement each other within the context of terrestrial natural nature-based tourism.

3.2.1 Sustainable tourism performance indicators: Environment (Planet)

The results of the distribution analysis simplified the performance indicators by grouping those with similar content, resulting in 33 performance indicators for environmental category (Table 3) (QT = Quantity, see Appendix 1 for Greenship Parameter Codes).

Table 3. Sustainable tourism performance indicators: Environment (Planet)

No.	Performance Indicator Summary	Greenship Parameter Code(s)	Main Reference Source(s)	QT Source	QT Discussion	QT GBCI
L1	Sustainable municipal wastewater treatment		[23]	1	1	0
L2	Cyclist and pedestrian facilities	MAC 5; MAC P2; MAC 1; MAC 4; ASD 2; ASD 3; ASD 4; ASD 6	[23, 37, 38]	1	2	8
L3	Anti-littering campaign	CWS 3	[23, 37]	1	1	1
L4	Alternative transport information	MAC P3	[23, 37]	1	2	1
L5	Tour operator training		[23]	1	2	0
L6	Water use risk management	WMC 1	[23, 37]	1	2	1
L7	Residual waste disposal	BEM 2	[23, 37, 38]	2	2	1
L8	Compliance with wildlife protection		[23, 24]	2	7	0
L9	Water quality monitoring		[23, 24]	2	4	0
L10	Visitor management systems		[23, 24]	2	4	0
L11	Monitoring & reducing generated waste	IFD 2	[23, 24, 38]	2	6	1
L12	Energy reduction and efficiency	BAE 4; IFD 2; EEC P1; EEC P2; EEC 1	[23, 24, 29, 31, 37, 38]	4	7	5
L13	Reduction of single-use items	CWS 3	[23, 37]	1	1	1
L14	Pollution control measures	BAE 5; BAE 6; IHC 3	[30, 38]	1	1	3
L15	Green open space program	ASD P	[28, 38]	1	1	1
L16	Wastewater quality monitoring		[23]	1	1	0
L17	Landscape quality preservation	LEE 2	[30, 32, 37]	2	5	1
L18	Accessibility & destination connectivity	MAC P1; MAC P3; MAC 4	[28, 37]	1	1	3
L19	Comprehensive waste control	BEM P	[28, 38]	1	1	1
L20	Water quality improvement program		[23, 31]	2	3	0
L21	GHG emissions reduction target	EEC 4	[23, 24, 38]	2	6	1
L22	Transport emission reduction target	ASD 2; ASD 3	[23, 24, 38]	2	3	2

L23	Water usage monitoring	WAC 3; WAC 5; WAC 6	[23, 32, 38]	2	2	3
L24	Waste collection and recycling	SWM P	[23, 37]	1	1	1
L25	Low-impact transportation	MAC P3; MAC 2	[23, 37]	1	1	2
L26	Septic and wastewater regulation		[24, 32]	2	2	0
L27	Water usage reporting	WAC P1	[23, 24, 31, 38]	3	3	1
L28	Noise and embodied pollution control	IHC 7; IHC 5	[23, 24, 38]	2	4	2
L29	Biodiversity and animal welfare compliance		[23, 24, 33]	3	9	0
L30	Environmental impact monitoring tools		[23, 24, 28, 34, 36]	5	12	0
L31	Comprehensive waste control	BEM P; SWM P	[23]	1	1	2
L32	Greywater for non-consumptive use	WAC 3	[31]	1	1	1
L33	Afforestation for water and air quality		[28]	1	1	0

As illustrated in Figure 2 and detailed in Table 3, the distribution of reference sources used in formulating performance indicators for the environmental (planet) category reveals a strong reliance on globally and nationally recognized standards. The Global Sustainable Tourism Criteria for Destinations (GSTC-D) emerges as the dominant reference, with 46% indicators derived from GSTSC-D. This highlights GSTC-D's global authority and relevance in defining sustainability principles for tourism, especially regarding environmental aspects.

The second most frequently cited reference is the Regulation of the Minister of Tourism and Creative Economy No. 9 of 2021, from which 21% of the indicators are derived. This regulation provides a national legal framework that aligns with global sustainability targets while contextualizing them to Indonesia's tourism landscape.

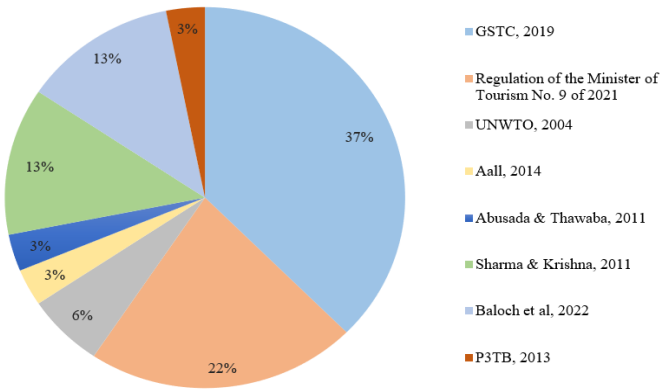

Figure 2. Distribution of reference sources for environmental performance indicators

Additional contributions include Baloch et al. [28] with 11%, reflecting recent empirical research that complements institutional guidelines, and Pratheep [31] with 7%, which emphasizes water and environmental quality. Other sources such as Chang et al. [29], Aall [30], AbuSada and Thawaba [32], P3TB [34], Mazilu and Draguleasa [36], and UNWTO [39] contribute smaller proportions (each ≤ 5%), yet they offer specialized insights particularly regarding environmental [30] pollutants, measurement tools, and cross-sectoral integration.

Overall, this distribution demonstrates that the environmental indicators are primarily shaped by internationally endorsed sustainability frameworks (GSTC) and reinforced by national regulations, while academic sources serve to enhance the framework with empirical and technical depth. This balanced sourcing strengthens the credibility, relevance, and applicability of the developed indicators in real-world terrestrial tourism contexts.

Figure 3 presents a dual-layered frequency analysis comparing the number of references from literature sources and the frequency of expert discussions for each environmental performance indicator (L1–L33). This analysis provides a balanced view of how often each indicator is recognized both in normative frameworks and in practical discourse, offering insight into their theoretical foundation and perceived relevance in the field.

Based on Figure 3 and detailed in Table 3 regarding the number of environmental performance indicators discusses, L30 which focuses on minimizing the negative impacts of tourism on the environment is the most frequently mentioned (twelve times). This highlights the importance of conservation efforts and the management of tourism impacts as prerequisite criteria for achieving sustainable tourism. In Figure 3, which outlines the number of environmental performance indicators cited in reference sources, L12 (energy consumption reduction, efficiency, and renewable energy) and L30 (tourism environmental impact management system) appear most frequently across various references. This indicates a shared focus on energy-related issues and the mitigation of tourism's environmental impacts, reflecting the significance of sustainability in the tourism sector.

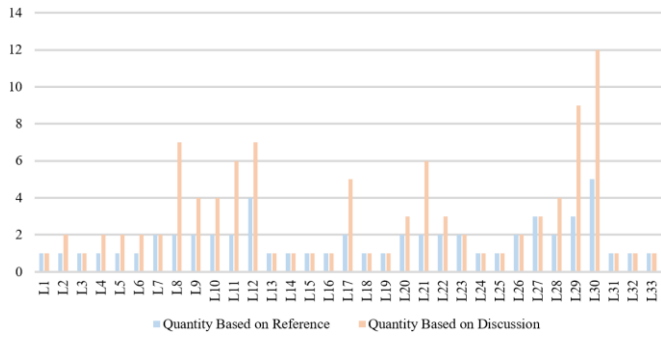

Figure 3. Quantity of environmental indicators based on references and discussion

3.2.2 Sustainable tourism performance indicators: Socio-economic (Prosperity)

The results of the distribution analysis simplify the socio-economic performance indicators into 13 performance indicators, focusing on improving the quality of life and community welfare, as Table 4 (QT = Quantity, see Appendix 1 for Greenship Parameter Codes).

As illustrated in Figure 4 and detailed in Table 4, the distribution of reference sources used in formulating socio-economic performance indicators. The analysis reveals that the Global Sustainable Tourism Criteria for Destinations [23] provides the largest contribution, with 28% indicators derived from GSTSC-D. This affirms the GSTC's position as a globally recognized framework that comprehensively addresses principles of equity, inclusiveness, and community empowerment within tourism development.

Table 4. Sustainable tourism performance indicators: Socio-economic (Prosperity)

No.	Performance Indicators Summary	Greenship Based Parameter Code (s)	Main Reference Source (s)	QT Source	QT Discussion	QT GBCI
S1	Accessible Destination Communication	MAC P1 MAC 4	[23, 37]	1	4	2
S2	Inclusive Employment Policy		[23, 24, 28, 30, 34]	5	10	0
S3	Local Employment Policy		[29, 36]	2	2	0
S4	Tourism Local Economic Impact	CWS 2	[23, 29, 33, 35, 37]	4	5	1
S5	Local economic Contribution		[24]	1	1	0
S6	Participatory Destination Management	CWS 2	[35-37, 39]	3	4	1
S7	Accessible Tourism Standards		[23]	1	2	0
S8	Ethical Protection Policies		[23, 24, 31]	3	6	0
S9	Community Sustainability Engagement		[23, 24, 35]	3	5	0
S10	Local Community Access Rights		[24, 28, 32]	3	3	0
S11	MSME Sustainability Support		[23, 24]	2	6	0
S12	Tourism Safety System	CWS 6	[23, 24, 37]	2	4	1
S13	Property Rights Enforcement		[23, 24]	2	5	0

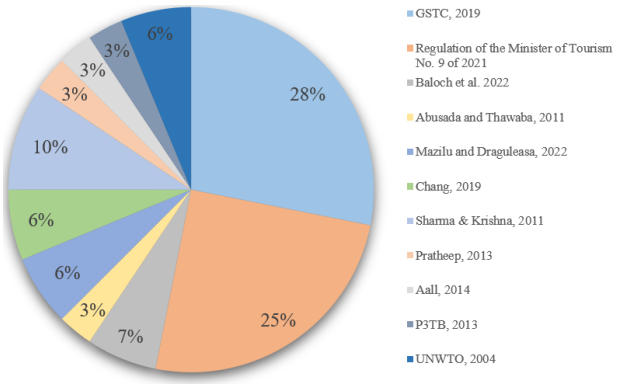

Figure 4. Distribution of reference sources for socio-economic performance indicators

The Regulation of the Minister of Tourism and Creative Economy No. 9 of 2021 serves as the second most prominent reference, contributing 25% of the socio-economic performance indicators. This demonstrates the significant role of national-level policy in contextualizing international standards and ensuring that sustainability practices are applicable and enforceable within the Indonesian tourism sector.

In addition to these dominant references, several academic and empirical studies also inform the development of the indicators. Sources such as Baloch et al. [28], Chang et al. [29], Aall [30], Abusada and Thawaba [32], Sharma and Krishna [35], and Mazilu and Draguleasa [36] each provide supporting insights, with contribution shares ranging between 3%, 6%, 7%, and 10%. These references help to enrich the indicator framework by introducing case-specific perspectives, critical reflections on implementation, and localized socio-economic concerns.

Figure 5 presents a comparative analysis of the socio-economic performance indicators, based on both the number of references from literature and the frequency of discussion among literature. The findings clearly indicate that Indicator S2, which emphasizes the formulation of inclusive policies to provide employment opportunities, access to training, occupational safety, and fair wages, is the most dominant indicator in both dimensions. It appears in five different reference sources and was also mentioned ten times in sources discussions.

