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## Coastal Landscape Design Mandrajaya Mangrove Geotourism in Ciletuh Palabuhanratu UNESCO Global Geopark

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### **Abstract**

*The priority for tourism development in Mandrajaya Village is Mangrove Ecological Tourism covering an area of 5 hectares, which from a macro perspective has very little distribution in the Ciletuh Geopark Area, so efforts are being made to expand the ecosystem to protect coastal areas from the threat of abrasion, tsunamis and climate change. and human activities. Amenities in the Mandrajaya mangrove tourist area which is managed by POKMASI (Conservation Aware Community Group) have experienced damage.*

*Improving the Mangrove ecosystem (Biodiversity) to protect the Mandrajaya coastal area, designing amenities that support the activities and mobilization of local communities and visitors, arranging cultural zones (Culturediversity), and Designing supporting facilities to explore geological diversity (Geodiversity) along the Cluster (F) coastal area revealed ancient subduction phenomenon.*

*The design method is in 3 stages, namely: Pre-design Phase, Site Assessment (site inventory, data collection and data analysis) and Design Phase by LaGro. Based on the research results, plans were made at the meso scale and micro scale.*

*Mandrajaya Village has geological diversity along the coastal area, biodiversity, especially mangroves, and cultural diversity in the form of maritime culture. This is a potential that must be developed so that society can benefit economically by maintaining the natural wealth it has.*

**Keywords:** *Ciletuh-Palabuhanratu, UNESCO Global Geopark, Mandrajaya Village, Coastal Landscape, Mangrove Geotourism.*

### **INTRODUCTION**

The facilities in this mangrove area have been completely damaged, the damage was caused by the inactivity of the management, in this case the Pokmasi (conservation



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conscious community group), so that no one cares for or takes care of the facilities. Apart from that, the materials of these facilities are vulnerable to damage or do not last long. The damaged facilities were assistance from the 2021 APBD. What was damaged included a 100 meter long boardwalk in the mangrove and 2 gazebo units.

Based on a direct interview with the Head of Mandrajaya Village, the positive impact of the designation of the Ciletuh Area as a Global Geopark has not been felt by the Mandrajaya Community. According to Mr. Opik Taopik, as chairman of POKMASI (Conservation Aware Community Group), in the interview he also said that currently the Mandrajaya Nusantara mangrove conservation tourism area is still very underdeveloped, it still needs additional facilities and infrastructure, especially basic infrastructure in the form of repairing damaged village roads and the need to build a connecting bridge from Ciwaru Village to Mandrajaya Village. The aim is to facilitate the activities or mobility of local people and tourists who come to visit. Therefore, this area, which is quite strategic both in terms of tourism and in terms of environmental conservation functions in the Ciletuh Palabuhanratu UNESCO Global Geopark area, really needs appropriate landscape design, which of course must involve local communities actively participating in contributing their thoughts and ideas, and the hope is that it can be managed and maintained well in a sustainable manner.

Based on the problems identified in the background, several problem formulations were obtained which were studied in the design, namely:

- a. How to improve the mangrove ecosystem (biodiversity) in the Ciletuh Palabuhanratu UNESCO Global Geopark area, which is being degraded due to human activities or climate change?
- b. What are the amenities needed in the design to support geotourism activities without damaging the ecosystem?
- c. How to ensure that local community culture (culture diversity) can be integrated into the design area?
- d. What is the ideal coastal area design concept to be applied and support exploration activities for geological diversity (geodiversity) in coastal geosites of ancient subdistrict cluster (F).

## **RESEARCH METHODS**

This design method is carried out in 3 stages, namely: Pre-design Phase, Site Assessment (site inventory, data collection and data analysis) and Design Phase. (LaGro, 2008).

## **RESULT AND DISCUSSION**

### **Design Location**

The area of the design area within the red line is around 43.1 hectares. This area is integrated with the boundaries of the Mandrajaya mangrove tourism area which will be



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developed or designed. The area of this area is determined based on considerations of land ownership analysis, coastal border analysis, and development concepts or plans.

This can be seen in Figure 1 as follows:



**Figure 1.** Design Location Map (micro area)

### **Design Analysis**

This analysis includes physical attribute analysis in the form of topography, elevation, land contour, sea contour, hydrology, soil type, Geodiversity, Landform, disaster risk, Microclimate analysis. Then analyze biological attributes in the form of flora and fauna. And cultural attributes include land cover and land use, accessibility, sensory, as well as user and visitor activities.

