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Morphological Characteristics of Green Tourism Village in Bali, Indonesia (Case Study: Taro Village, Gianyar)

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ABSTRACT: This study examines the morphological characteristics of Green Tourism Villages in Taro Village, Gianyar Regency, Bali, which consists of 14 Banjars (hamlets). The research aims to evaluate the sustainability performance of the village based on integrated green rating tools, including Greenship Neighborhood, LEED (Leadership in Energy and Environmental Design), Green Tourism, and N-Green V. Data were collected through field surveys, direct observations, structured interviews with community leaders, and a literature review of relevant sustainability assessment frameworks. The indicators assessed cover land use allocation, building form, circulation systems, open spaces, environmental quality, infrastructure, and waste management systems. The findings reveal that Taro Village generally aligns with sustainability principles, with strengths observed in land use practices, biodiversity preservation, and effective waste management, such as organic waste recycling and composting. However, challenges remain in biodiversity monitoring and the absence of public transportation infrastructure. This research concludes that integrating morphological analysis with green rating tools offers a comprehensive framework for assessing and enhancing sustainability in rural tourism villages, providing a replicable model for similar regions in Indonesia.

Keywords – Morphology, Green Tourism Village, Green Indicator

I. INTRODUCTION

Green tourism village is a tourism concept that emphasizes the importance of harmony between environmental conservation and sustainable use of natural resources by involving the active role of local communities in its management [1]. This concept aims to promote the development of the community's economy without ignoring ecological aspects and local wisdom. In its implementation, green tourism villages function as a model that can balance environmental sustainability and local communities' economic welfare. With an approach based on local wisdom and the principle of sustainability, green tourism villages are expected to increase community income and strengthen local social and cultural ties through participatory and inclusive conservation efforts [1].

However, the problems of implementing and developing green tourism villages in Indonesia show that despite the enormous potential for development, significant challenges still need to be overcome. One of the main challenges is the absence of clear and comprehensive standards for measuring and assessing the performance of green tourism villages. This has led to a lack of concrete guidance for stakeholders in developing and evaluating green tourism villages.

To address these challenges, various institutions have developed measurement tools or *rating tools* to assess the performance of green tourism villages, such as the Green Building Council Indonesia Kawasan (GBCI Kawasan), Tourism Village, N-Green V, and Leadership in Energy and Environmental Design (LEED). These measurement tools are designed to provide a framework that can be used to assess the extent to which a green tourism village meets the principles of sustainability.

One important aspect that has not been considered in the measurement tool is the morphology of green tourism villages, which includes spatial planning, physical structure, building patterns, and environmental infrastructure. The morphology of tourism villages has a significant role in determining the effectiveness and sustainability of an area. The absence of a specific measurement tool or approach that evaluates the performance of green tourism villages based on morphology creates the need to develop new variables. This

variable is expected to be able to summarize the main elements of existing rating tools and align them with morphological aspects to provide a more comprehensive assessment.
This research is important because it aims to identify morphological characteristics related to existing green rating tool indicators so that they can be used as a reference in the evaluation and development of green tourism villages that are more measurable and targeted.

The development of this new variable aims to create a measuring instrument that is more relevant to the context of green tourism villages in Indonesia. Thus, this variable can be used to assess and improve the performance of green tourism villages more holistically, including integrating spatial planning, environmental conservation, and local cultural empowerment. This study also focuses on testing the new variable using a sample of tourism villages in Bali, which is one of the leading tourist destinations in Indonesia.

Taro Village, located in Gianyar Regency, Bali, is one of the green tourism villages that has been recognized for its commitment to preserving the environment and local culture. This village offers pristine natural beauty and a wealth of traditions that are still well-preserved. In addition, Taro Village is also a location for wildlife conservation, such as elephants, and various ecotourism-based activities, such as trekking, cultural workshops, and organic farming practices. This village is a real example of how the principles of green tourism villages can be applied holistically, by involving local communities in natural resource management and cultural preservation.

This study focuses on the Taro green tourism village as a case study to explore the morphotypology of green tourism villages based on the GBCI Kawasan, Green Tourism, N-Green V, and LEED measurement tools. With its potential, the Taro green tourism village can be an example of an evaluation framework to support the development of green tourism villages more effectively and sustainably in Indonesia.

II. LITERATURE REVIEW

1. Green Tourism Village

Tourism villages are regional development projects that make villages into tourist destinations. The development of tourism villages involves several important aspects, such as the introduction of accommodation, facilities, and supporting tourism areas, preservation of customs and traditions of the community, cleanliness and environmental welfare, and the active role of local communities in tourism management. Tourism villages are closely related to UNESCO, an agency under the United Nations responsible for the protection of world heritage and sustainable development. UNESCO supports the development of tourism villages through programs such as UNESCO Creative Cities of Gastronomy and UNESCO Global Geoparks, which aim to preserve local culture, biodiversity, and sustainable culinary and agricultural practices.

Green tourism villages are designed to provide a tourism experience that is not only interesting but also educational about the importance of protecting the environment. This concept is a strategic step to improve the local economy through responsible tourism while reducing negative impacts on the ecosystem and promoting an environmentally friendly lifestyle. Green tourism villages offer an attractive alternative for tourists seeking authentic and sustainable experiences, with a focus on environmental conservation and sustainable resource management [2] .

In addition, research by Pratama [3] revealed that green tourism villages also contribute to the preservation of local wisdom. "Green tourism villages allow local communities to maintain and develop their traditions and culture, which in turn can attract tourists who are interested in authentic experiences," Pratama wrote. Thus, green tourism villages not only have a positive impact on the environment and economy but also strengthen the cultural identity of local communities through the preservation of traditions in a sustainable manner.

Green tourism villages must also have good access or connection to the city to support sustainability and improve the welfare of local residents and tourists. The path between the green tourism village and the city must provide easy and convenient access, including environmentally friendly transportation such as electric buses, bicycle paths, or pedestrian paths designed to reduce dependence on private vehicles [4]. This connectivity path is designed to support environmental sustainability by minimizing carbon emissions and negative impacts on natural ecosystems along the route. Green elements, such as planting trees along the path or using environmentally friendly road materials, can be applied to strengthen the principle of sustainability. This path is also an important means of connecting economic activities between the tourism village and the city [5].
Good connectivity standards enable villagers to access urban markets and support the efficient distribution of local village products to the city. Conversely, tourist visits to villages also increase with good connectivity [6]. There are important elements in the connectivity standards of green tourism villages: safe and comfortable bicycle and pedestrian paths, sustainable public transportation such as electric vehicles, and accessibility for all, including people with disabilities [5].

In addition, the availability of sustainable accommodations, such as hotels and homestays, around the green tourism village area is an important added value. Homestays, in particular, provide opportunities for local communities to be directly involved in the tourism industry. Tourists who stay in homestays can enjoy authentic local cultural experiences, such as daily activities with villagers, enjoying local cuisine, and participating in traditional activities [7].

2. Rating tools Green Value

Green ship Neighborhood is one of the rating tools developed by the Green Building Council Indonesia (GBCI) to assess and measure the sustainability of an environment or residential area. This tool focuses on the development of an environmentally friendly, healthy, and sustainable green environment, by considering various aspects that support the quality of life and ecosystem balance. GBCI (Green Building Council Indonesia) is an institution that develops a rating system to assess the performance of green buildings in Indonesia [8]. This rating system is designed to promote environmentally friendly and sustainable building practices. According to GBCI [8], "GBCI rating tools are a rating system used to assess the performance of green buildings in Indonesia, which aims to improve the quality of the living environment and reduce environmental impacts."

GBCI has assessments for various categories to create sustainable and environmentally friendly areas, namely Land Ecology Improvement, Movement of People and Goods, Water Management and Conservation, Solid Waste and Materials, Community Welfare Strategy, Buildings and Energy, Innovation and Future Development [8].