This dual prominence highlights the centrality of labor-related issues in sustainable tourism discourse. The frequent reference to S2 suggests that employment quality, worker protection, and economic inclusivity are viewed as fundamental pillars for realizing community well-being through tourism. These themes are in line with the broader objectives of the Sustainable Development Goals (SDGs), particularly SDGs 8 on decent work and economic growth.

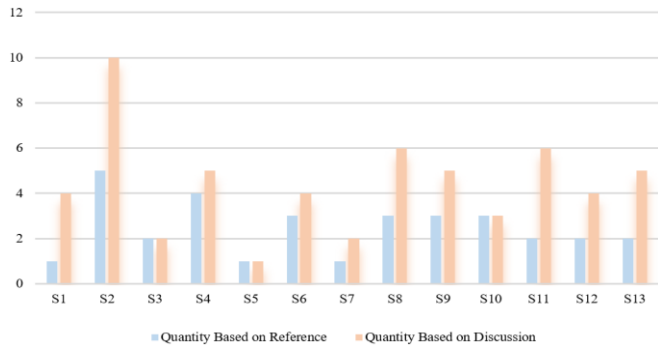

Figure 5. Quantity of socio-economic indicator based on references and discussion

The economic empowerment of local communities in tourism destinations can be assessed through quantitative indicators that reflect the extent to which MSMEs are integrated into the tourism value chain. These include the proportion of local procurement (percentage of goods and services sourced from local suppliers), the economic value of MSME participation (annual income generated, share of local suppliers involved, and growth in MSME revenue), and the magnitude of domestic value-added indicating how much tourism-related income remains within the community. Inclusivity can be observed through the percentage of tourism businesses and workforce owned or employed by women and youth, while supplier capacity building is reflected in the number of training programs delivered, the participation rate of local MSMEs, and measurable improvements in business skills and performance after training. Collectively, these indicators offer a concise overview of how tourism supports local economic independence and ensures that benefits are

distributed fairly among community members.

3.2.3 Sustainable tourism performance indicators: Socio-cultural (People)

The results of the distribution analysis simplify the performance indicators of the social and cultural aspects into 16 performance indicators, as Table 5 (QT = Quantity, see Appendix 1 for Greenship Parameter Codes).

As illustrated in Figure 6 and detailed in Table 5, the distribution of reference sources used to formulate performance indicators within the social and cultural category. The analysis reveals that the Global Sustainable Tourism Criteria (GSTC) [23] is the most dominant reference, contributing in 12 indicators, which account for 37% of the total. This demonstrates GSTC-D's strong emphasis on the preservation of cultural heritage, social inclusion, and respect for local identity as key components of sustainable tourism development.

The second largest contribution comes from the Regulation of the Minister of Tourism and Creative Economy No. 9 of 2021, which includes in 7 indicators, or 22% of the total. This finding reflects the Indonesian government's commitment to integrating cultural and social values into national tourism policies, ensuring that development efforts are aligned with the protection of local traditions and heritage.

In addition, several relevant previous academic studies and international sustainable tourism standards through GSTC guidelines, also contribute meaningfully to the indicator framework. Notably, Baloch et al. [28] and Sharma and Krishna [35] provides 13%, these contributions highlight the relevance of empirical and conceptual studies in enriching the cultural dimension of sustainability. Other references, such as Aall [30], AbuSada and Thawaba [32], P3TB [34], and UNWTO [39] through smaller in proportion (each less than 6%), add critical historical and institutional context to the development of culturally responsive tourism indicators.

The prominence of GSTC and Regulation of the Minister of Tourism and Creative Economy No. 9 of 2021 further affirms that cultural sustainability through heritage conservation, community engagement, and respect for social norms is increasingly recognized as a core pillar of sustainable tourism, not merely a complementary consideration.

Table 5. Sustainable tourism performance indicators: Socio-cultural (People)

No.	Performance Indicator Summary	Greenship Parameter Code(s)	Main Reference Source(s)	QT Source	QT Discussion	QT GBCI
B1	Intangible Heritage Protection		[24]	1	1	0
B2	Cultural Experience Feedback	CWS 2	[23, 37]	1	1	1
B3	Cultural Asset Conservation		[24, 28, 30, 33, 34]	5	5	0
B4	Indigenous Tourism Development	CWS 2	[23, 37]	1	1	1
B5	Tour Guide Standards		[23]	1	2	0
B6	Data collection on cultural assets (tangible and intangible)		[23, 32]	2	3	0
B7	Cultural asset rehabilitation and conservation program	CWS 5	[23, 37]	1	1	1
B8	Intellectual Property Protection and Preservation		[23, 24, 35]	3	5	0
B9	Local Community Access Protection Systems		[23, 24, 35]	3	5	0
B10	Visitor Management System		[23, 24, 33, 35]	4	6	0
B11	Local Cultural Experience	CWS 5	[23, 28, 37]	2	2	1
B12	Artifact Trade Regulations		[23, 24]	2	4	0
B13	Ethnic Cultural Awareness	CWS 5	[28, 37]	1	1	1
B14	Cultural Conservation Funding		[23]	1	1	0
B15	Artifact Regulation Enforcement		[28]	1	1	0
B16	Cultural Interpretation Standards	CWS 5	[23, 24, 35, 37]	3	6	1

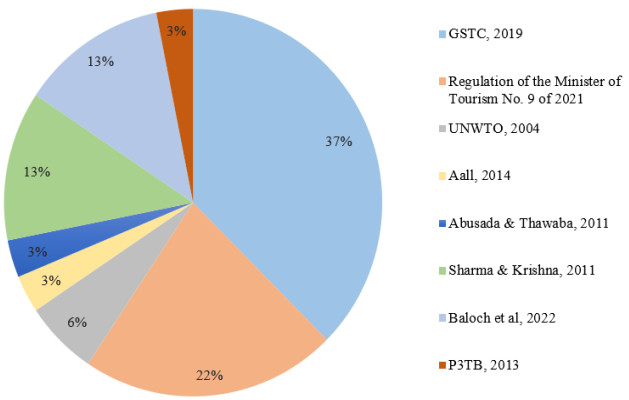

Figure 6. Social & cultural performance indicator reference source distribution diagram

In summary, the data in Figure 6 demonstrates a strong alignment between reference-based and discussion-based priorities, suggesting that socio-economic sustainability especially through labor inclusion and local empowerment constitutes a widely agreed-upon foundation for responsible tourism development.

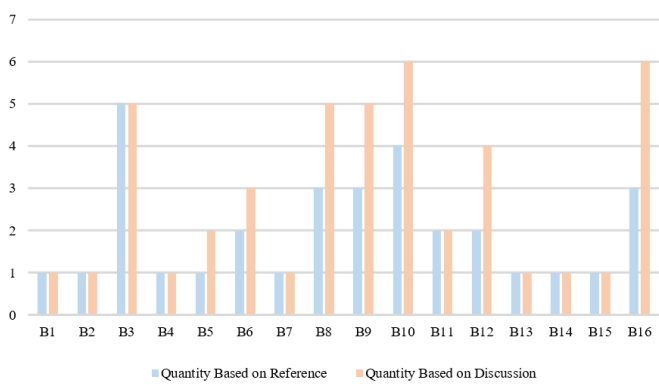

Figure 7. Quantity of social and cultural indicators based on references and discussion

Based on Figure 7, which presents the distribution of socio-cultural performance indicators based on discussion content and reference sources reveals that three indicators stand out as the most frequently addressed: B3 (conservation of cultural assets), B16 (cultural interpretation standards), and B10 (management of visitors to cultural sites). Each of these indicators is cited more than three and four times, reflecting a strong and consistent emphasis within the reviewed sources. The prominence of B3 underscores the critical role of preserving and rehabilitating cultural heritage as a foundation for sustainable tourism, ensuring that tangible and intangible cultural assets are safeguarded for future generations. Similarly, B16 highlights the necessity of establishing clear standards for cultural interpretation, which not only enhance visitors' understanding and appreciation of heritage but also foster respect for local traditions and identity. Meanwhile, the repeated mention of B10 illustrates the essential function of effective visitor management strategies in preventing overcrowding, minimizing physical degradation of sites, and maintaining the authenticity of cultural experiences. Collectively, these findings point to a shared recognition that cultural asset preservation, interpretive quality, and visitor regulation are indispensable prerequisites for achieving a balance between tourism development and cultural sustainability.

3.2.4 Sustainable tourism performance indicators: Management (Management)

The results of the distribution analysis simplify the performance indicators of the management aspect into 13 performance indicators. As illustrated in Figure 8 and detailed in Table 6 (QT = Quantity, see Appendix 1 for Greenship Parameter Codes), the distribution of reference sources that inform the development of performance indicators in the management category of sustainable tourism. The data show that the Global Sustainable Tourism Criteria GSTC (2019) is the most prominent reference, contributing 38% of the total. This strong representation underscores the centrality of governance and management mechanisms in global sustainability standards, where systematic planning, monitoring, and continuous improvement are considered foundational to effective destination management.

The second-largest contributor is the Regulation of the Minister of Tourism and Creative Economy No. 9 of 2021, which provides 25% of the total. This highlights the Indonesian government's emphasis on institutionalizing sustainable tourism practices through structured policy instruments, particularly in areas such as risk management, stakeholder coordination, compliance mechanisms, and transparency in tourism operations.

Table 6. Sustainable tourism performance indicators: Management

No.	Performance Indicator Summary	Greenship Parameter Code (s)	Main Reference Source(s)	QT Source	QT Discussion	QT GBCI
M1	Visitor Safety Experience		[35]	1	2	0
M2	Visitor Sustainability Awareness		[23]	1	1	0
M3	Management Coordination System		[23, 24]	2	5	0
M4	Community Engagement Planning	CWS 2	[23, 24, 29, 30, 33, 35, 37]	6	12	1
M5	Integrated Planning Regulations	BEM 4 IFD 2	[23, 24, 33, 37, 38]	3	10	2
M6	Tour Operator Standards		[23]	1	1	0
M7	Financial Planning Framework		[23]	1	4	0
M8	Monitoring Evaluation System	BEM 7	[23, 24, 30, 38]	3	8	1
M9	Emergency Response System		[23, 24]	2	6	0
M10	Tourism Standards System		[23, 24, 29, 35]	4	12	0
M11	Climate Adaptation Policies		[23, 24, 39]	3	7	0
M12	Tourism Management Strategies		[23]	1	5	0
M13	Responsible Tourism Promotion		[23, 24, 29, 39]	4	8	0

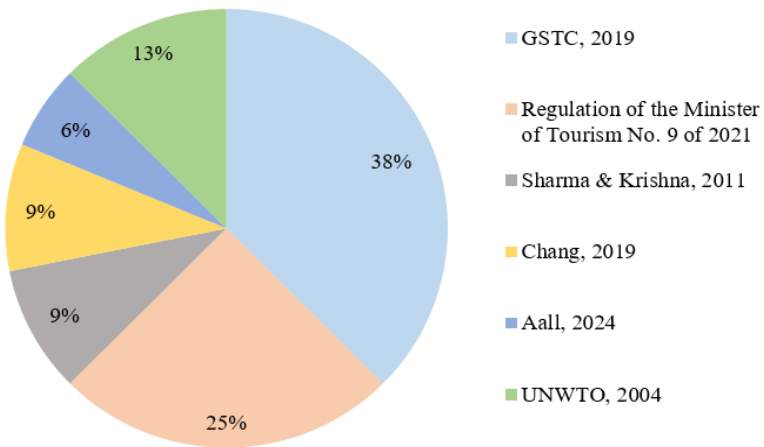

Figure 8. Distribution diagram of reference sources for performance indicators of management aspects

In addition to these two leading references, several academic sources also contribute to the indicator framework, though to a lesser extent. Sharma and Krishna [35] account for 9% of the indicators, offering insights on strategic destination governance and community-oriented planning. Aall [30] and UNWTO [39] each contribute 6% and 13%, drawing attention to long-standing international principles regarding destination-level sustainability planning and institutional resilience. Finally, Chang [29] added a further 9%, enriching the framework with perspectives on data-driven management and smart tourism systems.