The analysis results displayed are in the form of a detailed mapping of opportunities and constraints which will be used as a reference for the design concept. The mapping can be



seen in Figure 2 as follows:



**Figure 2.** Mapping Opportunities and Constrains

Detailed Opportunities and Constrains displayed are important components that will be optimized in the design area, namely aspects of View, sound, Sun and wind, water, vegetation, wildlife, land use and accessibility. This is shown in table 1 as follows:

**Table 1.** Opportunities dan Constrains

No	Aspects/Attributes	Opportunities	Constrains
1	View	View supports	Vegetation blocking the view
		Easy to access	Contour engineering for view utilization
		aesthetic	Viewing tower facilities
		Variety of Views	Spot for The best View
2	Sound	Dominant natural sounds	Spot for meditation
		Birds chirping	Busy and quiet zone mapping
		Relaxation tourism potential	Spot for optimal lodging zone
3	Sun and Wind	Fresh air	Changes in weather patterns
		Neutralizes heat	Thermal Comfort
		Renewable energy	Utilization of wind direction
		Optimization of sunrise and sunset orientation	Utilization of the sun's direction
4	Water	Optimization of former pond ponds	Water storage for agriculture
		Natural Drainage	Tidal engineering for mangroves
		Utilization of water sources	Optimization of natural drainage



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		Opportunities for boat tourism attractions	Optimization of water tourism areas
5	<i>Vegetation</i>	Ecological tourism	Water requirements for vegetation
		Conservation	Lack of shade trees
		Agriculture	Utilization of production tree species
		Variety Of Vegetation	Optimization of Existing Vegetation Variety
6	<i>Wildlife</i>	Ecological tourism	Aggressive monkey
		Conservation	A wild beast that comes out of the forest
		<i>Birdwatching</i>	Optimizing bird diversity
		Various types of Habitat	Optimization of fish resources or other habitats
7	<i>Land use</i>	The character of the residents is welcoming to visitors	Supporting Infrastructure
		Ethnographic Research	Land Occupancy
		The green area is still dominant	Population activities in managing land
8	<i>Accesses</i>	Geological trekking tour	Road Quality
		Tracking Tourism	Access distance between villages
			Streetscape Elements
			A connecting bridge is needed
			Tourist pier

**Source:** (Personal Analysis, 2024)

### **Design Concept (Vision and Design Strategy)**

The big concept used in the design is taken from the Sundanese language (IMAH) which means house, with the vision "Glorifying the earth, making the community prosperous, making mangroves a fortress in coastal areas and protecting the geology of Mandrajaya as Home Resilience for humans and nature".

The design strategy used in the landscape aspect is to integrate Resilience Landscape, Agriculture Landscape, geological landscape and Cultural Landscape. This design strategy is an integration of the core aspects of management of the Global Geopark Area, namely Geodiversity, Biodiversity and Cultural diversity and its suitability to the characteristic conditions in the design area. The concept of vision and design strategy is



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illustrated in Figure 3 as follows:



**Figure 3.** Concept, Vision And Design Strategy

Resilience landscape or landscape resilience is used to maximize the function of vegetation, especially mangroves, to protect coastal areas from the threat of abrasion, high waves or tsunamis and maintain biodiversity in the design area.

Agriculture landscape is a land use design strategy for agricultural production in addition to optimizing it for economic development or food resilience as well as a tourism activity.

Geological landscape is a core aspect in the development of planning and design areas, namely optimizing geological educational tourism areas.

Cultural landscape, maintaining and introducing the culture of the surrounding community as the main identity, this culture will be part of cultural educational tourism, applying cultural elements to facilities, and becoming an icon for sustainable tourism.

#### **Design Concept (Programs and Activities)**

There are 3 categories of activities planned, namely Biodiversity activity, Geodiversity activity and Culturediversity activity. This can be seen in Figure 4 as follows:



**Figure 4.** Activity program concept

Biodiversity activities include planting trees, planting flowers, gardening, harvesting plantation or agricultural products, education and exploring mangroves, birdwatching and seeing the attractions of long-tailed macaques.



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Geodiversity activities include geological education, exploring the geostreet corridor, geological research or exploration around the coast of Cikadal Beach, tracking and geological exploration from Cijebieur to Kunti Island and geological exploration of ancient subdistricts.

Culture diversity activities include cultural or ethnographic research in Mandrajaya Village, maritime cultural education, agriculture education, exploration of Mandrajaya history, exploration of Dutch heritage traces, and exploration of fish farming.

Tourism activities include camping on Cikadal beach, picnics on Cikadal beach, fishing, snorkeling on the coast of Kunti Island, photography, staying at the villa, enjoying sunset and sunrise and family gatherings in the plantation area.