Meanwhile, Green Business UK Ltd [9], through the Green Tourism program, provides rating tools and criteria for the development of sustainable tourism villages. Here are some important points about tourism villages according to Green Business UK Ltd, namely Communication, Public Awareness, Community, Health and Well-Being, Balance, Diversity and Inclusiveness, Experience, Destination, Travel, Availability of Food and Drink, Diversity, Energy, Waste and Water.

Need of Green Village (N-Green V) is a rating tool created by DK. Halim and team to assess the quality and needs of green tourism villages in Bali. The assessment can be a benchmark for the suitability of green tourism villages by fulfilling points such as economic, socio-cultural, and environmental needs [10].

LEED (Leadership in Energy and Environmental Design) is a green building rating system developed by the US Green Building Council (USGBC). LEED is used internationally to assess and accredit buildings, environments, or infrastructure based on sustainability, resource efficiency, and positive impacts on the environment and the quality of life of its occupants [11]. In the LEED for Neighborhood Development rating tools, there are several aspects that are focused on, namely, Smart Location & Linkage, Neighborhood Pattern & Design, Green Infrastructure & Buildings, Innovation & Design Process, and Regional Priority Credit. Based on the table above, there are several points that are the assessment standards in the LEED-ND rating tools. The highest value is in the Neighborhood Pattern & Design aspect, which is 44 points. Then the Green Infrastructure & Building aspect is 29 points, Smart Location & Linkage is 27 points, Innovation & Design Process is 6 points, and Regional Priority Credit is 4 points [12].

3. Green Value Indicator

Table 1. Comparison variables of 4 rating tools

Variable	GBCI (GREENSHIP)	LEED (Neighborhood Development)	Green Tourism	N Green-V
Sustainability of the Area	Minimum 30% Green Open Space (GOS).	Conservation of habitats and green spaces (min 30%).	Sustainable capacity management for tourism activities.	Maintenance of green spaces and nature.
Accessibility and Infrastructure	Pedestrian pathways and public transport access with eco-friendly design.	Public transport availability within a 400 m radius.	Accessible tourism for all, including disabled-friendly zones.	Pedestrian pathways and public transport integration.
Water Conservation	Rainwater absorption and water recycling	Rainwater management and low-impact water	Water efficiency in tourism activities.	Water recycling and rainwater infiltration systems.

Variable	GBCI (GREENSHIP)	LEED (Neighborhood Development)	Green Tourism	N Green-V
	systems.	infrastructure.		
Waste Management	Waste management with the 3R principle (Reduce, Reuse, Recycle).	Solid Waste Management and Waste Minimization Strategies.	Separation of organic and inorganic waste.	Waste separation and hazardous waste reduction.
Energy Efficiency and Infrastructure	Use of renewable energy sources covering 20%-50% of total consumption.	Renewable Energy Production Credits.	Carbon footprint reduction in tourism operations.	Low-carbon energy use and emission monitoring.
On-Site Facilities	Availability of sanitation facilities and public green spaces.	Accessibility to public facilities within 400 m.	Eco-friendly sanitation and waste management.	Community-based public facility provision.

The variables consisting of area sustainability, accessibility and infrastructure, water conservation, waste management, energy efficiency and infrastructure, and facilities in the area are formed from the principles of sustainability applied in four main environmental assessment systems: GBCI (greenship), LEED (neighborhood development), Green Tourism, and N Green-V. These variables are designed to assess how environmentally friendly an area or development project is by prioritizing ecological, social, and economic aspects [8][9][10][11].

a. Sustainability of the Area

These variables are rooted in the principles of protecting natural ecosystems and preventing excessive land exploitation. GBCI emphasizes a minimum of 30 percent green open space, LEED ND implements habitat conservation and avoids development in areas with high ecological value, Green Tourism focuses on managing environmental carrying capacity to maintain ecosystem balance, while N Green-V prioritizes green space preservation with a community-based approach.

b. Accessibility and infrastructure

Good accessibility creates environmentally friendly and inclusive connectivity. GBCI and LEED emphasize the provision of pedestrian paths and public transportation access within a radius of 400 meters, Green Tourism supports disabled-friendly tourism access, and N Green-V encourages the development of infrastructure with high connectivity to reduce carbon emissions.

c. Water conservation

Water conservation aims to manage water resources wisely and prevent clean water crisis. GBCI emphasizes the use of rainwater and bioretention systems, LEED introduces rainwater management with maximum absorption of rainwater, Green Tourism emphasizes the efficiency of water use in tourism operations, while N Green-V promotes infiltration wells and rainwater storage systems.

d. Waste management

Waste management arises from the need to reduce the impact of environmental pollution from solid and liquid waste. GBCI and LEED emphasize the 3r principle (reduce, reuse, recycle), Green Tourism emphasizes public education in separating organic and inorganic waste, while N Green-V prioritizes the reduction of B3 waste and community-based waste processing.

e. Energy efficiency and infrastructure

Energy efficiency is an important element in sustainable area development. GBCI and LEED prioritize the use of renewable energy with a minimum target of 20 to 50 percent, Green Tourism encourages carbon emission reduction in tourism activities, while N Green-V supports a carbon emission monitoring system to ensure the achievement of low emission targets.

f. Facilities in the Area

Providing adequate facilities is important to ensure the comfort and health of residents and visitors. GBCI emphasizes the provision of sanitation facilities according to hygiene standards, LEED emphasizes access to public facilities within a radius of 400 meters, Green Tourism emphasizes clean and safe sanitation facilities, while N Green-V emphasizes the provision of community-based facilities with environmentally friendly principles.

4. Elements of Urban Design

Table 2. Morphological variables of RTBL [14] and Shirvani [13] cities.

RTBL Morpohology Variables	Hamid Shirvani Morphology Variables
Land Use	Land Use
Land Use Intensity	Building Form and Massing
Building Layout	Circulation and Parking
Circulation and Connecting Roads	Open Space
Open Space and Green Space	Activity
Enviromental Quality and Layout	Signage
Infrastructure and Utility System	Pedestrian Path
Preservation of Historical Areas, Tourism, and Culture	Preservation

In urban or regional design, Hamid Shirvani [13] explains eight main elements that are indicators of the success of a design. The first element is Land Use , which involves a two-dimensional plan to organize three-dimensional development, such as buildings or parks, that support human activities and efficient circulation of goods and people. Second, Building Form and Massing , which refers to the physical structure and building patterns that form urban space and the activities that occur in it. Third, Circulation and Parking , which includes road patterns, parking facilities, and transportation systems to support urban mobility. Fourth, Open Space , such as parks and greenways, functions as an aesthetic element, social interaction space, and water absorption.

The fifth element is Pedestrian Ways , which provide space for pedestrians with supporting elements such as benches, lighting, and green paths, creating a comfortable and aesthetic public space. Sixth, Supporting Activities, which are activities that strengthen the function of the city's public spaces through designs that support social interaction and economic activities. Seventh, Signage , including road signs, directions, and advertising media, which are important visual elements for the orientation and identity of an area. Finally, Preservation, which is an effort to preserve historical sites that are economically and culturally significant, to maintain the historical value and identity of a city [13].

The Building and Environmental Layout Plan (RTBL) is a planning document that regulates spatial and building layout in an area in an integrated and sustainable manner. The main concept of RTBL includes Space Use , which determines the allocation of land for residential, commercial, industrial, and green open spaces by considering the principle of sustainability. Building Arrangement is designed to meet the aspects of aesthetics, comfort, ventilation, natural lighting, and integration with the surrounding environment. Functional Integration is also an important principle, namely the integration between residential, work, recreation, and transportation functions to create an efficient area and support community activities [14].

