

# Land Suitability Analysis and Tourism Suitability in Tourist Area of Pantai Panjang Bengkulu City of Indonesia

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## Abstract

Pantai Panjang Bengkulu City is a beach directly facing the Indian Ocean, located in the western part of the island of Sumatra, has a length of 7 km, has a beautiful view and easy access to reach it, so it is designated as a leading tourist area of Bengkulu city. The purpose of this study is to analyze land suitability and tourism suitability developed in the "Pantai Panjang" tourist area. This study uses primary data and secondary data. The study of land suitability as a tourist area is carried out by delineating coastal areas by pulling 100 meters inland, calculated from the limit of the highest tide point. In this study, spatial analysis through a weighting overlay process was carried out to obtain the suitability of the tourism area land with land cover and water depth parameters. Meanwhile, the study of tourism suitability in the Pantai Panjang area of Bengkulu City uses 10 parameters of marine tourism suitability. The results showed that the coastal land that was included in the administrative area of the Ratu Agung and Ratu Samban sub-districts was suitable as a tourist area with the type of tourism being developed in the form of beach recreation, while for the coastal land in the Teluk Segara sub-district it was not suitable to be developed as a tourist area.

**Keywords:** Land suitability, tourism suitability, tourist area of Pantai Panjang

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## 1. Introduction

The Pantai Panjang tourism area of Bengkulu City is a beach which is a priority for development in the Bengkulu City Regional Spatial Plan (RTRW) for 2012-2032. Pantai Panjang is a development priority (Pratama & Sakti 2016; Mutiara *et al.* 2018) because of its location in the city, access to the location can be passed by two-wheeled and four-wheeled vehicles with paved road conditions, and has a tourist attraction in the form of a sloping white sandy beach, with land cover dominated by natural vegetation in the form of sea pine.

Based on the Bengkulu City Regional Spatial Plan (RTRW) for 2012 - 2032. Pantai Panjang is a leading area for economic development that has the potential for a fast growing economy so that it is designated as one of the strategic areas of Bengkulu City. However, although development has been carried out, this area has not been developed optimally (Nugraha *et al.*, 2013; Pratama & Sakti 2016; Revolina *et al.* 2020) when compared to other beach tourism objects, such as Ancol, Bali. Lampung, NTT or the other areas. Existing problems encountered in the area are waste management that is not handled properly, lack of public space as a means of social interaction for local residents, there are no activities that become generators and attractions and characteristics of the area, lack of lighting along regional roads so that it is quite dark at night, not yet optimal connecting lanes between corridors, unavailability of pedestrian paths in the form of sidewalks, so that pedestrian paths are still united with vehicle lanes, unavailability of rainwater drainage channels and waste from houses around the area, and the presence of Bengkulu city in earthquake prone areas and tsunamis, require special treatment in the use of coastal areas, including the Pantai Panjang area.

Based on this, to be able to formulate a strategy for the development of the Pantai Panjang tourist area appropriately, it is necessary to analyze the suitability of the land and the suitability of the tourism being developed. Some of the ecological parameters used to see the potential of the area include; water depth, beach type, beach width, water base material, current speed, coastal slope, water clarity, land cover, dangerous biota, fresh water availability as a reference in obtaining the value of the Tourism Suitability Index. In addition, physical parameters in the form of land cover and water depth are used to analyze the suitability of coastal land using Geographic Information Systems so that products can be produced in the form of land suitability maps. Another parameter, namely, the social and economic conditions of the local community and visitors are used as supporting data to assess respondents perceptions of tourist attractions in the Pantai Panjang.

This research is expected to provide recommendations for tourism development that is appropriate to be

applied to the area, as well as an effort to assist the local government of Bengkulu City in determining the right tourism development strategy in the area.

## 2. Methodology

### 2.1 Method of collecting data

Data collection methods consist of: survey, interview and literature study. The types of data consist of; primary data and secondary data. Primary data is data obtained directly from the research field, either in the form of measurements, observations and interviews (Nazir, 2003). Secondary data is data collected by other people with a separate purpose and has a categorization or classification according to needs (Nasution, 2011). Primary data is obtained and collected directly through field observations such as land use ground checks. The secondary data collection was carried out by means of a literature study from various documents in several related agencies and the results of previous research. The secondary data collected was then validated by means of a ground check directly in the field.

