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Suitability of Coastal Tourism Resources in the Mandalika and Buffer Regions of the Central Lombok Regency

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Abstract: The use and allocation of areas in Indonesia, especially Lombok Island as a beach tourism location, provides ample opportunities for tourism development. Kuta Mandalika Beach, Tanjung Aan Beach, and Selong Belanak Beach have different physical and social characteristics as tourist resources for the Mandalika and buffer areas. The purpose of this study is to analyze the suitability of coastal tourism resources at Kuta Beach (located in a special economic zone) and Selong Belanak Beach (located in a buffer zone) regarding physical and social elements. The research uses a quantitative methodology based on scoring, as reflected in the field survey, data processing results, and descriptive analysis. Based on the study's results, eight parameters of physical aspects (beach type, beach coastline length, water base material, depth, current speed, hazardous biota, land cover, freshwater availability, and social aspect) were used (4A components; attraction, accessibility, amenities and ancillary). The Tourism Suitability Index (TSI) for Kuta Mandalika Beach is 2.60, Tanjung Aan Beach is 2.40, and Selong Belanak Beach is 2.57. The result shows that two beaches (Kuta and Selong Belanak) are very suitable, and Tanjung Aan is just suitable. Locations suitable for developing into beach tourism-based recreational locations, both within special economic and buffer zones. The suitability of the three beaches is undoubtedly a shared responsibility to establish the Central Lombok Regency area by relying on the tourism sector, which can support regional development.

Keywords: suitability, resources, coastal tourism, Mandalika, buffer region, Central Lombok.

龍目島中部曼達里卡及緩衝區濱海旅遊資源適宜性

摘要：印尼土地的利用和配置，特別是龍目島作為海灘旅遊地，為旅遊業的發展提供了充足的機會。庫塔曼達里卡海灘、丹絨安海灘和塞隆貝拉納克海灘作為曼達里卡和緩衝區的旅遊資源具有不同的自然和社會特徵。本研究的目的是分析庫塔海灘（位於經濟特區）和塞隆貝拉納克海灘（位於緩衝區）沿海旅遊資源在物理和社會要素方面的適宜性。研究採用基於評分的量化方法，反映在實地調查、資料處理結果和描述性分析。根據研究結果，使用了物理方面的八個參數（海灘類型、海灘海岸線長度、水基物質、深度、海流速度、危險生物群、土地覆蓋、淡水可用性和社會方面）（4A組成部分；吸引力、可及性）、便利設施和輔

助設施）。庫塔曼達利卡海灘的旅遊適宜指數為2.60，丹絨安海灘為2.40，塞隆貝拉納克海灘為2.57。結果顯示，兩個海灘（牆壁和塞隆貝拉納克）非常適合，丹絨安剛好適合。適合開發為海灘旅遊休閒場所的地點，均位於特殊經濟區及緩衝區內。三個海灘的適宜性無疑是依托旅遊業建立龍目島中央攝政區的共同責任，可以支持區域發展。

关键词：適宜性、資源、沿海旅遊、曼達利卡、緩衝區、龍目島中部。

1. Introduction

From a geographical perspective, tourism is defined as a social, cultural, and even economic activity related to the movement of people from their areas of origin to tourist destinations for personal and business purposes. The perpetrators of these activities are tourists [1]. One type of tourism refers to coastal tourism using the potential of coastal natural resources and their supporting components that are artificial and a combination of both [2]. Indonesia, an archipelagic country, has a coastline of 95,181 km [3]. The availability of natural resources and the diversity of tourist attractions trigger the use of space for recreation. Recreation as an integral part of tourism also relates to the approach or connection between rest and leisure; recreation and tourism are much closer and more intimate [4]. Beach tourism objects that are part of recreation relates to the physical elements of the beach that play a role in providing recreational tourism attractions. The physical elements of coastal tourism objects include beaches, sea levels, and land around the coast [2]. These three components are related to land and sea transition areas that are useful and recreational so that they can trigger tourists to spend recreational time enjoying coastal resources.