In addition, the RTBL theory also emphasizes Natural Resources and the Environment , such as water management, green area protection, renewable energy use, and pollution management to maintain environmental sustainability. The principle of sustainability is very important in RTBL, considering the long-term impact on future generations. Finally, Community Participation is a key element in the planning process to ensure that the needs and aspirations of local communities are accommodated, resulting in relevant and inclusive spatial planning [14].

5. Indicators and variables of city morphology

Table 3. Indicators and morphological variables of RTBL [14] and Shirvani [13] cities.

VARIABEL	INDIKATOR
Land Use and Land Use Intensity	A1. Percentage of Specific Land Use Designation
	A2. Green Area Coefficient (KDH)
Building Form and Massing	A3. Parcel/Lot Arrangement
Circulation, Parking, and Pedestrian Ways	A4. Road Network and Movement System
	A5. Availability of Public Transport
	A6. Parking System

VARIABEL	INDIKATOR
	A7. Pedestrian and Bicycle Circulation System
Open Space	A8. Public Open Space System
	A9. Tree and Green Space System
Activity Support	A10. Activity Support in Area
Environmental Quality & Signage	A11 .Enviromental Identity Concept
Infrastructure and Utility Systems	A12. Clean Water Supply System
	A13. Wastewater and Sewage System
	A14. Solid Waste Management System

In city or regional planning, Hamid Shirvani explains that there are eight main elements that are indicators of the success of a regional design. These elements are relevant in the context of the morphology of tourist villages, as reflected in the table of morphological variables above.

a. Land Use and Land Use Intensity

This element includes specific land use arrangements by considering the proportion of space allocation for green areas and the needs of the local community. This arrangement ensures that the development of tourist villages is in line with the principles of sustainability, by taking into account the balance between built space and green space that supports human activities, such as open space for social interaction and agricultural areas that support local food security.

b. Building Form and Massing

This element refers to the physical structure and building patterns that form the space in a tourist village, such as the arrangement of lots or plots of land that pay attention to grid patterns, sizes, and area of the lots. Building designs that are in accordance with the local context support the creation of a strong visual identity, maintain aesthetics, and create a space that is harmonious with the surrounding environment.

c. Circulation, Parking, and Pedestrian Ways

In the context of tourist villages, circulation and parking are important elements that regulate the movement of residents and tourists safely and comfortably. This includes a planned road network system with a clear pattern (grid, linear, radial) and the availability of adequate parking facilities. Well-connected pedestrian paths and bicycle paths also support environmentally friendly mobility and reduce dependence on motorized vehicles.

d. Open Space and Green Design

This element emphasizes the importance of providing green open spaces that not only function as aesthetic areas, but also as social interaction spaces and natural water absorption. The general open space system in the table includes a proportional percentage of green space to the total area, as well as tree arrangements designed to strengthen the sustainability of local ecosystems and create a comfortable environmental atmosphere for tourists.

e. Supporting Activities (Activity Support)

A successful tourism village needs to provide supporting activities that strengthen social interaction and local economic activities. These activities can be in the form of spaces for performing arts and culture, local educational activities, or spaces for traditional markets that allow direct interaction between tourists and local communities.

f. Environmental Quality & Signage

This aspect includes environmental identity that reflects local culture, both through building design, use of local materials, and signage that reflects cultural identity and provides clear orientation for tourists. This element also emphasizes the need for aesthetic and informative signage, such as directions to major tourist attractions or information about cultural sites.

g. Infrastructure and Utility Systems

This element includes the management of resources and utility facilities in tourist villages, including:

- Clean water system: Ensuring the availability of adequate clean water sources.
- Wastewater treatment: Handling wastewater in a safe and sustainable system.
- Waste management: Providing a waste management system that involves sorting organic and inorganic waste to maintain environmental cleanliness and health.

Every element, from land use, building form, circulation to utility infrastructure, is designed to create an area that is not only aesthetic and functional but also sustainable and in accordance with local cultural values. This approach is in line with the concept of the Building and Environmental Plan (RTBL) which emphasizes the integration of space, function, natural sustainability, and community participation in creating a comfortable environment that supports social and economic life.

6. Morphology of Green Tourism Village: Pillars of Environmental, Social, and Economic Sustainability

The morphology of green tourism villages reflects the physical structure, spatial layout, and building patterns designed to support the concept of environmental sustainability. Morphological elements such as building layout, green open space, and environmental infrastructure play an important role in supporting sustainability. Green tourism villages that have planned spatial layouts are able to integrate ecological, aesthetic, and economic functions harmoniously. According to the Green Building Council Indonesia [8], spatial management that considers the principle of sustainability can improve the quality of life of local communities while attracting tourists with an interest in the concept of ecotourism.

Green tourism villages also prioritize infrastructure that supports green values, such as bicycle paths, pedestrian paths, and environmentally friendly public transportation. Shah, Kinjal, et al. [4] stated that this connectivity path is designed to reduce carbon emissions while maintaining the sustainability of the ecosystem along the path. In addition, green elements such as greening transportation routes or the use of environmentally friendly materials can increase the green value of tourist villages. Rating systems such as LEED and Greenship Neighborhood emphasize this aspect as an indicator of environmental sustainability.

The relationship between morphology and green value is also reflected in resource management. A well-designed green tourism village is able to integrate energy efficiency, water management, and waste management, which are the main criteria in rating tools systems such as LEED and Green Tourism. For example, LEED for Neighborhood Development assesses morphological elements such as "Neighborhood Pattern & Design" and "Green Infrastructure & Buildings" which directly contribute to increasing the green value of an area [9][11].

In addition to the physical aspect, the morphology of green tourism villages also supports the preservation of local wisdom. Tourism villages that arrange their buildings and rooms according to local traditions and culture allow local communities to maintain their identity. Pratama [3] noted that green tourism villages provide opportunities for communities to preserve their traditions, which not only attract tourists but also strengthen local cultural identity. This shows that morphology that supports cultural values also contributes to overall green values.

However, the relationship between morphology and green value is not always in line. In some cases, tourist villages that are considered green in concept may have less than optimal green value in practice because the morphology of the area is not designed functionally. This is the basis for the development of a new assessment system such as N-Green V, which emphasizes the integration of economic, socio-cultural, and environmental needs in assessing green tourist villages [1].

Thus, the relationship between the morphology of green tourism villages and green values is very close, including spatial design, sustainable infrastructure, and local cultural preservation. Morphology-based sustainability assessments, as applied in various rating tool systems, are key to ensuring that green tourism villages provide positive ecological, social, and economic impacts in an integrated manner.