### 2.2 Data analysis method

The study of land suitability as a tourist area is carried out through delineation of the coastal area by drawing a distance of 100 meters from the mainland coast to the limit of the highest tide point. In this study, spatial analysis through a weighting overlay process was carried out to obtain the suitability of the tourism area land with land cover and water depth parameters. Spatial analysis is an analytical process used in a Geographic Information System (GIS) which has the ability to provide information and display it in map form. A tourist information system is an information system built to meet the information needs of tourists (Monangga *et al.* 2009). This can also be done in analyzing the suitability of the land for tourist sites. Meanwhile, a tourism suitability study that should be developed in the Pantai Panjang area of Bengkulu City uses the Yulianda marine tourism suitability parameter (2019). These parameters are shown in Table 1 below.

Table 1. Criteria for the suitability of marine tourism for the beach category

No	Parameter	Weight	Category	Score
1	Water depth (m)	0.125	0-3	3
			>3-6	2
			>6-10	1
			>10	0
2	Type of beach	0.200	White sand	3
			White sand mixed with coral fragments	2
			Black sand, a little steep	1
			Mud, rocky, steep	0
3	Beach width (m)	0.200	>15	3
			10-15	2
			3-<10	1
			<3	0
4	Water base material	0.170	Sand	3
			sandy coral	2
			Muddy sand	1
			Mud, sandy mud	0
5	Current speed (cm/detik)	0.080	0-17	3
			17-34	2
			34-51	1
			>51	0
6	Tilt (degrees)	0.080	<10	3
			10-25	2
			>25-45	1
			>45	0
7	Water brightness (%)	0.125	>80	3
			>50-80	2
			20-50	1
			<20	0
8	Beach land closure	0.010	Coconut, open land	3
			Bush, thicket, low, savanna	2
			High Scrub	1
			Mangroves, settlements, ports	0

No	Parameter	Weight	Category	Score
9	Dangerous biota	0.005	None	3
			Sea urchins	2
			Sea urchin, stingray	1
			Sea urchins, stingrays, lions, sharks	0
10	Fresh water availability (km)	0.005	<0.5	3
			>0.5-1	2
			>1-2	1
			>2	0

Source: Yulianda (2019)

Description: If  $IKW \geq 2.5$  : Very suitable  
 $2.0 < IKW < 2.5$  : Appropriate  
 $1 \leq IKW < 2.0$  : Not suitable  
 $IKW < 1$  : Very inappropriate

With:  $IKW = \sum_{i=1}^n (Bi \times Si)$

Description: n = Number of conformity parameters  
 Bi = Weight of the i-parameter  
 Si = i parameter score

### 3. Results and discussions

#### 3.1 Physical Condition and Physical Bio of Pantai Panjang

The Pantai Panjang is located to the west of Bengkulu City, which is along the edge of the mainland which is directly opposite the Indian Ocean. The area of Pantai Panjang Bengkulu City is 84.09 hectares with a coastline of 7 km, belonging to the type of straight beach on sloping land. (Apriliansyah *et al.* 2018; Nugraha *et al.* 2013). This area is located in three sub-districts of Bengkulu city, namely Ratu Agung sub-district, Teluk Segara sub-district, and Ratu Samban sub-district.