The usage and allocation of areas in Indonesia, especially Lombok Island as a beach tourism location, is an ample opportunity for tourism development. In 2014, the Indonesian government designated the southern part of Central Lombok Regency, covering an area of 1,035 hectares, as a Special Economic Zone (Mandalika SEZ), which focuses on a tourism zone based on Government Regulation No. 52 of 2014 concerning the Mandalika SEZ [3]. The area around the tourism zone functions as a buffer zone with integrated tourism activities. The primary and buffer areas have beach attractions with different physical and social characteristics. In 2019, before the COVID-19 pandemic hit, the number of tourist visits to Lombok Island reached 3,706,352 [5]. High interest in visiting very varied beaches requires an evaluation of the suitability of coastal tourism resources in supporting recreational tourism. The social component acts as a complement to the physical elements that add to the suitability of beach tourism recreation. Therefore, this study analyzes the suitability of coastal tourism resources at Kuta Beach (located in a special economic zone) and Selong Belanak Beach (located in a buffer zone) regarding physical and social elements. The application of Geographic Information Systems (GIS) in this conformity evaluation in data processing and visualization is also applied to communicate spatial data, which is a physical element in the suitability parameter.

2. Method

2.1. Research Location and Time

The research was conducted in Central Lombok Regency in September 2022, which has a Special Economic Main Area as a tourism zone and the surrounding area as a buffer zone. The potential for coastal tourism is enormous, supported by the development of beach tourism objects in particular areas, namely Kuta Beach and Tanjung Aan Beach. Meanwhile, the buffer zone also has many beaches that stretch to the south. Selong Belanak Beach is a famous beach and presents tourist attractions that are no less interesting, even though it is in a buffer zone. Therefore, the location selection was based on the area coverage of the Mandalika SEZ, tourist attractions, popularity, accessibility, and the availability of journals and previous publications from researchers who researched the three tourist attraction locations.

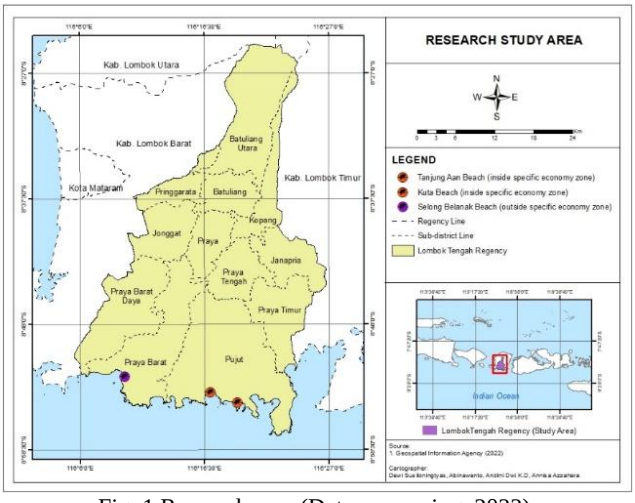

Fig. 1 Research area (Data processing, 2022)

2.2. Data Collection

The data used are primary and secondary. Secondary data were obtained through related agencies,

primary data – through field surveys in September 2022 with observations and interviews. Interviews were conducted with respondents who act as stakeholders, including managers, visitors, local communities, tourism businesses in tourist attraction areas, and the local government using research questionnaires. The research uses a quantitative method based on a scoring technique by suitability category, as reflected by the field conditions and data processing results. Descriptive analysis interpreted the condition of physical and social elements on the suitability of beach tourism objects as recreational facilities. Table 1 shows the data used in this study.

Table 1 Data collection (The authors, 2022)

Data	Year	Source
Beach type, material, hazardous biota, water availability	2022	Field survey
Coastline length and current speed	2022	Geospatial Information Agency, Google Earth Pro
Land Cover	2022	Geospatial Information Agency field survey
Component 4A (Attractions, accessibility, amenities, ancillary)	2022	Field survey and stakeholder interview

2.3. Suitability Assessment

The suitability assessment parameter uses the suitability matrix in the Tourism Suitability Index (TSI) with four conformity classes [6]. TSI score ≥2.5 is a very appropriate class, TSI 2.0–<2.5 is appropriate, TSI 1–<2.0 is not appropriate, and TSI <1 is very unsuitable, based on [6].