7. Green Tourism Village Variables

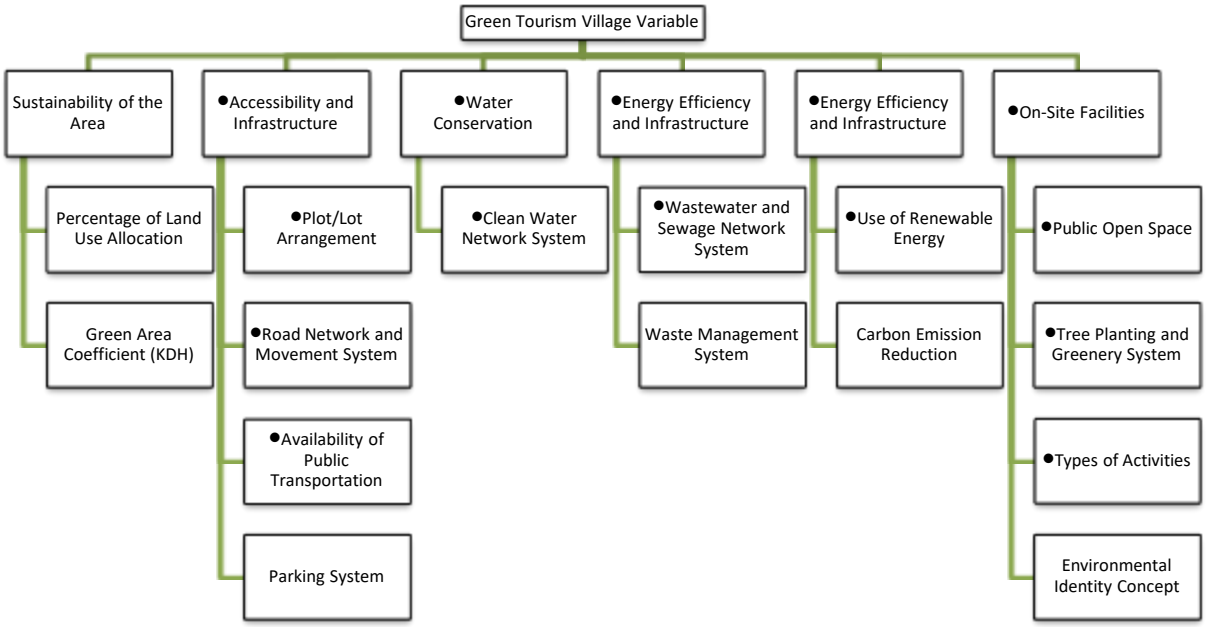

Diagram 1. Green Tourism Village Variables

The integration of green tourism village morphology with a green sustainability assessment system aims to align the physical and functional components of the village with applicable sustainability standards. This approach emphasizes the balance between nature conservation, infrastructure efficiency, and community welfare by referring to indicators such as land use percentage, green area coefficient, accessibility, water conservation, waste management, energy efficiency, and the provision of public facilities that support environmental sustainability and local culture.

a. Sustainability of the Area

Sustainability of the area emphasizes balancing environmental conservation and urban development by maintaining natural ecosystems and ensuring appropriate land allocation. The focus is on long-term ecological health and biodiversity protection.

Key Indicators:

- Percentage of Land Use Allocation: This measures the proportion of land allocated for green spaces, agriculture, or open spaces, ensuring that a minimum area remains dedicated to preserving natural elements [8][11].
- Green Area Coefficient (KDH): KDH measures the ratio of green area to total land area, with a standard of 25%-35% green space [8][11].

b. Accessibility and Infrastructure

Accessibility and infrastructure focus on creating well-connected, pedestrian-friendly spaces while minimizing vehicular congestion and enhancing public transport options.

Key Indicators:

- Plot/Lot Arrangement: Proper spatial arrangement and orientation of lots, often aiming for 75% of blocks oriented east-west for solar optimization [11].
- Road Network and Movement System: Emphasizes pedestrian priority, minimal vehicle conflicts, and the provision of safe, direct pathways [11].
- Availability of Public Transportation: Measures the accessibility of public transport options within a 400-meter radius of key facilities [8][11].
- Parking System: Encourages reduced reliance on on-street parking and prioritizes structured or shared parking solutions [11].

c. Water Conservation

Water conservation is essential for ensuring efficient use of water resources, reducing wastage, and enhancing resilience against water shortages.

Key Indicators:

- Clean Water Network System: Encourages the use of rainwater harvesting, greywater recycling, and efficient distribution systems for reducing potable water consumption [8][11].

d. Waste Management

Waste management emphasizes proper handling of waste streams through waste minimization, recycling, and safe disposal.

Key Indicators:

- Wastewater and Sewage Network System: Ensures effective treatment of wastewater to prevent environmental contamination [8][11].
- Waste Management System: Focuses on promoting 3R (Reduce, Reuse, Recycle) practices and minimizing waste sent to landfills [8][11].

e. Energy Efficiency and Infrastructure

Energy efficiency in tourism villages focuses on reducing carbon emissions, promoting renewable energy sources, and encouraging energy-efficient technologies.

Key Indicators:

- Use of Renewable Energy: Encourages the use of solar panels, wind turbines, and other renewable energy sources [8][11].
- Carbon Emission Reduction: Measures reductions in greenhouse gas emissions by incorporating low-carbon infrastructure and renewable technologies [10][11].

f. On-Site Facilities

On-site facilities ensure the availability of functional public amenities, open spaces, and cultural preservation areas for both residents and visitors.

Key Indicators:

- Public Open Space: Encourages a minimum of 25%-35% public open space for community use [8][11].
- Tree Planting and Greenery System: Promotes biodiversity and climate mitigation through extensive greenery and tree planting [10].
- Types of Activities: Supports cultural, educational, and recreational activities that benefit both tourists and the local community [9].
- Environmental Identity Concept: Promotes cultural heritage preservation through architecture and site design reflecting local traditions [10][11].

8. Green Tourism Village Morphology Parameters

Table 4. Green Tourism Village Morphology Parameters

VARIABLES	INDICATOR	DEFINITION	PARAMETER	BENCHMARK	SOURCE
Land Use and Land Use Intensity	A1. Percentage of Specific Land Use	The project is located in an area integrated with clean water and wastewater infrastructure.	A1.1 Minimum 1 option: Infill Sites, Adjacent Sites, Transit Corridor, or Nearby Neighborhood Assets.	P	LEED
		The proportion of space allocated for green areas, agriculture, or local community needs according to minimum green area requirements.	A1.2 Percentage of green area for local community food needs	<= 10% (1 point) > 10% (2 points)	GREENSHIP NH (CWS 4)
			A1.3 Using or promoting local food and beverages	Y/N	GREEN TOURISM

VARIABLES	INDICATOR	DEFINITION	PARAMETER	BENCHMARK	SOURCE
	A2. Green Area Coefficient (KDH)	Percentage of green space area to total land area with a minimum target of 25% to 35%	Percentage of green space area to land area & pedestrian paths	minimum 25% (3 points) and minimum 35% (4 points) of the total area.	GREENSHIP NH
Building Form and Massing	A3. Plot/Lot Arrangement	The percentage of the total length of the area block has one axis within ±15 degrees from the geographical east-west direction.	75% or more of the total length of the area block has one axis within ±15 degrees from the geographical east-west direction.	1 Point	LEED
Circulation, Parking, and Pedestrian Ways	A4. Road Network and Movement System	The road network in the area must be safe, free from conflicts with pedestrian paths, and allow connectivity between buildings.	Provide safe and uninterrupted facilities/access with motorized vehicle access to directly connect buildings to other buildings.	4 Points	GREENSHIP NH (MAC 1.5)
	A5. Public Transport Availability	The area has access to public transportation networks, with supporting facilities such as bus stops or interconnection spaces.	A5.1 People use public transportation	Y/N	GREEN TOURISM
			A5.2 The area is connected to the public transportation network and the area provides adequate interconnection space (and shelter for public transportation users).	P	GREENSHIP NH (MAC 1)
		Mechanisms to reduce carbon emissions and promote sustainable transport through public or active transport such as walking and cycling.	A system that encourages the use of fuel-efficient and environmentally friendly transportation, both public transportation and active transportation carried out by everyone (walking and cycling).	Strongly agree	N Green-V
				Agree	
				Quite Agree	
				Don't agree	
				Strongly Disagree	
	A6. Parking System	Provision of inclusive public parking facilities, avoiding on-street parking, and optimizing parking space within the area.	A6.1 Parking facilities provided by areas or buildings within the area are public (inclusive) (1 point)	2 Points	GREENSHIP NH (MAC 4)
			A6.2 Avoiding on street parking(1 point)		
	A7. Pedestrian and Bicycle Circulation System	Provision of safe, seamlessly connected pedestrian	A7.1 Pedestrian paths are 100% unbroken	2 Points	GREENSHIP NH (MAC 1)
			A7.2 Pedestrian paths are provided with shade for a minimum of 60%	2 Points	