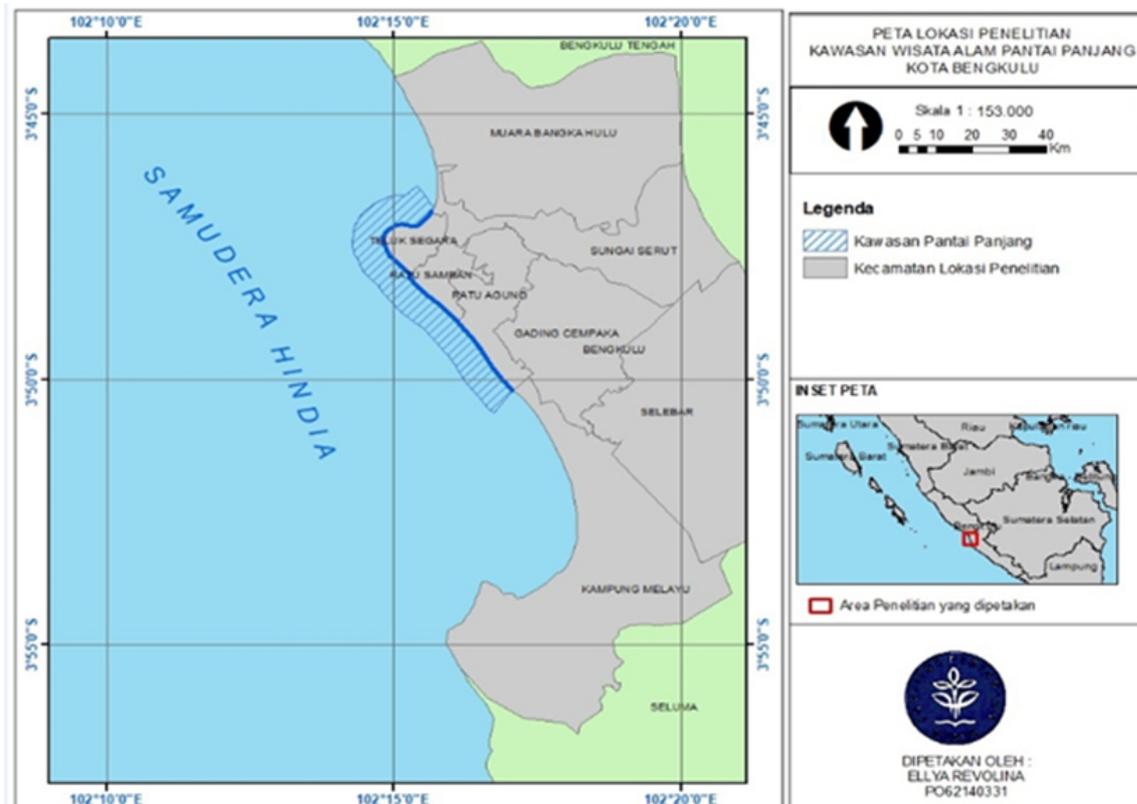


Figure 1. Map of the research area

The strength possessed by this beach so that many tourists visit every day, especially on holidays and holidays, is from the aspect of location and access, it is located approximately 3 Km from the city center, has four interconnected entrances, paved roads, can be reached by foot. Two wheeled or four wheeled vehicles.

From the aspect of vegetation and substrate, it is dominated by cypress plants that grow naturally with white sandy beaches. From the panoramic aspect, this area has a direct view of the sea. In general, the plant that usually dominates the coastal area is coconut, but unlike the usual, the plant that dominates the natural tourism area of the Pantai Panjang, Bengkulu City is cypress. This plant grows naturally in almost all areas. In addition, there are seventeen other types of natural plants, such as teki grass, ketapan, sea ferns and so on. In detail the types of plant vegetation in the natural tourism area of Pantai Panjang, Bengkulu City, as shown in Table 2.

Table 2. Types and Latin names of plant vegetation in the natural tourism area of the Pantai Panjang, Bengkulu City

No	Jenis Vegetasi	Nama Latin
1	Acacia	Accasia auriculiformis
2	Mangroves	Aegiceras corniculatum (L)
3	Nyamplung	Chalophyllum inulifolium
4	Fir	Casuarina equisetifolia
5	Bintaro	Cerbera manghas
6	Teki grass	Cyperus rotundus
7	Sea tuba/sea nuts	Derris elliptica
8	Sea spikes	Desmodium umbellarum
9	Sea Jelutung	Euphorbia atoto
10	Banyan	Ficus benjamina
11	Sea Waru	Hibiscus tiliaceus
12	Horse Footprint	Ipomoea pescaprae
13	Daffodils	Crynum augustum
14	Sea Pandan	Pandanus tectorius
15	Bakau	Rhizopora apiculata Bl
16	Babakoan	Scaevola frutescens
17	Ketapang	Terminalia cattapa
18	Laban	Vitex pubescens

Source: Bengkulu Natural Resources Conservation Center (2016)