Table 2 Suitability assessment matrix ([6] and the authors' modification, 2022)

No.	Parameter	Weight	Category	Score
1	Beach Type	0.200	White sand	3
			White sand mixed with coral fragments	2
			Black sand, a little steep	1
			Mud, rocky, and steep	0
2	Coastline length (km)	0.050	>2	3
			>1-2	2
			>0,5-1	1
			<0,5	0
3	Water base material	0.200	Sand	3
			Sandy coral	2
			Muddy sand	1
			Mud and sandy mud	0
4	Water depth (m)	0.125	0-3 m	3
			>3-6 m	2
			>6-10 m	1
			>10 m	0
5	Current speed (cm/sec)	0.090	0–17	3
			17–34	2
			34–51	1
			>51	0
6	Beach land cover	0.125	Coconut, open land	3
			Bush. Low grove, savanna	2
			High scrub	1
			Mangroves, settlements, harbors	0
7	Dangerous biota	0.005	Nothing	3
			Sea urchins	2
			Sea urchins and stingrays	1
			Sea urchins, stingrays, lionfish, and sharks	0
8	Fresh water availability/distance to fresh water sources (km)	0.005	<0,5	3
			>0,5-1	2
			>1-2	1
			>2	0
9	Social component 4A	0.200	Complete with attraction, accessibility, amenities, and ancillary in good condition	3
			Attraction, accessibility, and amenities	2
			Easy-to-reach attraction and accessibility	1
			Attraction and poor accessibility	0

2.4. Data Processing

To find suitability, field surveys and interpretations were conducted using the scoring method in the range of very unsuitable (0 points) and very suitable (3 points). Scoring the data involves assigning a numerical weight to each response on an instrument's suitability.

2.5. Flowchart of the Research Methodology

The following is a research flowchart that consists of determining the research location, variables used, data processing, and data analysis results.

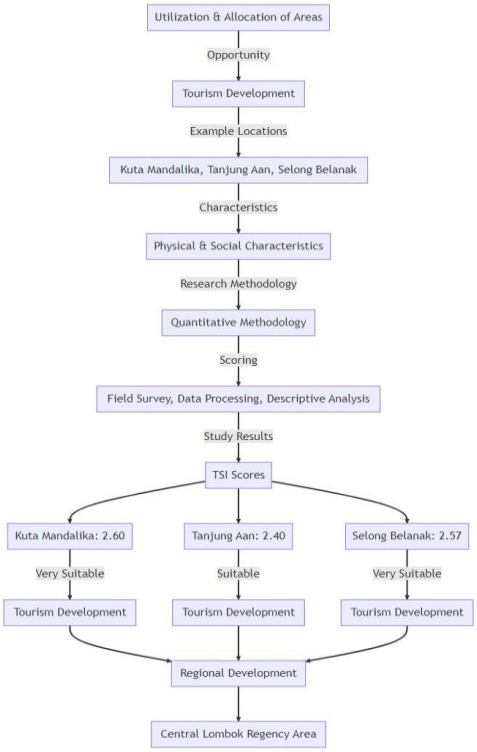

Fig. 2 Flow chart of the research methodology

3. Results and Discussion

3.1. Beach Type and Water Base Material

Based on the physical parameters, the study results showed that the three types of beaches are white sand types with different particle size levels. From the sand samples in the field survey, Kuta and Tanjung Aan Beaches have large-grained sand resembling pepper and many mixed parts of coral. This is similar to the findings of previous research on the attractiveness of white pepper sand [9]. Meanwhile, the white sand at Selong Belanak Beach has a striking difference in size which is very fine and soft on the feet. The beach type and material associated show the similarity between the material in the coastal land and the material in the waters. Observational data are presented in Figs. 3–5.

Fig. 3 Material of white coral sand of Kuta Beach

Fig. 4 Material of white coral sand of Tanjung Aan Beach

Fig. 5 Non-coral white sand of Selong Belanak Beach

Source: The authors' documentation, 2022

3.2. Coastline Length, Water Depth, and Current Speed

The length of the coastline measure used Google Earth Pro combined with secondary data from the relevant tourism agencies. Kuta Beach has the longest coastline of >5 kilometers, Tanjung Aan Beach has a length of >2 km [10], and the smallest is Selong Belanak Beach of <2 km. The depth of the three beaches is in the range of 0-3 m based on data of field surveys and bathymetric data processing. This depth is suitable for recreational activities evidenced by the large number of tourists swimming around the beach.

The Meteorology, Climatology, and Geophysics Agency shows that the current velocity in the southern area of Lombok Island, which includes above locations is 10 to 30 cm/s. However, findings in the field show that Selong Belanak Beach is famous for having higher current speeds than Kuta and Tanjung Aan because the beach location is often used as a medium for surfing, especially for foreign tourists.