VARIABLES	INDICATOR	DEFINITION	PARAMETER	BENCHMARK	SOURCE
		paths.	of the entire pedestrian path		
			A7.3 Provide accessibility facilities for people with disabilities.	Y/N	GREEN TOURISM
Open Space	A8. Public Open Space System	The percentage of public green open space is at least 25%-35% of the total area.	Proportion of Green Open Space (RTH) for the Public	minimum 25% (3 points)	GREENSHIP NH (LEE1)
				minimum 35% (4 points) of the total area.	
	A9. Tree Systems and Greenery	Conservation of ecosystems, species and habitats and prevention of the entry of invasive species into tourist areas.	A9.1 Systems for monitoring the impacts of tourism on the environment: ecosystem, species and habitat conservation; and prevention of the introduction of invasive species.	Strongly agree	N Green-V
				Agree	
				Quite Agree	
				Don't agree	
				Strongly Disagree	
		Efforts to protect and preserve flora, fauna and their ecosystems to ensure environmental sustainability.	A9.2 Conservation of wildlife and biodiversity.	Y/N	GREEN TOURISM
		Trees are planted at a distance of no more than 12 meters along a minimum of 60% of the total length of existing and planned blocks within the project.	A9.3 Minimum trees along 60% of the block with a distance of ≤ 12 meters in the project.	1 Point	LEED
		Tree planting specifications must comply with standards approved by the landscape architect, taking into account tree type, root media, planter strip/well width, and soil volume.	A9. 4 Tree design meets plant health standards as recommended by landscape experts.	P	
			A9.5 Planting and maintenance for biodiversity includes planting native trees, planting for insects and pollinators, leaving grass areas longer, and planting wildflower meadows.	Y/N	GREEN TOURISM
Activity Support	A10. Type of Activity	Availability of space for community activities that support social interaction and are in accordance	A10.1 Availability of Green Open Space (RTH) that can be used for human and natural interaction;	P	GREENSHIP NH (LEE1 & MAC 2)
			A10.2 Provide facilities where the community can interact and carry	2 points	

VARIABLES	INDICATOR	DEFINITION	PARAMETER	BENCHMARK	SOURCE
		with spatial planning and green open spaces.	out activities, within a minimum radius of 400 m.		
Environmental Quality Management & Signage	A11. Environmental Identity Concept	Implementing environmental design that adopts local culture, such as building architecture, place names based on local culture, and preservation of historic buildings.	A11.1 Policy/system for evaluating, rehabilitating and preserving natural and cultural sites, including cultural heritage in the form of buildings (historic/archaeological) and beautiful rural scenery.	Strongly agree	N Green-V
				Agree	
				Quite Agree	
				Don't agree	
				Strongly Disagree	
			A11.2 A system that regulates the flow of visits to village tourist attractions, including steps to preserve, protect and enhance natural and cultural assets	Strongly agree	
				Agree	
				Quite Agree	
				Don't agree	
				Strongly Disagree	
			A11.3 Systems that encourage the management of tourist villages (infrastructure development) to contribute to initiatives	Strongly agree	
				Agree	
				Quite Agree	
				Don't agree	
				Strongly Disagree	
			A11.4 Implementing local culture in the form of at least 2 (two) of the following aspects: a) Building architecture based on local identity, b) Supporting facilities for organizing local culture, c) Naming 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, community	1 Point (applying at least 2 aspects)	GREENSHIP NH (CWS 5)
				2 points (applying at least 4 aspects)	
			A11.5 No historic buildings or cultural landscapes are destroyed, altered, or damaged as part of the project.	P	LEED
Environmental Infrastructure and Utilities System	A12. Clean water network system	An initiative to increase transparency and efficiency in water use by	A12.1 Systems that encourage companies to measure, monitor, reduce and report publicly on their	Strongly agree	N Green-V
				Agree	
				Quite Agree	

VARIABLES	INDICATOR	DEFINITION	PARAMETER	BENCHMARK	SOURCE
		tourism businesses.	tourism businesses' water use.	Don't agree	
				Strongly Disagree	
		Ensuring the availability of clean water for the area and originating from alternative sources such as rainwater, in addition to PDAM and groundwater, with a minimum target of 10%-50%.	A12.2 A system that monitors water resources at tourist attractions to ensure that their use is balanced and appropriate to needs; ensuring that water resources are always available to the community and other public uses.	Strongly agree	
				Agree	
				Quite Agree	
				Don't agree	
				Strongly Disagree	
			A12.3 Using alternative water to meet the area's clean water needs (other than groundwater and PDAM)	10% (2 points)	GREENSHIP NH (WMC 1.1A)
				30% (4 points)	
				50% (6 points)	
			A12.4 Recovering or reusing water can help reduce overall water consumption, such as rainwater collection or retention, gray water recycling and hot water recovery systems.	Y/N	GREEN TOURISM
			A12.5 Water conservation, such as the use of water-saving fixtures, dual flush or waterless toilets, low-flow faucets and showerheads, waterless urinals, and others.	Y/N	
	A13. Wastewater and dirty water network system	Availability of a liquid waste processing unit capable of handling all waste generated in the area.	A13.1 Managing wastewater for reuse instead of clean water.	25% (1 Point)	LEED
				50% (2 Points)	
			A13.2 Availability of processing units for all liquid waste generated within the area	3 points	GREENSHIP NH (WMC 4)
			A13.3 Systems that encourage companies to reduce, reuse and recycle. Waste that cannot be reused can be managed safely to ensure environmental sustainability.	Strongly agree	N Green-V
				Agree	
				Quite Agree	
				Don't agree	
				Strongly Disagree	
	A14. Waste network system	Provision of waste management facilities involving the sorting of organic,	A14.1 Clear and consistently implemented systems for the sitting, maintenance and testing of septic tanks; wastewater	Strongly agree	
				Agree	
				Quite Agree	
				Don't agree	

VARIABLES	INDICATOR	DEFINITION	PARAMETER	BENCHMARK	SOURCE
		inorganic and B3 waste, as well as processing based on sustainable environmental principles.	management that ensures waste is properly processed and reused or discharged safely and with minimal adverse effects on the community and the environment.	Strongly Disagree	
			A14.2 The existence of waste sorting and collection installations or facilities for the operational period of the area; A. Easily decomposed waste (organic); B. Inorganic waste; C. Waste containing hazardous and toxic materials and hazardous and toxic waste (B3)	P	GREENSHIP NH (SWM)
			A14.3 Carry out environmentally friendly processing of biodegradable waste, independently or in collaboration with official waste processing agencies.	2 Points	
			A14.4 Carry out environmentally-oriented processing of reusable and/or recyclable waste, independently or in collaboration with official waste processing agencies.	2 Points	
			A14.5 Carry out environmentally-oriented management of waste containing hazardous and toxic materials and hazardous and toxic waste, in collaboration with official waste management bodies.	2 points	
			A14.6 Provide integrated waste management facilities that include recycling stations for materials such as paper, cardboard, glass, plastic, and metal; household or office hazardous waste collection points; composting stations for food and yard waste; and easy access to recycling containers on every block.	1 Point	LEED

VARIABLES	INDICATOR	DEFINITION	PARAMETER	BENCHMARK	SOURCE
			A14.7 System initiatives to avoid, reduce, reuse and/or recycle.	Y/N	GREEN TOURISM

The entire table shows the integration of various indicators to assess the sustainability of the area comprehensively by considering ecology, society, economy, design, and infrastructure. By integrating the elements of Shirvani, RTBL, and sustainability assessment systems, areas can be designed in an integrated manner to create an effective, aesthetic, and sustainable environment [8][11][12][13][14].