The prominence of GSTC and national regulation in this category reflects a consensus that sustainability goals cannot be achieved without robust and well-coordinated management structures. The diversity of supporting literature reinforces this view by bringing theoretical depth, empirical findings, and contextual relevance to the design of management-related indicators. Overall, the distribution shown in Figure 8 emphasizes that good governance and integrated destination management are not just technical requirements but strategic enablers of sustainability in the tourism sector.

Figure 9 and Table 6 provide a comparative analysis of the quantity of management performance indicators derived from both stakeholder discussions and reference sources. Among these, Indicator M4 (Community engagement), which emphasizes public participation in sustainable destination planning and management, emerges as the most frequently discussed, with 12 occurrences. This indicator highlights the importance of inclusive governance by ensuring that local communities are actively involved in planning processes, decision-making, and the formulation of tourism policies. The strong representation of M4 also aligns with global and national guidelines, appearing in six different reference sources, including GSTC [23], Regulation of the Minister of Tourism and Creative Economy No. 9 of 2021 [24], Chang [29], Aall [30], Sharma and Krishna [35], and GBCI for Neighborhood [37]. This convergence indicates that public engagement is widely recognized as a normative principle in sustainable tourism management.

Overall, the pattern revealed in Figure 9 suggests that effective tourism management requires not only regulatory frameworks and operational guidelines but also dynamic feedback systems and inclusive institutional arrangements. The consistent emphasis on community engagement (M4) and evaluation systems (M8) reflects a growing recognition that sustainable tourism governance must be both participatory and evidence-based to achieve long-term resilience and impact.

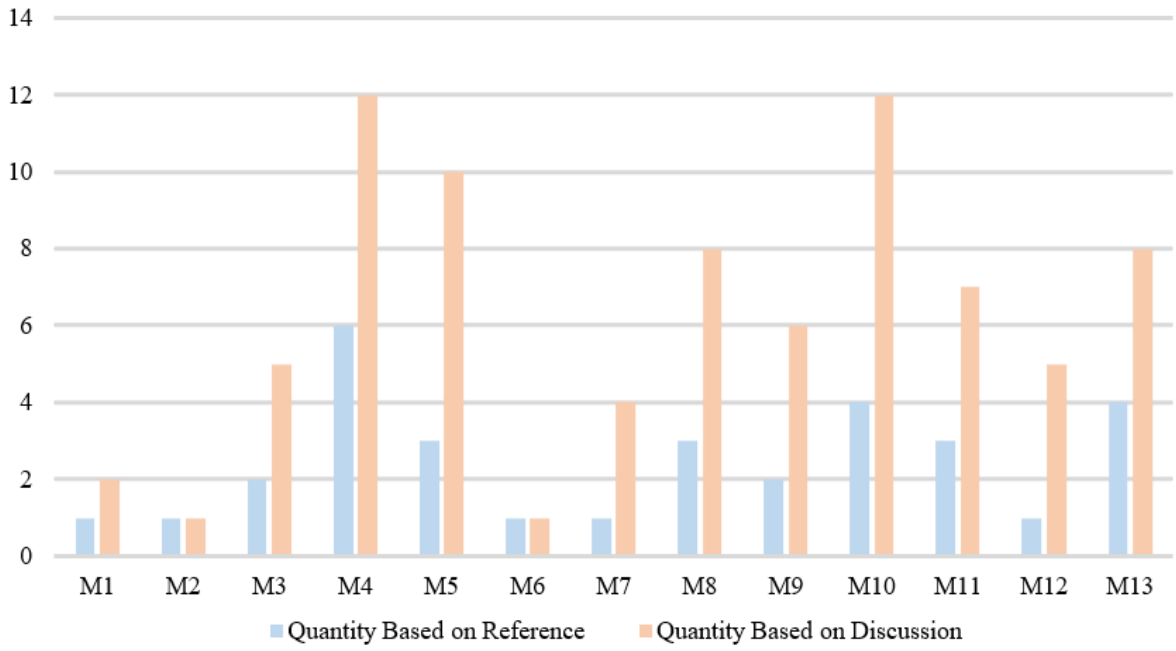

Figure 9. Quantity of management indicators based on references and discussion

4. DISCUSSION

The development of a contextually grounded and operational set of sustainability performance indicators is essential to support sustainable terrestrial nature-based tourism. This study identified 75 performance indicators, systematically grouped into four main categories: Planet (Environment), Prosperity (Socio-Economic), People (Socio-Cultural), and Management of Tourism (Management) derived from four primary sources: the GSTC, the Regulation of the Minister of Tourism & Creative Economy Number 9 of 2021, relevant previous academic research, and the criteria from the Green Building Council Indonesia (GBCI) serve as supporting parameters.

As shown in Figure 10, the Planet (Environment) category comprises the largest share, with a total of 33 indicators. This category is prominently embedded in both international sustainable tourism standards and national regulations, as outlined in the Regulation of the Minister of Tourism and Creative Economy Number 9 of 2021. In addition, it integrates 22 criteria from GBCI Neighborhoods and 21 criteria from GBCI Buildings as supporting parameters for the environmental performance indicators. Among the most frequently cited indicators are L12 (energy efficiency and renewable energy) and L30 (environmental impact monitoring), both which are widely recognized in literature as essential for mitigating the environmental footprint of tourism activities [6, 8, 13].

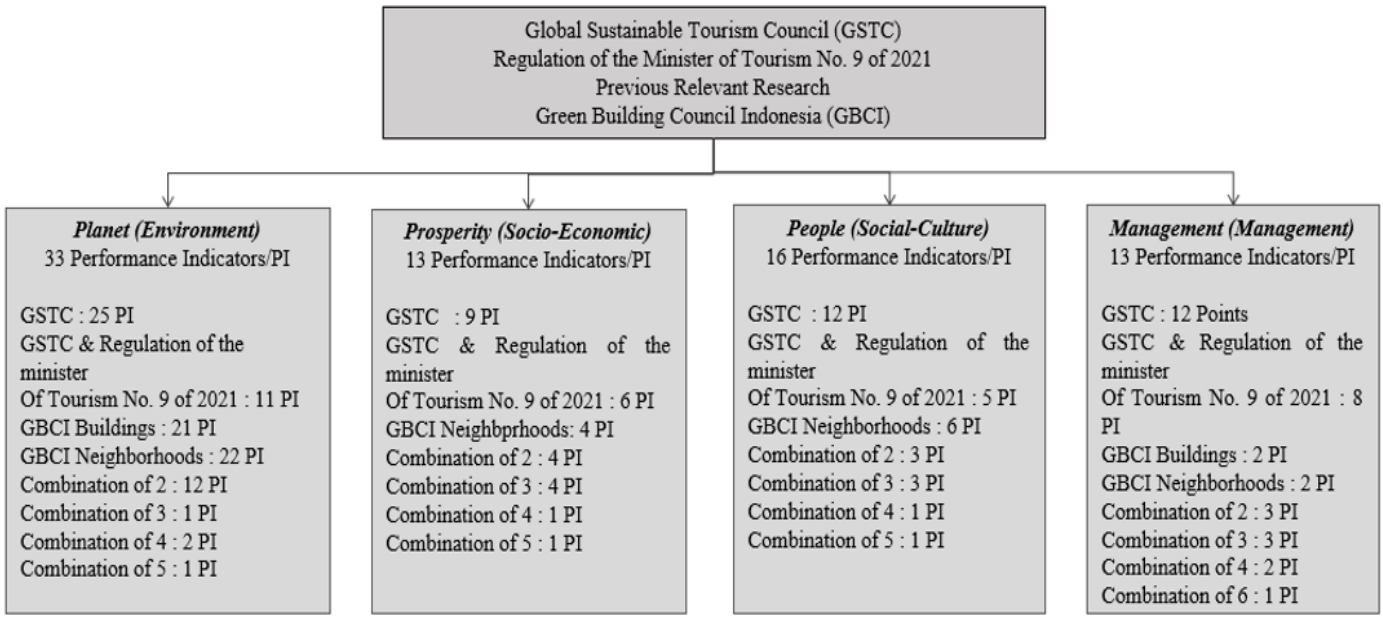

Figure 10. Seventy-five (75) performance indicators framework

The Prosperity (Socio-Economic) category comprises 13 indicators, with the largest proportion derived from national regulations, as outlined in the Regulation of the Minister of Tourism Number 9 of 2021 and from international sustainability standards through GSTC Standards. Additionally, it incorporates 5 criteria from GBCI Neighborhoods as supporting parameters for the socio-economic performance indicators. A key indicator in this group is S2 (inclusive employment and fair wage policies), which aligns with broader calls for social justice and equity in tourism development [40, 41]. Ensuring access to fair economic opportunities and livelihood security is especially relevant in rural and nature-based destinations, where economic leakage and inequality are prevalent [42-44].

The People (Socio-Cultural) category consists of 16 indicators, with the majority sourced from international sustainable tourism standards through GSTC guidelines and national regulations, as outlined in the Regulation of the Minister of Tourism and Creative Economy Number 9 of 2021. Additionally, it incorporates 6 criteria from GBCI Neighborhoods as supporting parameters for the socio-cultural performance indicators. This suggests that although cultural aspects are sometimes secondary in sustainability assessment, they are increasingly being integrated into built environment guidelines. Indicators such as B3 (cultural asset conservation) and B10 (visitor management at cultural sites) have been recognized for their role in preserving local identity and managing cultural sensitivities in tourism contexts [12, 10, 45].

The Management category comprises 13 indicators, with a relatively even distribution between international sustainable tourism standards, as outlined in GSTC guidelines, and national regulations. It also includes 2 criteria from GBCI Neighborhoods and 2 criteria from GBCI Buildings, serving as supporting parameters for the socio-cultural performance indicators. One indicator of high strategic importance is M4 (public participation in destination management), reinforcing the significance of inclusive governance models in sustainable tourism [46, 47]. The integration of local communities in planning and decision-making processes not only improves legitimacy but also strengthens implementation on the ground [48-51].

Furthermore, Figure 10 illustrates how several indicators are supported by combinations of two to six sources, reinforcing their robustness and applicability. For instance, nine indicators in the environmental dimension are corroborated by at least two sources, while some such as L12 and M4 appear in all four, signifying consensus across regulatory, professional, and scholarly domains. This convergence indicates that these indicators represent strategic priorities and should be prioritized in technical guidelines, certification standards, and policy instruments.

The application of the 75-indicator framework holds significant potential for guiding evidence-based decision-making in tourism development. Beyond compliance tools, these indicators can inform the design of spatial planning strategies, architectural guidelines, environmental management plans, and destination evaluation systems. A phased implementation strategy, starting with pilot projects in selected locations, is recommended to test and refine their practical relevance prior to national-scale adoption.