Domestic and foreign tourist visits to the Pantai Panjang tourism object in Bengkulu City from year to year always increase. For domestic tourists, from 112000 people in 2014 to 246000 people in 2017. Likewise for foreign tourists, from 156 people in 2014, to 345 people in 2017. (City Tourism Office 2018). Based on the strength of the area and the number of tourist visits, it can be concluded that the Pantai Panjang tourism object in Bengkulu City has great potential to be developed. The development carried out must of course pay attention to many factors such as regional attractiveness, infrastructure, tourist facilities and infrastructure, and the community environment (Inskeep 1991). The most important aspect in the concept of utilizing natural resources for tourism purposes is the suitability of resources to support tourism activities (Hutabarat *et al.* 2009), including land suitability and the suitability of tourism types in area development.

### 3.2 Land suitability for the Pantai Panjang area

The analysis of the suitability of land in the Pantai Panjang tourist area (KWPP) of Bengkulu City was carried out using a delineation technique (Widiatmaka and Hardjowigeno, S. 2007) for the coastal area, which was to pull 100 meters inland, calculated from the limit of the highest tide point. Several parameters of tourism land suitability, such as land cover and water depth are used as criteria for determining land suitability in the area. Through an overlay process with spatial data of land cover and water depth, in order to obtain data on land use in the coastal area of Pantai Panjang, Bengkulu City. The final result of the whole process is the obtaining of a map of the suitability of coastal tourism land in the Pantai Panjang as presented in Figure 2.

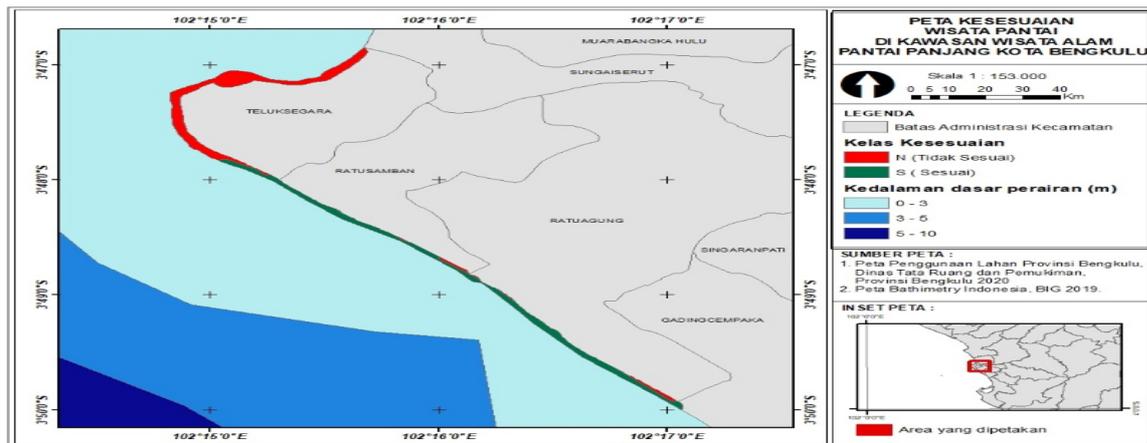


Figure 2. Map of land suitability for coastal tourism in the Pantai Panjang tourist area, Bengkulu City

Base on the information in Figure 2, it can be seen that the land cover condition in Ratu Agung and Ratu Samban sub-districts is still dominated by cypress forest and low shrubs (areas marked in green). Although, in the coastal border area there are several permanent buildings and non-permanent buildings erected by residents to support tourism activities. In the coastal area in Teluk Segara sub-district, almost the entire area is colored red because it is filled with residential building covers, coastal land cover in the form of cypress or other vegetation is almost non-existent. The visualization of land cover in the area is shown in the following Figure 3 and 4:



Figure 3. Land cover in Ratu Samban and Ratu Agung sub districts



Figure 4. Land cover in Teluk Segara sub district

Based on the land suitability analysis, it was concluded that the coastal area in the Ratu Samban and Ratu Agung sub-districts was included in the Appropriate (S) category to be used as a tourist area. Meanwhile, the coastal area in the Teluk Segara sub-district, including Unsuitable (TS) is developed as a tourist area. According to Yulianda (2019), coastal land cover is suitable for beach recreational activities if it is not arid and there is coastal vegetation. The results of field observations show that in these 2 (two) sub-districts (Ratu Agung and Ratu Samban sub-districts) the coastal land cover is not arid and there is still coastal vegetation in the form of 5% shrubs, 10% low shrubs and 85% pine (figure 3). Although in some parts of the land it has shown a red color, which indicates the vegetation cover of the coastal land is starting to be disturbed. According to Fandeli (2000), the beach is a tourist attraction that has the potential to attract tourists because of its varied forms and atmosphere. Senoaji (2009) stated that for the purpose of beach tourism, these objects have the potential to be used, ranging from passive activities (such as enjoying the scenery) to active activities (such as jogging). Likewise, the beaches in the Ratu Agung and Ratu Samban sub-districts are quite eligible for passive and active activities. Meanwhile, in Teluk Segara sub-district, 95% of land cover is filled with residential buildings and 5% by low-lying shrubs and shrubs and has a narrow beach width and is close to residential areas (figure 4). So it is not suitable to be developed into a tourist area. For that, we need a new segmentation determination from the local government in the development of tourist land in Pantai Panjang, Bengkulu City, so that the development carried out can be carried out optimally.

### 3.3 Tourism suitability

The parameter suitability of resources for coastal tourism in the coastal recreation category consists of 10 (ten) parameters, namely: parameters of water depth, beach type, beach width, base material, current speed, water brightness, coastal slope, coastal land cover, hazardous biota, and water availability bid. The results of the assessment of resource suitability parameters for coastal tourism in the category of beach recreation can be seen in Table 3.

Table 3. The results of the parameter assessment of the suitability of beach tourism for the category of beach recreation along the Pantai Panjang area of Bengkulu City

No	Parameter	District Ratu Samban	District Ratu Agung	District Teluk Segara
1	Depth (m)*	0,375	0,375	0,375
2	Beach type	0,125	0,37	0,12
3	Beach width (m)*	0,16	0	0
4	Water base material	0,6	0,6	0,4
5	Current speed (m/s)*	0,34	0,34	0,34
6	Tilt (degrees)	0,51	0,51	0,34
7	Water brightness (%)*	0,16	0,20	0,24
8	Beach land closure	0,03	0,03	0
9	Dangerous biota	0,015	0,015	0,015
10	Fresh water availability (km)	0	0	0,01
	Total IKW	2,215	2,155	1,845
	Suitability criteria	S	S	TS

Information:

IKW : Indek Fit wisata  
 S : Appropriate  
 TS : Not appropriate

The suitability of tourism for coastal recreational activities must pay attention to the characteristics of the coastal environment. (Domo *et al.* 2017). Because one of the most important aspects in the concept of utilizing natural resources for tourism purposes is the suitability of resources that support tourism activities (Hutabarat *et al.* 2009).

Based on the results of an analysis of 10 (ten) parameters of resource suitability for beach tourism (Table 3) it is known that the districts of Ratu Agung and Ratu Samban are suitable for beach tourism activities in the category of beach recreation, because it has a value of tourism suitability index (IKW) between 2.0 to 2.5. The suitability of resources for recreational category beach tourism can be said to be appropriate if it has a tourism conformity index value of  $2.0 \leq IKW \leq 2.5$ . {Yulianda (2019); Andronicus *et al.* (2016); Yustishar (2012)}. While in the district of Teluk Segara, it is not suitable to be developed into a recreational category beach tourism area, because it has a tourism suitability index below 2,0 (IKW = 1,845) and is on a scale of  $1.0 \leq IKW \leq 2.0$ . According to Yulianda (2019) the suitability of resources for beach tourism category of beach recreation can be said to be inappropriate if it has a tourism conformity index value of  $1.0 \leq IKW \leq 2.0$ .

#### 4. Conclusions and Suggestions

Based on research findings, it is known that not all areas in Pantai Panjang can be used as a tourist area. Areas that still meet the requirements and deserve to be used as tourist areas with this type of beach recreation tourism development are coastal areas located in the Ratu Agung and Ratu Samban districts, while the the beach in the administrative area of Teluk Segara district is not suitable to be developed as a tourist area. Based on the above findings, the local government must make an appropriate area boundary for tourism in Panjang Beach so that its management becomes more optimal, and avoids horizontal conflicts in the future.

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