III. METHODS

The research method used in this study is descriptive analytical with a case study approach that aims to describe and analyze phenomena systematically using quantitative data [15]. The object of the study is Taro Village which consists of 14 Banjar, analyzed based on variables in the conceptual framework in the previous chapter. Data collection was carried out through literature studies from books, journals, and official documents, followed by field surveys to observe physical conditions directly and interviews with the head of the banjar (klian) to obtain information on environmental governance and community participation. In addition, secondary data was collected from village documents such as administrative maps and statistical reports, which were then visualized in the form of mapping to understand land use patterns and available facilities.

IV. RESULTS AND DISCUSSIONS

1. Taro Village , Bali Indonesia

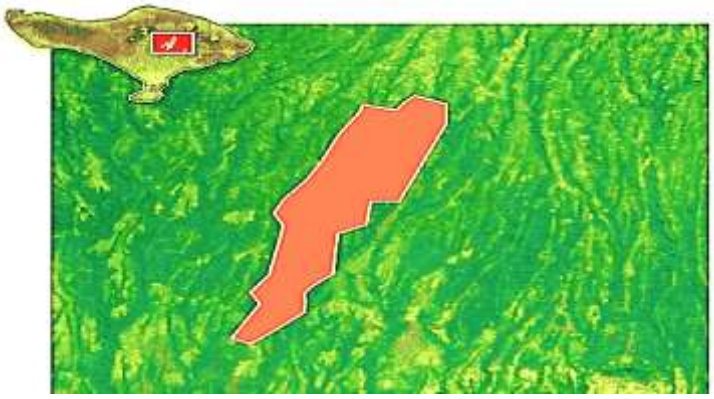

Figure 1. Location of Taro Village (Source: Primary Data)

The location of this research is in Taro Village in Gianyar Regency, Bali Province, precisely in Tegallalang District. This village is about 45 kilometers from Ngurah Rai International Airport. Taro Village is an old village rich in cultural heritage and stories of the past. This village has the characteristics of traditional Balinese houses, cool air, and beautiful nature. Taro Village is also known as a modern tourist destination that offers the beauty of tropical countryside and strong spirituality.

Taro Village has an area of 130.83 km2. Administratively, Taro Village is divided into 14 hamlets, namely Banjar Dinas Sengkaduan, Banjar Dusun Alas Pujung, Banjar Dusun Tebuana, Banjar Dinas Let, Banjar Dinas Pisang Kaja, Banjar Dusun Pisang Kelod, Banjar Dinas Patas, Banjar Dinas Belong, Banjar Dusun Puakan, Banjar Dusn Pakuseba, Banjar Dusun Taro Kaja, Banjar Dinas Taro Kelod, Banjar Dinas Tatag, and Banjar Dusun Ked.

Taro Village was originally known as Bhumi Sarwaa Ada which means everything. This nickname was given by a Maharsi Agung, Ida Maha Rsia Markandeya who came from India. He came to teach Hinduism and teach farming methods. The Subak system is a popular agricultural system in Taro Village. There are traces of history and a very rich cultural heritage in Taro Village. One of the legendary historical sites in Taro Village is the Pura Kahyangan Jagat Pura Agung Gunung Raung and the Duwe Lembu Putih Conservation. In addition, Taro Village has a very cool climate.

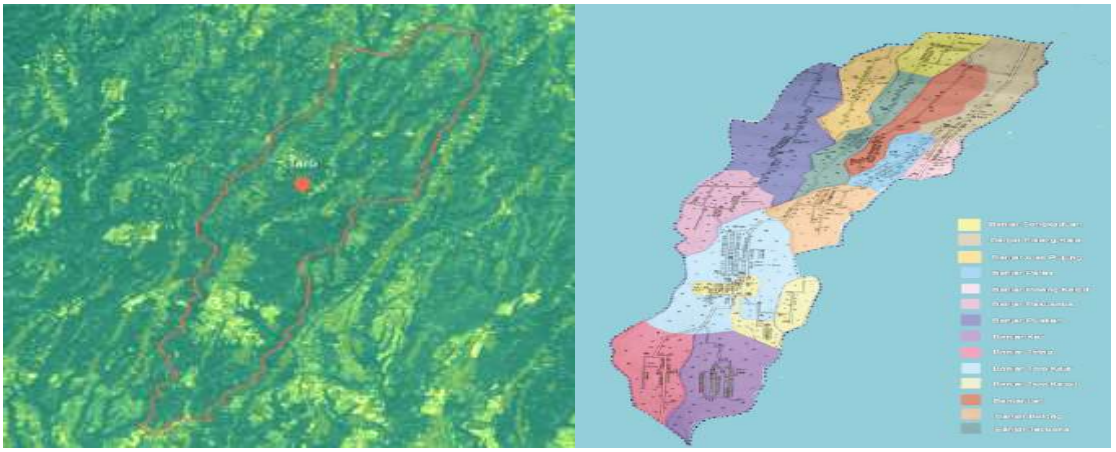

Figure 2. Taro Village SDGs Roadmap Implementation Document (Source: Gianyar Regency Government, 2022)

Most of the people are farmers, so it is still very easy to find vast and beautiful agricultural lands. Such as terraced rice fields (Rice Terrace) plantations of various fruits, vegetables and flowers. In addition, Banjar Taro Kelod is currently developing a natural tourist attraction called Delod Sama. The Delod Sama tourist attraction is a tourist attraction that presents a village challenge that is neatly arranged and terraced like the village of Panglipuran.

Land use in the Taro Village area is now divided into several parts, namely:

- Residential area 32.25 ha
- 248 ha of rice fields
- Plantation/dry land 869 ha
- Forest 21 ha
- Other uses (public facilities, temples, religious buildings, roads, fields and so on) covering an area of 138.06 ha.

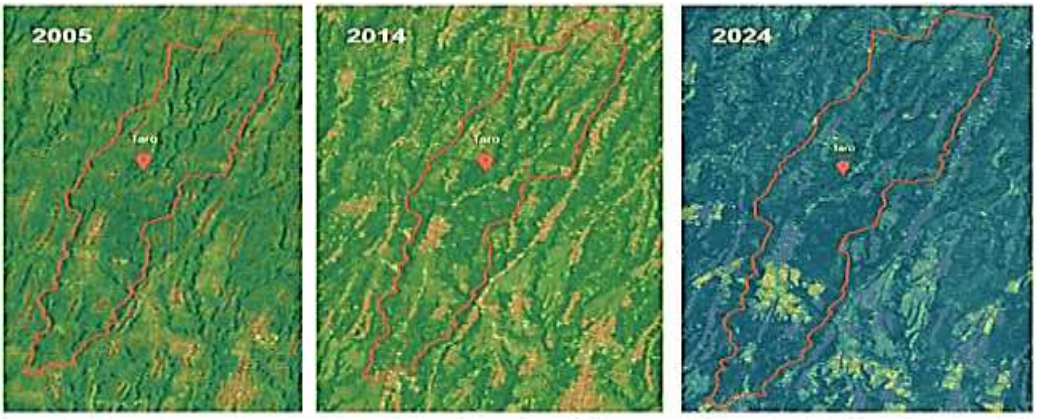

Figure 3. Morphological Development of Taro Village (Source: *Google Earth* , 2024)

Based on the 2014 and 2024 aerial maps taken from Google Earth, morphological changes in the Taro village area can be seen, but the forest area is still maintained and the existing fields are maintained.

2. Morphology of Green Tourism Village in Taro Village Based on Variables Integrated with Green Tourism Village Principles

The morphology of the Green Tourism Village in Taro Village reflects the implementation of the integrated Green Tourism Village principle , by paying attention to the balance between environmental sustainability, social sustainability, and responsible resource management. Through spatial planning that is in harmony with nature, sustainable agricultural practices, and protection of ecosystems and cultural heritage, Taro Village presents an environmentally friendly tourism concept that supports the welfare of local communities.