Notably, the categorization into Planet, Prosperity, People, and Management presents a balanced and interdisciplinary framework, effectively mitigating the tendency to focus disproportionately on either environmental or economic aspects. This integrative approach is in line with the increasing international emphasis on multidimensional sustainability assessments in tourism [17, 52, 53], and reinforces Indonesia's dedication to advancing sustainable development through the tourism sector.

Despite its contributions, this study has several limitations. The performance indicators were developed through literature-based synthesis without field testing or stakeholder validation, thus not fully reflecting practical constraints or institutional capacities across varied destinations. While Green Building Council Indonesia (GBCI) criteria significantly informed environmental and architectural aspects, they were originally designed for urban building contexts and may require adaptation for ecological tourism settings such as forests and wetlands. Additionally, the framework does not yet address climate resilience, disaster

risk reduction, or adaptive capacity key considerations in Indonesia's climate-vulnerable geography. It also lacks direct community input and the integration of indigenous knowledge, which are vital for culturally grounded and locally accepted sustainability practices.

To enhance the credibility and practical applicability of the proposed sustainability assessment model, this study incorporates a concise data governance component. The framework promotes data transparency, establish basic QA/QC procedures to maintain data accuracy and consistency, and ensures that assessment results can be independently audited. Periodic public reporting is recommended to support ongoing monitoring of destination performance, while a simple versioning system is proposed to track methodological updates and data changes. Additionally, the model encourages the development of a basic destination dashboard to visualize key indicators and improve stakeholder accessibility to the findings.

Nonetheless, the framework offers a strong foundation for sustainability governance in terrestrial tourism. The identification of high-priority indicators (L12, L30, S2, B3, B10, M4), supported by multiple sources, presents strategic entry points for integration into policy, spatial planning, and design practice. By bridging global standards with local operational realities and embedding architectural dimensions into sustainability discourse, this study contributes to a more holistic tourism paradigm. Future work should prioritize pilot implementation, field validation, and participatory refinement to ensure adaptability and long-term relevance across Indonesia's diverse tourism landscapes. These 75 sustainable terrestrial nature-based tourism performance indicators strengthen specific and complementary aspects of the GSTC guidelines, which previously lacked performance indicators specifically focused on the context of terrestrial nature-based tourism.

The application of sustainability principles in terrestrial nature-based tourism inevitably involves trade-offs, particularly between infrastructure development and environmental protection, as well as between traditional architecture and modern facility requirements. While improved infrastructure enhances tourism performance and regional economic growth, it may also trigger environmental degradation if not accompanied by edaquate ecological mitigation. Therefore, infrastructure development must balance short-term economic benefits with long-term ecological risks through eco-friendly and community-based design.

A similar trade-off emerges in architectural decisions: traditional architectural forms strengthen local identity and enrich visitor experience, yet they may conflict with modern technological, comfort, and maintenance demands. Sustainability, therefore, does not imply preserving cultural elements in absolute terms, but rather finding a balanced compromise between tradition and modernity.

Overall, these trade-offs emphasize that sustainable destination development requires a multi-objective balancing of environmental, socio-economic, socio-cultural, and managerial dimensions. The performance indicator model proposed in this study supports this process by identifying the dual impacts of development interventions, enabling decision-makers to pursue scenarios that maximize benefits while minimizing negative consequences.

5. CONCLUSION

This study presents a foundational contribution to the development of sustainability performance indicators specific to terrestrial nature-based tourism, addressing a critical gap within the existing GSTC framework, which has yet to explicitly accommodate this tourism typology. Through a structured methodology integrating international standard, national regulations, and previous relevant studies, the study formulates 75 performance indicators systematically grouped into four main categories: Planet (Environmental), Prosperity (Socio-Economic), People (Socio-Cultural), and Management of tourism (Management).

The framework's strength lies in its contextual relevance and applicability, particularly demonstrated by its strong alignment with the Green Building Council Indonesia (GBCI) parameters especially in environmental and managerial aspects. This alignment enhances the practical feasibility of applying the indicators within destination-level sustainability assessments. Rather than merely adapting generic criteria, the proposed indicators offer a tailored evaluative tool that supports certification, monitoring, and planning in nature tourism contexts grounded in terrestrial ecosystems.

Importantly, the framework enables a shift toward data-informed governance, offering a structured reference for the formulation of national technical guidelines and sustainability certification schemes. It not only supports compliance with international standards but also strengthens local destination resilience through performance-based measurement. The incorporation of these indicators into planning and policy mechanism could reinforce Indonesia's leadership in advancing sustainability in terrestrial nature-based tourism.

The proposed indicator set may be provisionally adopted by destinations and auditors while the formal validation process still underway. In practice, the model evaluation can be implemented through an operational audit checklist in which performance indicators translated into assessment questions, supported by verifiable evidence such as design documents, digital files, photographs, and other records, accompanied by rating categories (compliant, needs improvement, & not compliant) and additional notes. A pilot test will be carried out to evaluate the model's clarity and field applicability, and insights from this trial will inform iterative refinements to ensure the indicators remain empirically reliable and operationally relevant.

Future research should prioritize empirical validation of the indicators through field-based applications, evaluating their operational clarity, scalability, and stakeholder acceptance. Longitudinal studies tracking destination performance over time would further inform indicator refinement and enhance adaptive management. In sum, the study provides a robust platform for advancing sustainability governance in terrestrial tourism and opens pathways for context-sensitive tourism policy, implementation, and innovation.

REFERENCES

[1] Susanti, E., Amelia, D. (2021). Tourism recovery strategy after COVID-19 pandemic. Economica: Journal of Economic and Economic Education, 10(1): 85-91. https://doi.org/10.22202/economica.2021.v10.i1.4792

[2] BPS. (2024). Domestic tourism statistics 2023. https://www.bps.go.id/id/publication/2024/05/23/9bbe1

6f7f850126353cea5d2/statistik-wisatawan-nusantara-2023.html.
[3] BPS. (2022). Domestic tourism statistics 2022. https://www.bps.go.id/id/publication/2023/07/21/d931ad07e60eec01b745dffa/statistik-wisatawan-nusantara-2022.html.
[4] Kementerian Pariwisata dan Ekonomi Kreatif. (2021). Tourism trends 2021. https://www.scribd.com/document/547953828/Buku-Tren-Pariwisata-2122-825b87ea0f, accessed on Nov. 22, 2025.
[5] Disparbud, J.B. Jumlah Kawasan Pariwisata Berdasarkan Kabupaten/Kota Di Jawa Barat. https://opendata.jabarprov.go.id/id/dataset/jumlah-kawasan-pariwisata-berdasarkan-kabupatenkota-di-jawa-barat.
[6] Gao, H., Song, W. (2022). Assessing the landscape ecological risks of land-use change. International Journal of Environmental Research and Public Health, 19(21): 13945. https://doi.org/10.3390/ijerph192113945
[7] Hunter, C., Howard, G. (1995). Tourism and the Environment: A Sustainable Relationship? Van Nostrand Reinhold.
[8] Albrich, K., Rammer, W., Seidl, R. (2020). Climate change causes critical transitions and irreversible alterations of mountain forests. Global Change Biology, 26(7): 4013-4027. https://doi.org/10.1111/gcb.15118
[9] Shaheen, K., Zaman, K., Batool, R., Khurshid, M.A., et al. (2019). Dynamic linkages between tourism, energy, environment, and economic growth: Evidence from top 10 tourism-induced countries. Environmental Science and Pollution Research, 26(30): 31273-31283. https://doi.org/10.1007/s11356-019-06252-1
[10] Kostić, M., Milićević, S., Nedeljković, I. (2016). Research of tourists' perception of the relationship between tourism and environment. Аграрный вестник Северного Кавказа, S4: 32-35.
[11] Ahmed, Z.U., Krohn, F.B. (1992). International tourism, marketing and quality of life in the third world: India, a case in point. Development in Quality of Life Studies in Marketing, 4: 150-156.
[12] Kayumba, P.M., Chen, Y., Mind'je, R., Mindje, M., et al. (2021). Geospatial land surface-based thermal scenarios for wetland ecological risk assessment and its landscape dynamics simulation in Bayanbulak Wetland, Northwestern China. Landscape Ecology, 36(6): 1699-1723. https://doi.org/10.1007/s10980-021-01240-8
[13] Balmford, A., Beresford, J., Green, J., Naidoo, R., Walpole, M., Manica, A. (2009). A global perspective on trends in nature-based tourism. PLoS Biology, 7(6): e1000144. https://doi.org/10.1371/journal.pbio.1000144
[14] Torres-Díaz, V., del Río-Rama, M.D.L.C., Álvarez-García, J., Simonetti, B. (2025). Environmental sustainability and tourism growth: Convergence or compensation? Quality & Quantity, 59(3): 2129-2152. https://doi.org/10.1007/s11135-024-01906-w
[15] Shekhar, C. (2024). Sustainable tourism development: Balancing economic growth and environmental conservation. SSRN Electronic Journal. https://doi.org/10.2139/SSRN.4901174
[16] Mihalic, T., Mohamadi, S., Abbasi, A., David, L.D. (2021). Mapping a sustainable and responsible tourism paradigm: A bibliometric and citation network analysis. Sustainability, 13(2): 853. https://doi.org/10.3390/su13020853
[17] Zhu, S., Luo, Y., Aziz, N., Jamal, A., Zhang, Q. (2022). Environmental impact of the tourism industry in China: Analyses based on multiple environmental factors using novel Quantile Autoregressive Distributed Lag model. Economic Research-Ekonomska Istraživanja, 35(1): 3663-3689. https://doi.org/10.1080/1331677X.2021.2002707
[18] Risteskia, M., Kocevskia, J., Arnaudov, K. (2012). Spatial planning and sustainable tourism as basis for developing competitive tourist destinations. Procedia-Social and Behavioral Sciences, 44: 375-386. https://doi.org/10.1016/j.sbspro.2012.05.042
[19] Lopes, E., Araújo-Vila, N., Perinotto, A.R.C., Cardoso, L. (2022). Tourism and land planning in natural spaces: Bibliometric approach to the structure of scientific concepts. Land, 11(11): 1930. https://doi.org/10.3390/land11111930
[20] Papageorgiou, M. (2025). Spatial planning for tourism destinations resilient to climate change. Tourism and Hospitality, 6(1): 8. https://doi.org/10.3390/tourhosp6010008
[21] Walker, S., Mullagh, L., Evans, M., Wang, Y. (2019). Design ecologies: Sustaining ethno-cultural significance of products through urban ecologies of creative practice. International Journal of Anthropology and Ethnology, 3(1): 10. https://doi.org/10.1186/s41257-019-0025-7
[22] GSTC. (2024). Certified Sustainable Destinations. https://www.gstcouncil.org/certified-sustainable-destinations.
[23] GSTC. (2019). GSTC Destination Criteria Performance indicators and SDGs. https://www.gstcouncil.org.
[24] JDIH. (2021). Regulation of the Minister of Tourism and Creative Economy/Head of the Tourism and Creative Economy Agency Number 9 of 2021concerning Guidelines for Sustainable Tourism Destinations. https://peraturan.bpk.go.id/Details/203906/permenpar-no-9-tahun-2021.
[25] Assarroudi, A., Heshmati Nabavi, F., Armat, M.R., Ebadi, A., Vaismoradi, M. (2018). Directed qualitative content analysis: The description and elaboration of its underpinning methods and data analysis process. Journal of Research in Nursing, 23(1): 42-55. https://doi.org/10.1177/1744987117741667
[26] Hsieh, H.F., Shannon, S.E. (2005). Three approaches to qualitative content analysis. Qualitative Health Research, 15(9): 1277-1288. https://doi.org/10.1177/1049732305276687
[27] Corbin, J., Strauss, A. (1998). Basics of Qualitative Research: Techniques and Procedures for Developing Grounded Theory. Sage Publications, Inc.
[28] Baloch, Q.B., Shah, S.N., Iqbal, N., Sheeraz, M., Asadullah, M., Mahar, S., Khan, A.U. (2023). Impact of tourism development upon environmental sustainability: A suggested framework for sustainable ecotourism. Environmental Science and Pollution Research, 30(3): 5917-5930. https://doi.org/10.1007/s11356-022-22496-w
[29] Chang, C.C., DiGiovanni, K., Mei, Y. (2019). Sustainability. Water Environment Research, 91(10): 1129-1149. https://doi.org/10.1002/wer.1210
[30] Aall, C. (2014). Sustainable tourism in practice: Promoting or perverting the quest for a sustainable development? Sustainability, 6(5): 2562-2583.