3.3. Beach Land Cover, Dangerous Biota, and Fresh Water Availability

Land cover in coastal areas tends to maintain its original condition with open land and coconut trees around the coast. Kuta Beach has experienced the most extensive development; retail activity buildings, accommodation, and other facilities dominate part of the area. However, on the beach side, it still maintains the beach and a minimal number of trees. Tanjung Aan and Selong Belanak beaches are also dominated by open land with more shady trees, and local traders use several temporary buildings for tourists.

No dangerous biota were found to injure or disturb tourists. The biota is fish, so local people use coastal areas for fishing spots. Local managers or traders can provide an analysis of the freshwater needed for tourists, open easily accessible paid toilets on the beach location. Figs. 6–8 present observational data.

Fig. 6 Kuta Beach land cover

Fig. 7 Tanjung Aan Beach land cover

Fig. 8 Selong Belanak Beach land cover

Source: The authors' documentation, 2022

3.4. Social Components

Apart from the physical aspect, the suitability of the beach can be seen from 4 social components: attraction, accessibility, amenities, and ancillary (commonly shortened to 4A) [7]. The following is a brief explanation of the 4A components on each beach.

1) *Attraction:* Surfing is one of the favorite attractions, especially for foreign tourists, and Selong Belanak Beach is a great choice. According to some respondents, Selong Belanak Beach is suitable for beginner surfers. The Bau Nyale Festival is a tradition from the Sasak tribe in West Nusa Tenggara included in the tourism agenda and is an annual event.

In 2022, the Bau Nyale Festival will be adjacent to an international event, MotoGP, at the Mandalika Circuit. The Mandalika Circuit is located close to Seger Beach, which became the starting place for the Bau Nyale Festival. This event was moved to Tanjung Aan Beach, and several other events were moved to Kuta Mandalika Beach.

2) *Accessibility:* Access to the three beaches, Kuta Mandalika and Tanjung Aan, is included in the easy category. While Selong Belanak Beach still needs to be developed again because the road is small and needs to be climbed, the signs and street lighting are minimal, so tourists need to be careful at night. The three beaches can be reached using both two-wheeled and four-wheeled vehicles.

3) *Amenities:* The number of accommodation facilities provided continues to grow from year to year. Lodging facilities are available from Tourism Residential Facilities (Sarhunta) to star hotels. In addition, some facilities around the beach can be used by tourists, such as Selong Belanak Beach, the availability of surfboard rental services at different prices, and also receiving guide services. ATM services were available around Kuta Mandalika Beach. Umbrella tents/gazebos are one of the facilities many tourists are looking for to sit back, rela, and take shelter, such as those provided at Selong Belanak Beach and Tanjung Aan. Some restaurants are too

expensive to meet the needs of food and drink around the beach.

Fig. 9 ATM services at Kuta Mandalika Beach

Fig. 10 Gazebo on Tanjung Aan Beach

Fig. 11 Umbrella tents, restaurants, board rental and guide services in Selong Belanak

Source: The authors' documentation, 2022

4) *Ancillary:* Since the establishment of the Mandalika Special Economic Zone in 2014, it is hoped that tourism management and steps taken by the government to develop and support Lombok tourism, especially on the three beaches, will become the research focus. The Indonesia Tourism Development Corporation (ITDC) is a state-owned enterprise specializing in developing and managing tourism complexes. ITDC, local governments, and local communities are also involved in accelerating the tourism sector.

3.5. Suitability Scoring System

Based on the description of the results of the physical and social components, the weighting results of each parameter are shown in Table 3.

Table 3 Resource suitability parameters for the beach tourism category beach recreation ([6] and the authors' modification, 2022)