A. Sustainability of the Area

- Percentage of Specific Land Use: Each banjar has a clear proportion of land use, such as Banjar Taro Kaja with 50 ha of rice fields, 110 ha of dry land, and 40 ha of settlements. In Banjar Pakuseba, settlements only cover 15 ha of the total 75 ha of land, with the rest being rice fields and fields.

- Green Area Coefficient (KDH): Almost all banjar have significant green areas with the presence of rice fields, fields, and forests such as in Banjar Taro Kaja and Let which have protected customary forests.

Figure 4. Customary Forest in Banjar Let, Taro

- Ecosystem Protection: There is protection for wild animals such as civets, monkeys, birds and porcupines which may not be hunted, according to customary regulations in all hamlets, such as Banjar Pisang Kelod and Banjar Taro Kelod.

B. Accessibility and Infrastructure

- Plot Arrangement and Building Orientation: Most of the houses throughout the banjar face east and west to support spatial planning that is in harmony with the climate conditions, such as in Banjar Taro Kaja and Banjar Tatag.

Figure 5. Building orientation facing east and west

- Road Network System and Movement: There is no public transportation in all hamlets, but connectivity between houses is very good because there are smart roads between houses to facilitate social interaction.
- Availability of Public Transportation: Public transportation is not available in all banjars, relying on private vehicles with organized parking in home garages or public parking areas such as in Banjar Taro Kaja and Banjar Tatag.
- Parking System: Each banjar has a well-organized parking arrangement, such as in Banjar Taro Kelod which has a private garage and garage rental on customary land, as well as Banjar Pakuseba which has parking in the field area.

Figure 6. Balai Banjar which provides parking and garages for residents' homes

C. Water Conservation

- Network System and Clean Water: Some hamlets have their own springs that are used as the main water source, such as Banjar Puakan which has 10 springs that supply the surrounding water needs. However, there are also hamlets that rely on water sources from other hamlets, such as Banjar Taro Kelod which takes from Banjar Puakan.
- Utilization of Rainwater and Traditional Irrigation: Traditional irrigation systems (Subak) are applied in agriculture throughout the hamlet.

D. Waste Management

- Wastewater and Dirty Water Network System: All hamlets have implemented livestock waste processing by reusing it as fertilizer or compost for their own use in the fields.
- Waste Network System: All hamlets have implemented a waste sorting system, where organic waste is reused in the fields and inorganic waste is collected and taken to TPS 3R.

Figure 7. TPS 3R Taro Village (Source: *Google Maps*)

E. Energy Efficiency and Infrastructure

- Use of Renewable Energy: Currently, there is no significant use of renewable energy in all hamlets.
- Carbon Emission Reduction: Low carbon emissions occur naturally because the majority of agricultural products are consumed by residents themselves, reducing the need for distribution transportation, as implemented in Banjar Taro Kaja, Banjar Tatag, and Banjar Taro Kelod.

F. Facilities in the Area

- Public Open Space: All banjar have public facilities such as sports fields, banjar halls, and wantilan which are used for social and cultural activities, such as in Banjar Taro Kaja which has a soccer field, and Banjar Tatag which has the same facilities.
- Tree System and Green Management: There is protection of old trees that are protected by custom in all banjars such as beringin, pule, and sentul. Planting trees for the needs of traditional ceremonies is also common, such as in Banjar Taro Kelod and Banjar Taro Kaja.

Figure 8. Protected Rijase tree in Banjar Let

- Type of Activity: Residents' activities are centered in the banjar hall, wantilan, and temple with religious and social activities.

Figure 9. Wantilan and Pura in Banjar Ked for traditional events

- Environmental Identity Concept: Each banjar has historical buildings such as temples and artifacts that are well maintained, such as in Banjar Taro Kelod which has the Gunung Raung Temple and historical keris relics.

Figure 10. Gunung Raung Temple (Source: Detik.com

3. Morphological Value of Taro Green Tourism Village

Table 5. Morphological Value of Taro Green Tourism Village

NAME OF BANJAR	INDICATOR		Banjar Let	Banjar Belong	Banjar Patas	Banjar Dinas Sengkaduan	Banjar Pisang Kaja	Banjar Taro Kelod	Banjar Dinas pakuseba	Banjar Dinas Tatag	Dusun Taro Kaja	Dusun Puakan	Dusun Tubuane	Dusun Alas	Dusun Ked	Dusun Pisang Kelod
Percentage of Land Use Allocation	A1	A1.1	P	P	P	P	P	P	P	P	P	P	P	P	P	P
		A1.2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
		A1.3	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
		A2	4	4	4	4	4	4	4	4	4	4	4	4	4	4
Building Form and Massing		A3	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Circulation, Parking, and Pedestrian Ways		A4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
	A5	A5.1	N	N	N	N	N	N	N	N	N	N	N	N	N	N
		A5.2	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP
		A5.3	STRONGLY DISAGREE	STRONGLY DISAGREE	STRONGLY DISAGREE	STRONGLY DISAGREE	STRONGLY DISAGREE	STRONGLY DISAGREE	STRONGLY DISAGREE	STRONGLY DISAGREE	STRONGLY DISAGREE	STRONGLY DISAGREE	STRONGLY DISAGREE	STRONGLY DISAGREE	STRONGLY DISAGREE	STRONGLY DISAGREE
	A6	A6.1	1	1	1	1	1	1	1	0	1	1	1	1	0	0
		A6.2	1	1	1	1	0	1	1	1	1	1	0	0	0	1
Circulation, Parking, and Pedestrian Ways	A7	A7.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		A7.2	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		A7.3	N	N	N	N	N	N	N	N	N	N	N	N	N	N
Open Space		A8	4	4	4	4	4	4	4	4	4	4	4	4	4	4
	A9	A9.1	STRONGLY DISAGREE	STRONGLY DISAGREE	STRONGLY DISAGREE	STRONGLY DISAGREE	STRONGLY DISAGREE	STRONGLY DISAGREE	STRONGLY DISAGREE	STRONGLY DISAGREE	STRONGLY DISAGREE	STRONGLY DISAGREE	STRONGLY DISAGREE	STRONGLY DISAGREE	STRONGLY DISAGREE	STRONGLY DISAGREE
		A9.2	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
		A9.3	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		A9.4	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP
		A9.5	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Activity Support	A10	A10.1	P	P	P	P	P	P	P	P	P	P	P	P	P	P
		A10.2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Environmental Quality & Signage	A11	A11.1	STRONGLY AGREE	STRONGLY AGREE	STRONGLY AGREE	STRONGLY AGREE	STRONGLY AGREE	STRONGLY AGREE	STRONGLY AGREE	STRONGLY AGREE	STRONGLY AGREE	STRONGLY AGREE	STRONGLY AGREE	STRONGLY AGREE	STRONGLY AGREE	STRONGLY AGREE
		A11.2	STRONGLY AGREE	STRONGLY AGREE	STRONGLY AGREE	STRONGLY DISAGREE	STRONGLY AGREE	STRONGLY AGREE	STRONGLY AGREE	STRONGLY AGREE	STRONGLY AGREE	STRONGLY DISAGREE	STRONGLY AGREE	STRONGLY DISAGREE	STRONGLY DISAGREE	STRONGLY DISAGREE
		A11.3	STRONGLY AGREE	STRONGLY AGREE	STRONGLY AGREE	STRONGLY DISAGREE	STRONGLY AGREE	STRONGLY AGREE	STRONGLY AGREE	STRONGLY AGREE	STRONGLY AGREE	STRONGLY DISAGREE	STRONGLY AGREE	STRONGLY DISAGREE	STRONGLY DISAGREE	STRONGLY DISAGREE
		A11.4	2	2	2	2	2	2	2	2	2	2	2	2	2	2
		A11.5	P	P	P	P	P	P	P	P	P	P	P	P	P	P
Infrastructure and Utility Systems	A12	A12.1	AGREE	AGREE	AGREE	AGREE	AGREE	AGREE	AGREE	AGREE	AGREE	AGREE	AGREE	AGREE	AGREE	AGREE
		A12.2	STRONGLY AGREE	STRONGLY AGREE	STRONGLY AGREE	STRONGLY AGREE	STRONGLY AGREE	STRONGLY AGREE	STRONGLY AGREE	STRONGLY AGREE	STRONGLY AGREE	STRONGLY AGREE	STRONGLY AGREE	STRONGLY AGREE	STRONGLY AGREE	STRONGLY AGREE
		A12.3	6	6	6	6	6	6	6	6	6	6	6	6	6	6
		A12.4	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
		A12.5	N	N	N	N	N	N	N	N	N	N	N	N	N	N
Infrastructure and Utility Systems	A13	A13.1	2	2	2	2	2	2	2	2	2	2	2	2	2	2
		A13.2	3	3	3	3	3	3	3	3	3	3	3	3	3	3
		A13.3	STRONGLY AGREE	STRONGLY AGREE	STRONGLY AGREE	STRONGLY AGREE	STRONGLY AGREE	STRONGLY AGREE	STRONGLY AGREE	STRONGLY AGREE	STRONGLY AGREE	STRONGLY AGREE	STRONGLY AGREE	STRONGLY AGREE	STRONGLY AGREE	STRONGLY AGREE
	A14	A14.1	STRONGLY AGREE	STRONGLY AGREE	STRONGLY AGREE	STRONGLY AGREE	STRONGLY AGREE	STRONGLY AGREE	STRONGLY AGREE	STRONGLY AGREE	STRONGLY AGREE	STRONGLY AGREE	STRONGLY AGREE	STRONGLY AGREE	STRONGLY AGREE	STRONGLY AGREE
		A14.2	P	P	P	P	P	P	P	P	P	P	P	P	P	P
		A14.3	2	2	2	2	2	2	2	2	2	2	2	2	2	2
		A14.4	2	2	2	2	2	2	2	2	2	2	2	2	2	2
		A14.5	2	2	2	2	2	2	2	2	2	2	2	2	2	2
		A14.6	1	1	1	1	1	1	1	1	1	1	1	1	1	1
		A14.7	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y