https://doi.org/10.3390/su6052562
[31] Pratheep, P.S. (2013). Sustainable architecture and tourism management. International Journal for Environmental Rehabilitationand Conservation, 4(2): 38-49.
[32] AbuSada, J., Thawaba, S. (2011). Multi criteria analysis for locating sustainable suburban centers: A case study from Ramallah Governorate, Palestine. Cities, 28(5): 381-393. https://doi.org/10.1016/j.cities.2011.05.001
[33] WTO. (2004). Indicators of Sustainable Development for Tourism Destinations A Guidebook (English version). World Tourism Organization. https://doi.org/10.18111/9789284407262
[34] P3TB. (2013). Program Pembangunan Pariwisata Terintegrasi dan Berkelanjutan (P3TB). https://www.scribd.com/document/551285444/Pedoman-Umum-P3TB-1.
[35] Sharma, K. (2011). Sustainable tourism development through sustainable architecture: A projected case study of Cox's Bazar, Bangladesh. Masters thesis, University of Huddersfield. https://eprints.hud.ac.uk/id/eprint/10736/1/ksharmafinalthesis.pdf.
[36] Mazilu, M.E., Draguleasa, I.A. (2022). Sustainable tourism development - An applied model of the Bucegi Mountains. Annals of the University of Craiova, Series Geography, 22(1): 71-88. https://doi.org/10.52846/AUCSG.22.1.06
[37] GBCI. (2015). Greenship rating tools untuk Kawasan VERSI 1.0. http://www.gbcindonesia.org/files/resource/a3d8097a-a716-4848-a85f-07cf0df13345/Summary%20GREENSHIP%20Neighborhood%20V1.0.pdf.
[38] Indonesia, G.B.C. (2013). Greenship Untuk Bangunan Baru Versi 1.2 Ringkasan Kriteria Dan Tolok Ukur. Jakarta, Indonesia: Green Building Council Indonesia.
[39] UNWTO. (2013). Sustainable tourism for development. https://www.ilo.org/sites/default/files/wcmsp5/groups/public/@ed_dialogue/@sector/documents/publication/wcms_216669.pdf.
[40] Scheyvens, R., Hughes, E. (2019). Can tourism help to 'end poverty in all its forms everywhere'? The challenge of tourism addressing SDG1. Journal of Sustainable Tourism, 27(7): 1061-1079. https://doi.org/10.1080/09669582.2018.1551404
[41] UNEP. (2003). Industry and Environment. https://www.academia.edu/7906435/UNEP_Industry_and_Environment.
[42] Subramaniam, Y., Masron, T.A., Loganathan, N. (2022). Tourism and income inequality. Journal of Business and Socio-Economic Development, 2(2): 181-194. https://doi.org/10.1108/JBSED-07-2021-0102
[43] Castilho, D., Fuinhas, J.A. (2025). Exploring the effects of tourism capital investment on income inequality and poverty in the European Union countries. Journal of Economic Structures, 14(1): 6. https://doi.org/10.1186/s40008-025-00349-2
[44] Jönsson, C. (2023). Leakage (economic) in tourism. In Encyclopedia of Tourism, pp. 1-2. https://doi.org/10.1007/978-3-319-01669-6_527-1
[45] Kostić, M., Lakićević, M., Milićević, S. (2018). Sustainable tourism development of mountain tourism destinations in Serbia. Ekonomika Poljoprivrede, 65(2): 843-857. https://doi.org/10.5937/ekopolj1802843k
[46] Salazar, N.B. (2012). Community-based cultural tourism: Issues, threats and opportunities. Journal of Sustainable Tourism, 20(1): 9-22. https://doi.org/10.1080/09669582.2011.596279
[47] Goodwin, H.J. (2009). Community-based tourism: A success? https://www.researchgate.net/publication/265278848.
[48] Bello, F.G., Carr, N., Lovelock, B. (2016). Community participation framework for protected area-based tourism planning. Tourism Planning & Development, 13(4): 469-485. https://doi.org/10.1080/21568316.2015.1136838
[49] Mak, B.K., Cheung, L.T., Hui, D.L. (2017). Community participation in the decision-making process for sustainable tourism development in rural areas of Hong Kong, China. Sustainability, 9(10): 1695. https://doi.org/10.3390/su9101695
[50] Bello, F.G., Lovelock, B., Carr, N. (2018). Enhancing community participation in tourism planning associated with protected areas in developing countries: Lessons from Malawi. Tourism and Hospitality Research, 18(3): 309-320. https://doi.org/10.1177/1467358416647763
[51] Restrepo Rico, S., Peterek, M. (2024). Empowering rural communities: A theoretical approach to sustainable tourism through community-based development. Technical Transactions, 2024(5): e2024005. https://doi.org/10.37705/TechTrans/e2024005
[52] Hardy, A., Beeton, R.J., Pearson, L. (2002). Sustainable tourism: An overview of the concept and its position in relation to conceptualisations of tourism. Journal of Sustainable Tourism, 10(6): 475-496. https://doi.org/10.1080/09669580208667183
[53] UNWTO Tourism Highlights: 2018 Edition. World Tourism Organization (UNWTO). https://doi.org/10.18111/9789284419876

APPENDIX

Appendix 1. An explanation of the GBCI building criteria and GBCI neighborhood criteria

GBCI Building Criteria

Criteria	Description
ASD	Appropiate Site Development
EEC	Energy Efficiency and Conservation
WAC	Water Conservation
IHC	Indoor Health and Comfort
BEM	Building Environment Management

GBCI Neighborhood Criteria

Criteria	Description
LEE	Land Ecological Enhancement
MAC	Movement and Connectivity
WMC	Water Management and Conservation
SWM	Solid Waste and Material
CWS	Community Wellbeing Strategy
BAE	Building and Energy
IFD	Innovation and Future Development

Appendix 2. 281 performance indicators identified through directed content analysis

Source	Performance Indicators	Environment (Planet)																																Socio-Economic (Prosperity)													Socio-Cultural (People)																Management (Management)												
		L1	L2	L3	L4	L5	L6	L7	L8	L9	L10	L11	L12	L13	L14	L15	L16	L17	L18	L19	L20	L21	L22	L23	L24	L25	L26	L27	L28	L29	L30	L31	L32	L33	S1	S2	S3	S4	S5	S6	S7	S8	S9	S10	S11	S12	S13	B1	B2	B3	B4	B5	B6	B7	B8	B9	B10	B11	B12	B13	B14	B15	B16	M1	M2	M3	M4	M5	M6	M7	M8	M9	M10	M11	M12	M13
	Local sourcing by tourism enterprises encouraged and supported																																												✓																														
	Local producers linked to tourism value chain																																												✓																														
	Local goods promoted and sold to visitors																																												✓																														
	Tourism enterprises support local sustainability initiatives																																										✓																																
	Visitor support for community and sustainability schemes promoted																																										✓																																
	Community engagement avoids exploitation or intrusion																																										✓																																
	Human rights laws referenced by title and date																																									✓																																	
	Human rights laws communicated and enforced with stakeholders																																									✓																																	
	Human rights risks regularly analyzed																																									✓																																	
	Destination and tourism actors signed child protection Code of Conduct																																									✓																																	
	Local laws cited on property, acquisition, and resource access (title/date)																																														✓																														
	Referenced laws include communal/indigenous rights, consultation,																																														✓																														
	Enforcement of rights laws evident in tourism activities																																														✓																														
	Community consultation, consent, and compensation evidenced.																																														✓																														
	Destination has active security and health services																																													✓																															
	Visitor needs addressed in security and health services																																													✓																															
	Tourism facilities checked for safety and hygiene compliance																																													✓																															
	Accessibility regulations for visitor sites and services exist																																							✓																																			
	Accessibility standards consistently applied in public facilities																																							✓																																			
	Proportion of Accessible Visitor Sites & Facilities																																		✓																																											
	Programmes Supporting Diverse Access Needs																																		✓																																											
	Destination communications include accessibility info																																		✓																																											
	Accessibility details included in visitor info for key sites																																		✓																																											
	Cultural assets listed with evaluation and vulnerability status																																																				✓																							
	Asset rehabilitation and conservation program in place																																																					✓																						

Source	Performance Indicators	Environment (Planet)																																Socio-Economic (Prosperity)													Socio-Cultural (People)																Management (Management)												
		L1	L2	L3	L4	L5	L6	L7	L8	L9	L10	L11	L12	L13	L14	L15	L16	L17	L18	L19	L20	L21	L22	L23	L24	L25	L26	L27	L28	L29	L30	L31	L32	L33	S1	S2	S3	S4	S5	S6	S7	S8	S9	S10	S11	S12	S13	B1	B2	B3	B4	B5	B6	B7	B8	B9	B10	B11	B12	B13	B14	B15	B16	M1	M2	M3	M4	M5	M6	M7	M8	M9	M10	M11	M12	M13
	Tourism income channels support cultural conservation																																																										✓															
	Relevant laws on historical artefacts cited (title/date)																																																									✓																	
	Relevant laws communicated to tourism enterprises and visitors																																																									✓																	
	Enforcement of relevant laws documented																																																									✓																	
	Intangible cultural heritage identified and listed																																																			✓																							
	Intangible heritage celebrated through events, visitor experiences, and unique																																																							✓																		
	Local and indigenous communities engaged in heritage-based visitor																																																	✓																									
	Visitor and community feedback on heritage experiences recorded.																																															✓																											
	Accessibility to natural and cultural sites monitored for local community.																																																						✓																				
	Local community engaged on traditional access matters.																																																						✓																				
	Specific action to protect and/or rehabilitate local community access.																																																						✓																				
	Intellectual property laws cited (title/date)																																																					✓																					
	Intellectual Property rights communicated to tourism stakeholders																																																					✓																					
	Intellectual Property rights protected in cultural experience development																																																					✓																					
	Visitor flows and site impacts monitored; results shared across destination																																																							✓																			
	Actions taken to manage tourism impacts at cultural sites documented																																																							✓																			
	Visitor guidelines for sensitive sites/events published, distributed, and compliance																																																							✓																			
	Code of practice for guides/operators in place; engagement on cultural site management active.																																																		✓																								
	Provision of training for guides.																																																		✓																								
	Interpretative materials provided onsite and accessible before arrival																																																													✓													
	Interpretative material research verified; content deemed accurate.																																																													✓													
	Interpretative material highlights site significance and sensitivity.																																																													✓													
	Host community collaborated on interpretative content development																																																													✓													
	Natural heritage sites listed with type, conservation status, and vulnerability																														✓																																																
	Biodiversity and natural heritage conservation programmes active.																														✓																																															
	Invasive species eradication and control programmes implemented																														✓																																															
	Tourism impacts on biodiversity identified, monitored, and mitigated																														✓																																															
	Tourism income allocated to natural asset conservation.																														✓																																															
	Visitors and enterprises informed on minimizing alien species spread																														✓																																															
	Visitor impact monitored; results shared.										✓																																																																		
	Tourism impact mitigation at natural sites evidenced										✓																																																																		
	published, distributed, and compliance monitored										✓																																																																		