No.	Parameter	Weight	Category	Score	Kuta score	Tanjung Aan score	Selong Belanak score
1	Beach Type	0,200	White sand	3	2	2	3
			White sand mixed with coral fragments	2			
			Black sand, a little steep	1			
			Mud, rocky, and steep	0			
2	Coastline length (km)	0,050	>2	3	3	3	2
			>1-2	2			
			>0,5-1	1			
			<0,5	0			
3	Water base material	0,200	Sand	3	2	2	3
			Sandy coral	2			
			Muddy sand	1			
			Mud and sandy mud	0			
4	Water depth (m)	0,125	0-3 m	3	3	3	3
			>3-6 m	2			
			>6-10 m	1			
			>10 m	0			
5	Current speed (cm/sec)	0,090	0–17	3	3	3	1
			17–34	2			
			34–51	1			
			>51	0			
6	Beach land cover	0,125	Coconut, open land	3	3	3	3
			Bush. Low grove, savanna	2			
			High scrub	1			
			Mangroves, settlements, and harbors	0			
7	Dangerous biota	0,005	Nothing	3	3	3	3
			Sea urchins	2			
			Sea urchin and stingray	1			
			Sea urchins, stingrays, lionfish, and sharks	0			
8	Fresh water availability/distance to fresh water sources (km)	0,005	<0,5	3	3	3	3
			>0,5-1	2			
			>1-2	1			
			>2	0			
9	Social component 4A	0,200	Complete with attraction, accessibility, amenities, and ancillary in good condition	3	3	2	2
			Attraction, accessibility, and amenities	2			
			Easy-to-reach attraction and accessibility	1			
			Attraction and poor accessibility	0			
Total Score					2.60	2.40	2.57
Level of Suitability of Physical and Social Parameters					Very appropriate	Appropriate	Very appropriate

The interpretation of the physical components relates to parameters 1-8; the beach type of the three

beaches shows a perfect score at Selong Belanak Beach, which is full white sand, while the similarity of scores is found for white sand mixed with coral fragments at Kuta Beach and Tanjung Aan. The water base material is associated with the type of beach with sand and sandy coral dominance. Kuta Beach and Tanjung Aan have the longest coastline length with a perfect score. At the same time, Selong Belanak Beach has a shorter coastline due to the geographical proximity of the area to other beaches.

Water depth relates to the safety and convenience of using a place as a tourist area; the three beaches have high suitability with a beach blood depth of 0–3 m and various recreational activities. The current speed shows high usefulness at Kuta Beach and Tanjung Aan. At the same time, Selong Belanak Beach tends to be unsuitable due to its large waves, which are only suitable for surfing enthusiasts but not for the public. Suitable land cover in coconut trees and open land is found on all three beaches, with access to fresh water that can be reached within 0.5 km. The coastal biota does not show any threats or elements of danger that can interfere with recreation.

The social component that supports the elements of tourism becomes the non-physical attraction needed and supports tourist activities. Kuta Beach has a perfect score with complete and amazing attractions, accessibility, amenities, and ancillary facilities. This condition is related to the state of the beach and the management of the Special Economic Zone (SEZ), which are in the same place, so development tends to be centered on Kuta Beach. Then, Tanjung Aan Beach and Selong Belanak fulfill the three components but should be faster and more developed in the ancillary sector.

Furthermore, all scores at three coastal locations were added up and divided by the total of all components, namely 9, so a suitability index was found in the range of 2.40–2.60. Kuta Beach has the highest index, 2.60, followed by Selong Belanak Beach, which differs only by 0.03 points, 2.57. The two beaches are suitable for coastal tourism because they display natural and social resources supporting each other. The different conditions of Tanjung Aan Beach show an appropriate level, which indicates the need for imports to create an index and improve the quality of resources.

4. Conclusion

This study found three variations of suitability organized by physical and social factors for tourism activities in the Mandalika area, especially in Kuta Beach, Tanjung Ann, and Selong Belanak. Based on the physical and social elements, these three beaches have various indices. Kuta Beach and Selong Belanak Beach have an index of >2.5, meaning they are very suitable (SS). Meanwhile, Tanjung Aan Beach has a TSI index value of 2.4, which is appropriate. Although Kuta Beach and Tanjung Aan are in the Special Economic Zone, the conditions for the two beaches are very different, which can be a consideration for tourism zone managers to be able to develop both tourist objects simultaneously so that they remain balanced. On the other hand, Selong Belanak Beach proves that even though it is in a buffer area, it can compete with the quality of beaches managed in a special zone. The suitability of the three beaches is undoubtedly a shared responsibility to develop the Central Lombok Regency area by relying on the tourism sector, which can support regional development.

The research results produced in this study differ from those of previous research, namely that Mandalika is a trigger for physical and socio-economic dynamics for tourism activities that makes the beaches in Central Lombok relevant to the distance factor from Mandalika. The proximity of the distance will make beach tourism activities develop faster.

This research implies that it can provide knowledge of beach tourism development that should always consider the existing physical and social factors so that it will create a beach tourism attraction beneficial for local, regional, and national scales.

The recommendation for further research is that the suitability for tourism areas around the Mandalika area can correlate with the number of visitors at each beach tourist location and visitors' perceptions of the presence of the Mandalaika Circuit in this area.

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