Based on the analysis of the morphological indicators and data collected from the various Banjars (village units) in Taro Village, several sustainability patterns and practices have been identified, reflecting the principles of a Green Tourism Village. Each Banjar showcases distinct approaches towards land use, biodiversity preservation, waste management, and infrastructure sustainability, which are integral components for promoting environmental harmony and local cultural preservation.

A. Land Use and Building Orientation

The data indicates that most Banjars, such as Banjar Taro Kaja , Banjar Tatag , and Banjar Taro Kelod , demonstrate effective land use distribution where a significant portion of the land is dedicated to agriculture and green spaces. For example, Banjar Taro Kaja comprises 200 ha with 50 ha of rice fields, 110 ha of dryland, and 40 ha of settlements, with a substantial portion of the agricultural yield consumed locally, promoting self-sufficiency.

Consistently, the A1.1 and A1.2 indicators show compliance with the required allocation for green spaces across all Banjars, while the A1.3 indicator highlights the promotion of local food sources, as seen in Banjar Tatag and Banjar Taro Kelod , where agricultural products are primarily consumed by the community.

B. Circulation, Parking, and Pedestrian Systems

The pedestrian and vehicular circulation systems vary across the Banjars. For example:

- Banjar Taro Kaja and Banjar Tatag provide public parking facilities in open fields and near community hubs such as temples and marketplaces.
- However, several Banjars, including Banjar Pisang Kelod and Banjar Pisang Kaja , lack formal pedestrian pathways and public transportation systems, as reflected in the A5 and A7 indicators, which consistently scored "Strongly Disagree" or 0 points across all units.

Efforts to minimize on-street parking were noted in Banjar Patas and Banjar Puakan , where residents primarily use private garages or designated parking areas.

C. Open Space and Biodiversity Preservation

Open space preservation and biodiversity protection were evident across all Banjars, with A8 (Open Space Availability) scoring 4 points consistently. Notable examples include:

- Banjar Taro Kaja , where large protected trees like Kayu Pule and Beringin Tua are preserved due to cultural beliefs.
- Banjar Tatag and Banjar Taro Kelod also emphasize the protection of trees such as Sentul and Rijase while promoting tree planting for ceremonial purposes.

However, A9.1 (Biodiversity Monitoring) scored "Strongly Disagree" across all Banjars, indicating a gap in systematic biodiversity assessments. Despite this, A9.2 and A9.5 scored positively, as hunting of protected species like civets, porcupines, and monkeys is prohibited under local customary laws.

D. Activity Support and Cultural Heritage Preservation

Most Banjars, including Banjar Taro Kaja , Banjar Tatag , and Banjar Let , provide communal spaces such as balai banjar (village halls) and wantilan for community gatherings and cultural events, reflected by positive scores in A10.1 and A10.2 .

Additionally, cultural heritage preservation efforts are strong across all units, with historical temples such as Pura Sangiyang Tegal in Banjar Taro Kaja and Pura Sabang in Banjar Puakan being actively maintained. This is reflected in the consistently high scores in A11.1 to A11.5 for environmental quality and signage preservation.

E. Water Management and Infrastructure

Water resource management varies significantly across the Banjars:

- Banjar Taro Kaja relies on external water sources from Banjar Patas and Banjar Puakan , despite having multiple natural springs.
- Banjar Puakan stands out for its self-sufficiency, possessing 10 springs that also supply nearby Banjars.

The A12 (Water Management) indicators scored "Agree" and "Strongly Agree" , emphasizing positive water management practices, such as rainwater harvesting and groundwater conservation.

F. Waste and Sewage Management

The A13 and A14 indicators reveal a commendable level of waste management across all Banjars, with strong adherence to the 3R principles (Reduce, Reuse, Recycle):

- Organic waste is consistently reused for agricultural composting across all units, as seen in Banjar Taro Kaja , Banjar Tatag , and Banjar Let .
- An efficient waste segregation system was identified in all Banjars, ensuring that inorganic waste is transported to TPSR (Temporary Waste Management Sites) for proper disposal.

The assessment highlights that most Banjars in Taro Village are successfully implementing key sustainability principles in line with the Green Tourism Village concept. Strong practices were noted in land use allocation , waste management , and cultural preservation . However, critical areas for improvement include biodiversity monitoring , public transportation infrastructure , and water-saving technologies . Addressing these gaps will further enhance Taro Village's sustainability, making it a model for green tourism and ecological preservation.

V. CONCLUSION

The morphological characteristics of Taro Village reveal a strong alignment with the principles of a Green Tourism Village, emphasizing sustainability in land use, infrastructure, and community practices. Key

contributing variables include effective land use allocation, significant green area coverage, and responsible waste management practices. Most Banjars prioritize local agricultural consumption, minimize on-street parking, and integrate traditional cultural values into their village design. However, challenges remain, particularly in public transportation infrastructure and systematic biodiversity monitoring.

The research highlights that the village has successfully implemented multiple sustainability strategies, such as tree conservation, waste segregation, and organic composting. These findings demonstrate that morphological factors, including building orientation, open space, and circulation patterns, directly influence the sustainability performance of the village.

In conclusion, while Taro Village exhibits commendable green tourism practices, continuous improvements in biodiversity conservation strategies and public transport systems are needed for a more holistic approach. This study provides a valuable framework for evaluating and improving the sustainability of other tourism villages based on morphological indicators integrated with green rating tools.

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