Source	Performance Indicators	Environment (Planet)																																Socio-Economic (Prosperity)													Socio-Cultural (People)																Management (Management)												
		L1	L2	L3	L4	L5	L6	L7	L8	L9	L10	L11	L12	L13	L14	L15	L16	L17	L18	L19	L20	L21	L22	L23	L24	L25	L26	L27	L28	L29	L30	L31	L32	L33	S1	S2	S3	S4	S5	S6	S7	S8	S9	S10	S11	S12	S13	B1	B2	B3	B4	B5	B6	B7	B8	B9	B10	B11	B12	B13	B14	B15	B16	M1	M2	M3	M4	M5	M6	M7	M8	M9	M10	M11	M12	M13
GSTC Destination Criteria (version 2.0), (GSTC, 2019)	Code for operators/guides active; visitor management engagement at natural sites ongoing					✓																																																																					
	Local conservation bodies engaged to identify and mitigate tourism-related environmental risks.																														✓																																													
	Provision of training for guides.					✓																																																																					
	Wildlife interaction laws referenced by title and date at all governance levels.								✓																																																																			
	International wildlife viewing standards endorsed for marine and terrestrial species								✓																																																																			
	Code for wildlife interaction distributed; aligns with international standards.								✓																																																																				
	Compliance with tourism regulations and codes monitored.								✓																																																																			
	Wildlife wellbeing monitored; disturbance minimized at interaction sites.								✓																																																																			
	Visitors informed about harmful wildlife interaction (e.g., touching, feeding)								✓																																																																			
	Animal welfare and species conservation laws, standards, and guidelines cited by title and date across all governance levels																													✓																																															
	Tourism enterprises and guides notified of applicable laws, standards, and guidelines.																													✓																																															
	Animal welfare inspection system in place for housing and handling of captive and domestic species.																													✓																																															
	Personnel for captive wildlife licensed and qualifications verified																													✓																																															
	CITES promoted within tourism sector; compliance ensured.																													✓																																															
	Visitors informed about avoiding trade in endangered species (e.g., souvenirs from IUCN/CITES-listed wildlife)																													✓																																															
	Legislation enforced to ensure hunting aligns with scientific, managed conservation practices.																													✓																																															
	Energy targets publicised and actively promoted												✓																																																																
	Energy efficiency programme active (e.g., insulation support)												✓																																																																
	Renewable energy: funding & share of consumption												✓																																																																
	Enterprise energy monitoring support & incentives												✓																																																																
	Enterprise water use: guidance & support																											✓																																																		
	Program to regularly assess water risk.						✓																																																																						
	Water goals set/enforced in high-risk areas						✓																																																																						
	Tourism water use: monitoring & community impact																							✓																																																							
	Programme of water quality monitoring.									✓																																																																			
	Existence of data and reports on water quality.									✓																																																																		
	Water quality checks & site certification									✓																																																																			
	Evidence of actions to improve water quality.																				✓																																																								
	Promoting local tap water use																				✓																																																								
	Waste water treatment guidelines and regulations (written).											✓																																																																		
	Guideline Enforcement Framework											✓																																																																			
	Monitoring/testing of released wastewater.																✓																																																												
	Sustainable municipal water treatment for tourism, where feasible.	✓																																																																											

Source	Performance Indicators	Environment (Planet)																																Socio-Economic (Prosperity)												Socio-Cultural (People)															Management (Management)											
		L1	L2	L3	L4	L5	L6	L7	L8	L9	L10	L11	L12	L13	L14	L15	L16	L17	L18	L19	L20	L21	L22	L23	L24	L25	L26	L27	L28	L29	L30	L31	L32	L33	S1	S2	S3	S4	S5	S6	S7	S8	S9	S10	S11	S12	S13	B1	B2	B3	B4	B5	B6	B7	B8	B9	B10	B11	B12	B13	B14	B15	B16	M1	M2	M3	M4	M5	M6	M7	M8	M9	M10	M11	M12	M13
	Waste monitoring programme, with results and targets published.										✓																																																															
	Coordinated waste management support for tourism enterprises.										✓																																																															
	Campaign to cut single-use plastics.												✓																																																													
	Waste management programme for public offices and facilities.										✓																																																															
	Four-stream recycling system provided.																							✓																																																		
	Sustainable residual waste disposal system.						✓																																																																			
	Anti-litter campaign for clean public spaces.		✓																																																																							
	Adequate bins for separated waste disposal.																														✓																																											
	Published emissions reduction target with deadline.																				✓																																																					
	Annual climate report with actions.																				✓																																																					
	Supported campaign with tourism sector on emission reduction.																				✓																																																					
	Public Sector Decarbonization																				✓																																																					
	ffset Guidance for Stakeholders																				✓																																																					
	Low-Carbon Transport Upgrades																					✓																																																				
	Eco Travel Guidance			✓																																																																						
	Data on visitor use of alternative transport modes.			✓																																																																						
	Cycling & Walking Upgrades	✓																																																																								
	Sustainable Access Prioritization	✓																																																																								
	Low-Impact Transport Priority																								✓																																																	
	Light & Noise Guidelines																											✓																																														
	Noise & Light Source Tracking																											✓																																														
	Noise-Light Complaint Channel																											✓																																														
Impact of tourism development upon environmental sustainability: a suggested framework for sustainable ecotourism (Baloch dkk., 2023)	Scenic & Connected Destination																	✓																																																								
	Cultural & Community Appeal																																										✓																															
	Heritage & Culture Assets																																																								✓																	
	Cultural Commerce Support																																																												✓													
	Local Infrastructure & Livelihoods																																		✓																																							
	Heritage Rehabilitation & Conservation																																																										✓															
	Cultural Awareness & Preservation																																																✓																									
	Nature Reserve Establishment														✓																																																											
	Wildlife & Nature Protection																													✓																																												
	Afforestation & Waste Control						✓											✓													✓																																									
	Inclusive Indigenous Engagement																																						✓																																			
	Heritage Interpretation for Visitors																																																													✓												
	Suited for Solo & Small Tours																																																														✓											
Sustainable architecture and tourism management (Sharma dan Krishna, 2011)	Inclusive & Enduring Sustainability																																																					✓																				
	Eco-Cultural Destination Harmony																																																						✓																			
	Local Heritage Impact																																																							✓																		
	Inclusive Multi-Level Cooperation																																																														✓											
	Quality & Preservation Standards																																																																	✓								
	Inclusive Local Development																																				✓																																					
	Inclusive Resource Allocation																																									✓																																
	Responsible Tourism Guidelines																																																																							✓		

Source	Performance Indicators	Environment (Planet)																																	Socio-Economic (Prosperity)													Socio-Cultural (People)																Management (Management)												
		L1	L2	L3	L4	L5	L6	L7	L8	L9	L10	L11	L12	L13	L14	L15	L16	L17	L18	L19	L20	L21	L22	L23	L24	L25	L26	L27	L28	L29	L30	L31	L32	L33	S1	S2	S3	S4	S5	S6	S7	S8	S9	S10	S11	S12	S13	B1	B2	B3	B4	B5	B6	B7	B8	B9	B10	B11	B12	B13	B14	B15	B16	M1	M2	M3	M4	M5	M6	M7	M8	M9	M10	M11	M12	M13
Sustainable Tourism Development - An Applied Model of The Bucegi Mountains (Marilu, 2022)	Socially Inclusive Development																																						✓																																					
	They create new local jobs for local people;																																			✓																																							
	Inclusive Development Process																																						✓																																					
	It is promoted the rational use of natural resources																														✓																																													
	Environmental Impact Reduction																														✓																																													
Sustainable Tourism in Practice: Promoting or Perverting the Quest for a Sustainable	Local Tradition Promotion																																																	✓																										
																		✓																																																														
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																✓																																																																	
																																				✓																																													
	Local Empowerment in Tourism																																																																			✓									
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	Certification																																																																										✓			
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Charter for Sustainable Tourism (UNWTO, 1995)	Sustainable, Equitable Tourism Development																													✓																																															
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																																																																						✓									
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	Tourism strategies must prioritize quality and sustainability with community input.																																					✓																																												
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	Promote diverse, sustainable alternative tourism for long-term stability.																																																																												✓
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Source	Performance Indicators	Environment (Planet)																																	Socio-Economic (Prosperity)													Socio-Cultural (People)																Management (Management)												
		L1	L2	L3	L4	L5	L6	L7	L8	L9	L10	L11	L12	L13	L14	L15	L16	L17	L18	L19	L20	L21	L22	L23	L24	L25	L26	L27	L28	L29	L30	L31	L32	L33	S1	S2	S3	S4	S5	S6	S7	S8	S9	S10	S11	S12	S13	B1	B2	B3	B4	B5	B6	B7	B8	B9	B10	B11	B12	B13	B14	B15	B16	M1	M2	M3	M4	M5	M6	M7	M8	M9	M10	M11	M12	M13
	Sustainable tourism requires adoption of codes of conduct by key actors.																																																																								✓		
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	Regular Monitoring & Evaluation System																																																																				✓					
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	Regularly Reviewed Visitor Management System																																																																				✓					
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	Inclusive Employment Policy for Fair Tourism Work																																							✓																																															
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	Public Safety & Health Risk Response System																																											✓																																	
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																																																✓																												
	System for Protecting & Restoring Community Access to Heritage Sites																																																							✓																				
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Source	Performance Indicators	Environment (Planet)																																		Socio-Economic (Prosperity)													Socio-Cultural (People)																Management (Management)												
		L1	L2	L3	L4	L5	L6	L7	L8	L9	L10	L11	L12	L13	L14	L15	L16	L17	L18	L19	L20	L21	L22	L23	L24	L25	L26	L27	L28	L29	L30	L31	L32	L33	S1	S2	S3	S4	S5	S6	S7	S8	S9	S10	S11	S12	S13	B1	B2	B3	B4	B5	B6	B7	B8	B9	B10	B11	B12	B13	B14	B15	B16	M1	M2	M3	M4	M5	M6	M7	M8	M9	M10	M11	M12	M13
	Sensitive Visitor Flow Management at Natural Sites											✓																																																																	
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	Guidelines & Regulations to Minimize Light & Noise Pollution																													✓																																																
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	Reducing waste, pollution and environmental degradation.													✓																																																																
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	Cultural heritage: Presence of significant archaeological or cultural monuments was assessed.																																																			✓																								
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Appendix 3. Sustainable performance indicators: Environment (Planet)