### Design Concept (User Capacity)

Based on the design area of 43.1 hectares, calculations were made to estimate the maximum demand for the number of users or tourists who could carry out activities in a matter of 8 hours per day, resulting in a Physical Carrying Capacity (PCC) of 21,550 people, with details of a maximum capacity of 8 hours per day of 2,693.75 people. Detailed calculations can be seen in Figure 5 as follows:



**Figure 5.** User Capacity concept

### Master Plan

The master plan for designing the Mandrajaya mangrove geotourism coastal landscape covering an area of 43.1 hectares has various activities and facilities on offer, namely tourism dock, iconic mangrove elevated ramp, mangrove skywalk, conservation museum, mangrove boardwalk, viewing tower, parking area, beach sports facility, water fountain, tree nursery. All of these facilities and amenities are integrated into each zoning zone, namely the welcoming area, fish farming, beach sport, children's playground, bird rest area, bicycle track, mango orchard 1, intercropping garden, rice field, mango orchard 2, villa, flower garden, geostreet corridor, mangrove corridor, beach tourism, mangrove labyrinth, and water storey pond. Details of the master plan can be seen in Figure 6 as



follows:



Figure 6. Master Plan

### Site Plan Zona 1 (Welcoming Area)

The welcoming area is the main gateway area for visitors who come to the location, there are several supporting facilities to maximize tourist activities on the site, these facilities are motorbike parking, mini bus car parking, car parking, management office or visitor office center, souvenir center building, tourist equipment rental center, handicraft center, geopark museum, food center, kiosk, water fountain, skywalk and entrance gate. Detailed positioning per facility can be seen in Figure 7 as follows:





**Figure 7.** *Site Plan Welcoming Area*

### **Detail Section Welcoming Area**

In detail, the use of elements in the welcoming area is designed to maximize each existing function, apart from ecological functions, aesthetic functions and other security functions. The Mangrove Gate is inspired by the shape of mangrove roots using PVC material. Then 2 entrance ticket posts, 2 sets of doorstops and posts, each placed for the entry and exit zone for cars and the entry and exit zone for motorbikes. Apart from that, there is also the writing Mangrove Mandrajaya in red, then a pedestrian for the pedestrian entrance with anangsana trees as shade or direction and vetifer grass to decorate the green lane. In detail, it can be seen in Figure 8 as follows:



**Figure 8.** *Detail Section Welcoming Area*

### **Site Plan Zone 2 (Beach, Mangrove, agriculture)**

The second zone which is detailed in the form of a site plan is an area designated for beach tourism, mangrove tourism and agricultural tourism. There are several types of facilities in it which are designed to maximize educational and cultural tourism activities. For the beach area there is a tourism dock facility which consists of 3 buildings or gazebos for the waiting area or reception area for guests or visitors who use vehicles in the form of boats or speedboats.

Then there are several tourist support building facilities, namely 6 beach villas, 2 restaurants, 1 prayer room, 4 huts or gazebos, and there are also several existing buildings that are still maintained, namely, the POKMASI (Conservation Aware Community Group) secretariat, meeting hall, and community stalls selling around Cikadal Beach. And a tree nursery area in the form of mangrove trees, coconuts and Ketapang trees as well as 1 viewing tower building as a tourist security function. Beaches, green spaces or other sand areas can be used for camping or picnic activities for visitors.



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Then in the area inside the mangrove there is a boardwalk for visitors who want to explore the mangrove forest from inside. There are also mangrove education building facilities, and an amphitheater as a mangrove conservation education function. Further facilities include an elevated ramp, skywalk, food center, hut, and kiosk, which is positioned between the rice field area and gazebo area, as well as a flower garden with existing types of flower plants. This entire area is maximized for visitor activities and maintaining biodiversity on the site. In detail, it can be seen in Figure 9 as follows:



**Figure 9.** Site Plan Zone 2 (beach, mangrove, angriculture)

### **Section Plan Facility (*Elevated Ramp, Boardwalk, Skywalk*)**

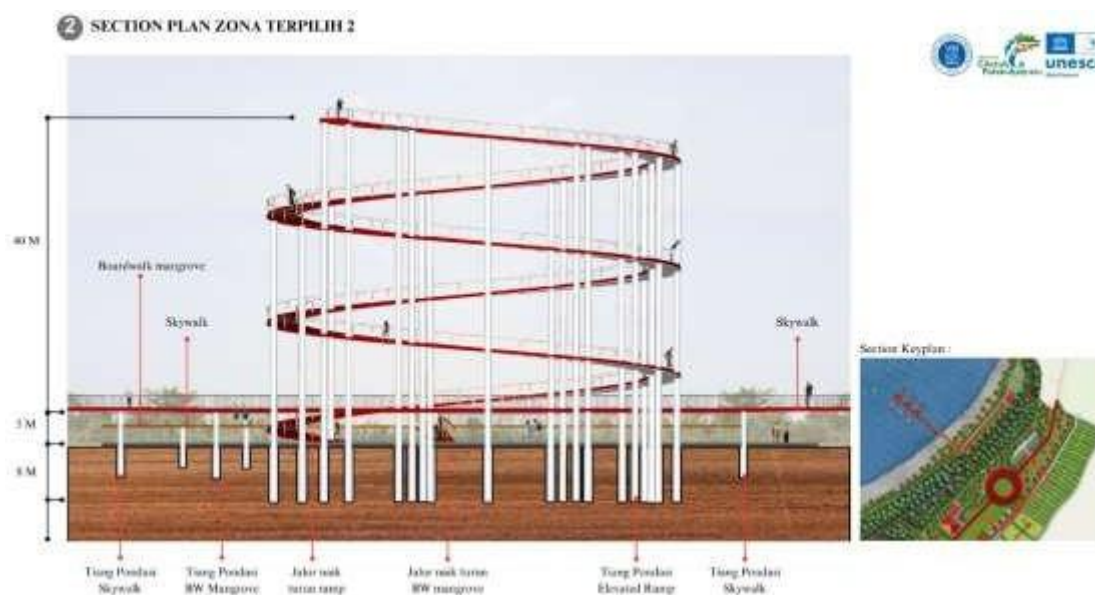
In zone 2, what is detailed is the facilities in the form of an elevated ramp, boardwalk in the mangrove and skywalk. This was created to show in detail the differences in size or height of each of these facilities, which functionally have different visibility and cruising



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distances. This can be seen in detail in Figure 10 as follows:



**Figure 10.** Section Plan Facility (Elevated Ramp, Boardwalk, Skywalk)

### Site Plan Zone 3 (Mangrove Labirin)

The last zone or area detailed in the form of a site plan is the mangrove labyrinth area, where there are several sub-zones which include the pond area which is used as an extension of the mangrove or in the concept it is called the mangrove labyrinth, which has facilities in the form of a bridge or road connecting to the pool area and underneath there is a fish holding net, then there is a beach villa management building, canoeing dock, restaurant and lodging, viewing tower, and skywalk to explore the mangrove labyrinth area. Then in the welcoming private subzone, where facilities are provided in the form of parking for motorbikes, minibuses and cars as well as a management office. Then in the agriculture subzone specifically for the rice area, there are rice field villas, villa management offices, restaurants and rice field boardwalks. The remaining subzones are the previously detailed zones which are integrated with the mangrove area in the form of boardwalks and skywalks. In the detailed site plan for this zone, there are also several existing areas that are being maintained, in the form of community land designated for mango gardens, chili gardens and coconut gardens. This can be seen in detail in Figure





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docks, viewing towers and skywalks. This can be seen in detail in Figure 12 as follows:



**Figure 12.** *Section Plan Zone 3 (Mangrove Labirin)*

## CONCLUSION

Globally, Geopark areas are very important to develop or maintain their geodiversity, culturediversity and biodiversity elements. Likewise with the Ciletuh-Palabuhanratu Geopark. If we look at the 2019 Ciletuh Geopark Masterplan, the area with the potential to develop a Geotourism Route which is rich in geological diversity, biodiversity and cultural diversity is found in Mandrajaya Village, Ciemas District. The main potential is the existence of a mangrove ecosystem in the coastal area of Cikadal Beach, which of course protects coastal areas from the threat of abrasion and tsunamis.

As the results of direct research in the field and interviews with stakeholders and the surrounding community show, Mandrajaya Village has still not felt the positive impact of the designation of their area as a Global Geopark area. Economic turnaround or development of supporting infrastructure for Geopark tourism is only in a few areas, for example Ciwaru Village, which is located on the border with Mandrajaya Village.

As with the 4 problem points that want to be resolved, this research tries to provide alternative solutions that can be implemented, firstly related to the problem of the mangrove ecosystem (biodiversity) which is being degraded due to climate change and human activities. In the design, mangrove planting strategies and zones or expansion areas are made, especially the distribution area in the coastal area of Cikadal Beach. Then secondly, the need for amenities to support geotourism activities without damaging the ecosystem, various amenities are designed in the form of environmentally friendly and sustainable materials with various functions. Then thirdly, how to ensure that the culture (culture diversity) of the surrounding community can be integrated into the design area, so a tourism activity program based on cultural education or cultural research, both



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agricultural culture and maritime culture, is created. Then finally, how to optimize exploration activities for geological diversity (geodiversity), at the coastal geosite of the ancient subdistrict cluster (F), namely designing a tourist pier, tourist boat, then determining rest area points for tourists who are exploring.

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