No.	Performance Indicators	Greenship Based Parameters		Source
L1	Provision of sustainable municipal wastewater treatment plant for use by the tourism sector.			[23]
L2	Adequate facilities for cyclists and pedestrians.	*MAC 5*	Provide bicycle lanes on the back, free from parallel intersections with motor vehicles (dedicated bike lanes). (50%-100% ratio)	[23, 37, 38]
			Provide secure bicycle parking at (at least one of) gates, parks, and public transportation interchanges.	
		MAC P2	Provide pedestrian paths on the back.	
		MAC 1	The pedestrian path is not 100% disconnected.	
			It creates high permeability with pedestrian options; has an average *Route Directness Index* value of at least 0.65. Or A ratio of the number of pedestrian intersections to motor vehicle intersections of 1 or more.	
			Prioritize pedestrians at every intersection.	
			Pedestrian paths are shaded for at least 60% of the pedestrian path.	
			Ensure safe and uninterrupted access, free from intersections with motorized traffic, to connect one building to another directly.	
			Meet walkway quality standards (a) and (b), and two other quality standards.	
			Create an attractive environment for pedestrians.	
		MAC 4	Accommodate and easy and smooth passage for everyone in the public space.	
			Providing special facilities at specific points for everyone, including: a. Rest areas are mainly used as casual seating at the edges, b. Public parking spaces for wheelchairs, c. Wheelchair-accessible public toilets, where public toilets are available in public spaces.	
		ASD 4	Secure bicycle parking should be provided at a rate of one parking unit for every 20 building users, with a maximum limit of 100 bicycle parking units.	
			If benchmark 1 above is met, 1 shower is required for every 10 bicycle parking spaces.	
		ASD 2	Provide pedestrian access to the main road outside the site and secondary roads and/or adjacent properties, ensuring access to at least three public facilities within a 300-meter walking distance.	
			Design the ground floor of the building to remain open, allowing safe and convenient pedestrian access for at least 10 hours per day.	
		ASD 6	The landscape design in the form of vegetation (softscape) on the main pedestrian circulation, protects againts heat due to solar radiation.	
			Using plants as softscape in the main pedestrian area helps shield pedestrians from strong winds.	
		ASD 3	Provide pedestrian facilities within the building area to go to the nearest public transportation station that is safe and comfortable by considering the Minister of Public Works Regulation 30/PRT/M/2006 regarding Technical Guidelines Facilities and Accessibility in Buildings and the Environment Appendix 2.	
L3	An appeal to tourists not to litter.	*CWS 3*	Sustainable lifestyle promotion efforts should be conducted by implementing at least two consistent promotional programs.	[23, 37]
L4	Information about alternative transportation options for tourists travelling to and around the destination.	*MAC P3*	The area is connected to the public transportation network and provides adequate interconnection space (as well as public transportation user shelters).	[23, 37]
L5	Training, codes of practice for tour operators and tour guides and/or other engagement with them in visitor management.			[23]
L6	A program or system is in place to address and manage the risks related to water use.	*WMC 1*	Utilizing alternative water sources to meet 10%, 30%, or 50% of the area's clean water needs, or to meet the irrigation requirements of the area fully.	[23, 37]
L7	Sustainable disposal of residual waste (solid and liquid).	BEM 2	Collection areas, segregation, and recording systems provide solid waste. Recording is differentiated based on solid waste disposed of in landfills, reused, and recycled by third parties.	[23, 28, 38]
			Liquid waste is maintained by maintaining the quality of all water discharges arising from construction activities so as not to pollute the city's drainage.	
L8	A system is in place to ensure adherence to local, national, and international laws and standards regarding interactions with wildlife.			[23, 24]
L9	Implementing of a monitoring system to assess water quality for potable, recreational, and ecological uses is in accordance with standardized criteria.			[23, 24]

L10	A system for managing visitors within and around natural sites, considering the environment's characteristics, capacity, and sensitivity, aims to optimize visitor movement and minimize negative impacts.			[23, 24]
L11	A system for measuring and reporting generated waste and setting targets to reduce it.	*IFD 2*	Setting objectives for enhancing energy and water efficiency while also striving to decrease waste generation throughout the management period	[23, 24, 38]
L12	Targets are set to reduce energy consumption, increase energy efficiency and increase the use of renewable energy.	*BAE 4*	Using alternative energy sources in the back.	[23, 24, 29, 31, 37, 38]
		IFD 2	Have energy and water efficiency targets and waste volume reduction during the management period.	
		EEC P1	Install kWh meters to measure electricity consumption for each load group and equipment system, which includes: - Air conditioning system - Lighting system and contact boxes - Other load systems.	
		EEC P2	Calculate OTTV based on SNI 03-6389-2011 or the latest edition of SNI on Energy Conservation of Building Envelope in Building.	
		EEC 1	Energy modeling software will be employed to assess energy usage in the baseline building and the proposed design. The difference between the energy consumption of the baseline and the designed building is the savings. For every 2.5% saving, starting from a 10% energy reduction from the baseline building, 1 point is scored (mandatory for platinum). OR Using the worksheet calculation, every 2% saving from the difference between the designed and baseline building scores 1 point. Savings start from a 10% energy reduction from the baseline building. The worksheet is provided by GBCI.	
L13	There is an appeal/campaign to reduce/eliminate single-use items, especially through reuse.	CWS 3	Implementing sustainable lifestyle promotion within the community through at least two consistently maintained promotional programs.	[23, 37]
L14	Implementing measures to minimize pollutants in water, air, and soil (including noise pollution) from both management and visitors, ensuring environmental sustainability.	*BAE 5*	Strategy fulfillment: Lamp Shielding, Light Trespass, Glare, and Sky-Glow Limitation.	[30, 38]
		BAE 6	Implement measures to mitigate noise pollution, ensuring compliance with established noise quality standards.	
		IHC 3	Using paints and coatings containing low levels of volatile organic compounds (VOCs), as GBC Indonesia recognized labels/certifications indicated.	
			Using composite wood products and laminating adhesives with low formaldehyde emission requirements, as indicated by GBC Indonesia recognized labels/certifications.	
			Use lamps with mercury content within the maximum tolerance approved by GBC Indonesia, and do not use asbestos materials.	
L15	The existence of the program presents a green open space.	ASD P	Landscaped areas consist of vegetated zones (softscape) free from building structures and minimal garden-related structures (hardscape), either above or below ground. **a.** In new developments, these landscaped areas must occupy at least 10% of the total site area. **b.** In major renovation projects, they must comprise at least 50% of the open space not occupied by basements within the building footprint. This area is vegetated by Article 13 (2a) of Permendagri No. 1 of 2007, requiring that 50% of the land be planted with a mix of small, medium, and large trees, as well as semi-woody shrubs and mature-sized shrubs. The selection of plant species also adheres to the criteria outlined in Article 2.3.1 of the Minister of Public Works Regulation No. 5/PRT/M/2008 concerning Green Open Space (RTH), which specifies vegetation standards for residential yards.	[28, 38]
L16	The existence of a program to monitor and test wastewater before disposal.			[23]
L17	The existence of the program to maintain the quality of the landscape and minimize the impact, both physically and visually.	*LEE 2*	Retain at least 20% of large, mature trees in the backlot. Enhancement of ecological value on-site based on recommendations from a qualified landscape or biology expert. The use of local provincial plant species, such as trees and/or shrubs within the area, must be accompanied by a management plan: either covering 30%–60%, more than 60%, or including a plan for fauna protection or a strategy to enhance local fauna biodiversity. For every tree within the site that has fallen or been intentionally removed, ten young saplings must be planted as part of the reforestation or ecological restoration effort.	[32, 37, 30]
L18	The existence of the program to manage accessibility to maintain connectivity between destinations.	*MAC P1*	There is a study on accessibility.	[28, 37]
		MAC P3	The area is connected to the public transportation network and provides adequate interconnection space (as well as public transportation user shelters).	

		MAC 4	Accommodating accessible and unobstructed pathways for all individuals within public spaces.	
L19	The existence of a program to control and manage waste.	BEM P	The existence of installations or facilities for sorting and collecting waste is similar to household waste (Law No. 18 of 2008) based on the types of organic, inorganic, and hazardous waste.	[38, 28]
L20	The existence of the program to improve water quality.			[23, 31]
L21	Have a target to reduce greenhouse gas emissions and implement and report on policies and mitigation.	EEC 4	Submit a calculation of the CO2 emission reduction obtained from the difference in energy demand between the designed building and the baseline building using the grid emission factor set out in the DNA Decree on B/277/Dep.III/LH/01/2009.	[23, 24, 38]
L22	Have a target to reduce transportation emissions from travel to and within destinations.	ASD 2	Provide facilities/access that is safe, convenient, and free from intersections with motorized access to directly connect buildings with other buildings, where there are at least three public facilities and/or with mass transportation stations.	[23, 24, 38]
		ASD 3	The existence of a public transportation stop or station within 300 m (walking distance) of the building site gate does not consider the length of pedestrian bridges and ramps.	
			Provide shuttle buses for the building's regular users, with a minimum number of units for 10% of regular users.	
L23	Monitoring and controlling the source and volume of water used for tourism and its impact on local communities and ecosystems.	WAC 6	Not all water used for building irrigation comes from groundwater sources and/or PDAM.	[23, 32, 38]
			Implement innovative irrigation technologies that can control water requirements for precise landscaping according to the needs of the plants.	
		WAC 3	Use of all recycled gray water for flushing systems or cooling towers.	
			Use of all grey water that has been recycled for the flushing system and cooling tower - 3 marks (If a non-water cooled cooling system is used, this criterion is not applicable and the total marks will be 100).	
			Provide a rainwater storage tank installation with a capacity of 20% of the amount of rainwater falling on the building's roof calculated using a rainfall intensity value of 50 mm/day.	
		WAC 5	Provide a rainwater storage tank installation with a capacity of 35% of the above calculation.	
			Provide a rainwater storage tank installation with a capacity of 50% of the above calculation.	
L24	Provision of a collection and recycling, with at least four streams (i.e., back, paper, metal, glass, and plastic).	*SWM P*	Have a Waste Management Plan for the entire operational life of the back (buildings, landscaping, and public places), which includes: A. Identification of waste types and estimated volume/weight. B. A review of the area's existing waste management programs and infrastructure, provided by the government or relevant agencies. C. A waste separation, collection, transportation, treatment, and final processing plan.	[23, 37]
			The existence of waste sorting and collection installations or facilities for the period of operational period back, into at least 3 (three) types of waste consisting of: A. Easily degradable waste; B. Inorganic waste; C. Waste containing hazardous and toxic materials and hazardous and toxic waste (B3).	
L25	The public sector and tourism enterprises prioritize low-impact transportation.	*MAC P3*	The area is connected to the public transportation network and provides adequate interconnection space (as well as public transportation user shelters).	[23, 37]
		MAC 2	Integrated with public transportation networks and equipped with bus stops or shelters, or offers shuttle services.	
			The area has access to mass public transportation within a 400-meter radius from its outer boundary, or serves as a transit node for mass public transport modes that are integrated with the built environment	
L26	There are well-defined and enforced regulations governing the installation, maintenance, and effluent testing of septic systems and wastewater treatment facilities.			[24, 32]
L27	The existence of a program to encourage businesses to measure, monitor, publicly report, and manage water usage.	WAC P1	Installation of water meters (volume meters) placed at specific locations in the water distribution system, as follows: - One volume meter is used for clean water source output system such as a PDAM or groundwater source. - One volume meter to monitor the output of the recycled water system. - One volume meter is installed to measure additional clean water output in case of an insufficient recycling system.	[23, 24, 31, 38]
			Fill in the provided GBCI standard water *worksheet.*	
L28	Guidelines and regulations are in place to minimize embodied and noise pollution.	IHC 7	The noise level at 90% of the *net lettable area* (NLA) is no more than or by SNI 03-6386-2000 on Specifications for Sound Level and Reverberation Time in Buildings and Housing (recommended design criteria).	[23, 24, 38]

		IHC 5	Use lamps with room illuminance according to SNI 03-6197-2011 on Energy Conservation in Lighting Systems.	
L29	The existence of the program ensures compliance with local, national, and international laws and standards aimed at safeguarding animal welfare and the conservation of species, including fauna, flora, and all living organisms.			[23, 24, 39]
L30	The availability of tools to monitor, measure, and respond to tourism's impacts on the natural environment, conserve ecosystems, habitats, and species, and prevent the introduction and spread of alien species.			[23, 24, 28, 34, 36]
		BEM P	The existence of facilities for sorting and collecting waste similar to household waste (Law No. 18 of 2008) based on organic, inorganic, and hazardous waste types	
L31	Availability of adequate trash bins for waste disposal, separated according to type.	*SWM P*	The existence of waste sorting and collection installations or facilities for the period of operational period back, into at least 3 (three) types of waste consisting of: A. Easily degradable waste; B. Inorganic waste; C. Waste containing hazardous and toxic materials and toxic waste (B3).	[23]
L32	The use of greywater as an alternative water source for non-consumptive purposes.	WAC 3	Use of all grey water that has been recycled for flushing or cooling tower needs. Use of all grey water that has been recycled by flushing vessels and cooling towers - 3 marks. If non-water-cooled cooling vessels are used, then this criterion is not applicable, so the total score becomes 100.	[31]
L33	The program aimed at improving water and air quality is conducted through afforestation. This process involves the conservation of non-forested land by transforming it into forested areas through direct human intervention. Activities include planting trees, cultivating seedlings, and promoting natural sources.			[28]

Appendix 4. Sustainable tourism performance indicators: Socio-economic (Prosperity)

No.	Performance Indicators	Greenship Based Parameters		Source
S1	Accessibility information is included in the overall destination communication.	*MAC P1*	There is a study on accessibility.	[23]
		MAC 4	Accommodate an easy and smooth passage for everyone in public spaces. Providing special facilities at specific points for everyone, including: a. Rest areas are mainly used for casual seating at the edges b. Public parking spaces for wheelchairs, c. Public toilets for wheelchairs, if public toilets are available in public spaces.	
S2	Policies and laws that require companies in tourism destinations to provide employment, training opportunities, occupational safety, fair wages (in line with the average minimum wage), and equality for all, including women, youth, people with disabilities, minority groups, and others.			[23, 24, 28, 30, 34]
S3	There are policies in place that require tourism destination companies to provide jobs, training opportunities, job safety, and fair wages to local communities.			[29, 36]
S4	Tourism contributes directly and indirectly to the destination's economy and supports the enhancement of the quality of life for local communities.	*CWS 2*	Provide study results on the impact of regional development on the economic development of communities inside and outside the area. It includes communication channels with community representatives or associations, providing a platform for expressing opinions regarding the area's development plans. Has facilities/infrastructure for the community, which can be used for socio-economic activities.	[23, 29, 35, 39]

S5	The direct and indirect economic impact of tourism on the local economy.			[24]
S6	Public participation in sustainable destination planning and management.	*CWS 2*	Provide a means of communication with residents' representatives or community associations and a place to express opinions about the area development plan.	[35, 36, 39]
S7	Availability of regulations, standards, and information for accessibility at visitor sites, facilities, and services.			[23]
S8	Published practices, programs, and legislation aimed at preventing the commercialization and exploitation, as well as sexual harassment and other forms of abuse against children, youth, women, and minority groups.			[23, 24, 31]
S9	Programs and systems are in place that enable and encourage businesses, visitors, and the public to contribute to community and sustainability initiatives.			[23, 24, 35]
S10	Programs that ensure local communities can continue to access natural, cultural, historical, archaeological, religious, and spiritual sites in tourist destinations.			[24, 28, 32]
S11	Systems and programs that support micro, small, and medium enterprises (MSMEs) in the tourism value chain to promote and develop sustainable local products with fair trade principles.			[23, 24]
S12	Systems are in place to monitor, prevent, publicly report, and respond to crime, safety, and health hazards that meet the needs of visitors and residents.	*CWS 6*	Have efforts to ensure security and resilience in the face of disasters.	[23, 24]
S13	Laws and regulations on property rights and acquisitions are documented and enforced.			[23, 24]

Appendix 5. Sustainable tourism performance indicators: Social-cultural (People)

No.	Performance Indicators	Greenship Based Parameters		Sources
B1	Support the celebration and protection of intangible cultural heritage, including local traditions, art, music, language, gastronomy, and other aspects of local identity and distinctiveness.			[24]
B2	Feedback from tourists and local communities related to culture-based tourism experience (tangible and intangible)	CWS 2	It includes communication channels with community representatives or associations, providing a platform for expressing opinions regarding the area's development plans.	[23]
B3	Policies and systems are in place to evaluate, rehabilitate, and conserve cultural assets, including heritage buildings and cultural landscapes.			[24, 28, 30, 34, 39]
B4	The involvement of local and indigenous communities in developing culture-based *tourism experiences* (tangible and intangible)	*CWS 2 [37]*	It includes communication channels with community representatives or associations, providing a platform for expressing opinions regarding the area's development plans.	[23]
B5	Training, codes of practice for tour operators and tour guides, and/or other engagement with them in visitor management at cultural sites.			[23]
B6	Data collection on cultural assets (tangible and intangible)			[23, 32]
B7	Cultural asset rehabilitation and conservation program	*CWS 5*	Conservation of historical buildings and/or areas Local culture preservation activities	[23]
B8	A system designed to enhance the protection and preservation of intellectual property rights for both communities and individuals.			[23, 24, 35]
B9	Systems are in place to monitor, protect, and, when required, rehabilitate or restore local communities' access to natural and cultural sites.			[23, 24, 35]
B10	A visitor management system is established for cultural sites and their surroundings, considering each site's specific characteristics, capacities, and sensitivities. The aim is to optimize visitor circulation and reduce adverse impacts.			[23, 24, 35, 39]
B11	The presence of a tourism experience based on local culture, encompasses both tangible and intangible aspects.	CWS 5	Building architecture based on local identity. Supporting facilities for the organization of local culture. Naming places/buildings/streets based on local cultural names.	[23, 28]
B12	Legal frameworks govern the sale, trade, display, and transfer of historical and archaeological artifacts, with enforcement mechanisms in place and information disseminated to the public, including tourism operators and visitors.			[23, 24]
B13	There are efforts to create awareness and understanding of various ethnic cultures, social values, and traditions, connect them, and preserve the culture.	CWS 5	Applying the local culture of the local area in the form of at least 2 (two) the following: a) Building architecture based on local identity,	[28]

			b) Supporting facilities for the implementation of local culture, c) Naming of places/buildings/streets based on local cultural names, d) Conservation of historical buildings and/or areas, e) Local cultural preservation activities, f) Local cultural education activities,	
B14	Budget allocation to support the conservation of cultural assets			[23]
B15	Established legal frameworks regulate the sale, exchange, exhibition, and gifting of historical and archaeological artifacts, with effective enforcement and public dissemination targeting tourism stakeholders and visitors.			[28]
B16	Accurate interpretation materials inform visitors of the importance of the cultural and natural aspects of sites visited. The information provided is culturally appropriate, developed with the host community, and communicated using languages that visitors and locals know.	CWS 5	Local cultural education activities.	[23, 24, 35]

Appendix 6. Sustainable tourism performance indicators: Management (Management)

No.	Criteria Indicator	Greenship Based Parameters (GBCI)		Sources
M1	Providing a comfortable and safe tourist experience/flow for both group and individual visitors.			[35]
M2	Information for visitors about sustainability issues and ways to address them.			[23]
M3	There is an effective, coordinated management organization with funding and a clear division of tasks.			[23, 24]
M4	Public participation in sustainable destination planning and management.	CWS 2	Provide a means of communication with residents' representatives or community associations and a place to express opinions about the area development plan.	[23, 24, 29, 30, 35, 39]
M5	Guidelines, regulations, and policies on planning that include environmental, economic, social, zoning, land use, design, construction, and demolition impact assessments developed in conjunction with local communities to protect natural and cultural resources.	BEM 4 [38]	Perform testing-commissioning procedures by GBC Indonesia guidelines, including related training to optimize the suitability of the function and performance of equipment/systems with plans and references. Ensure that all measuring and adjusting instruments have been installed during construction. Pay attention to the conformity between design and technical specifications related to the proper commissioning of components.	[23, 24, 39]
		IFD 2	Have institutions and SOPs/guidelines for area management.	
M6	Existence of training, codes of practice for tour operators and tour guides, and/or other engagement with them in management			[23]
M7	A financial plan and budget that shows current and future funding sources.			[23]
M8	There is a monitoring and evaluation system, both in terms of management and visitor satisfaction, that is carried out and reported regularly.	BEM 7	Provide a statement that the building owner will conduct a temperature and humidity survey no later than 12 months after the certification date and submit a survey report no later than 15 months after the certification date to GBC Indonesia.Note: If more than 20% of the respondents express discomfort, the building owner agrees to make improvements no later than 6 months after reporting the survey results.	[23, 24, 30]
M9	An emergency response management system includes an action plan developed with private sector input, defined human and financial resources, and communication procedures during and after a crisis/emergency.			[23, 24]
M10	The existence of a tourism standard system that regulates important aspects of sustainable tourism activities for Tourism Actors			[23, 24, 29, 35]
M11	Better systems, regulations, policies, and programs for climate change adaptation, risk reduction, and awareness raising for communities and tourism businesses.			[23, 24, 39]
M12	Management strategies are implemented to address tourist visitation patterns, activity impacts, and the needs of the destination.			[23]
M13	The promotion of tourism destinations, products, and services is accurate, authentically responsible, and respectful of local communities and tourists.			[23, 24, 29, 39]

Appendix 7. Categorization and mapping of performance indicators

Reference	Indicator	Category	Environmental	Socio-Cultural	Management of Tourism	Socio-Economic
[31]	Reducing water consumption and protecting water quality are key objectives in sustainable building. Wastewater may be minimized by utilizing water-conserving fixtures such as ultra-low flush toilets and low-flow showerheads.	Environmental	The existence of the program to improve water quality (L20).	-	-	-
	"Greywater", wastewater from sources such as dishwashing or washing machines, can be used for subsurface irrigation, or if treated, for non-potable purposes, e.g., to flush toilets and wash cars. Rainwater collectors are used for similar purposes.	Environmental	The use of greywater as an alternative water source for non-consumptive purposes (L32).	-	-	-
	Efficiently using energy, water, and other resources	Environmental	The existence of a program to encourage businesses to measure, monitor, publicly report, and manage water usage (L27).	-	-	-
	Protecting occupants health and improving employee productivity	Socio-Economic	-	-	-	Published practices, programs, and legislation aimed at preventing the commercialization and exploitation, as well as sexual harassment and other forms of abuse against children, youth, women, and minority groups (S8).
	Reducing waste, pollution and environmental degradation.	Environmental	Targets are set to reduce energy consumption, increase energy efficiency and increase the use of renewable energy (L12).	-	-	-