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Coastal Habitat Suitability of Kade Tigo, Tapanuli Tengah for Marine Ecotourism

Nella Asima Br. Sinaga[1*], Joko Samiaji[1], Afrizal Tanjung[1]
[1]Department of Marine Science, Faculty of Fisheries and Marine, Universitas Riau
Kampus Bina Widya KM. 12,5 Simpang Baru, Pekanbaru 28293
Corresponding Author: anellasinaga@gmail.com

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ABSTRACT

This research was carried out in February – May 2022 at Kade Tigo Beach, Central Tapanuli. This study aims to determine the suitability value and carrying capacity of Kade Tigo Beach for sustainable marine ecotourism. The method used is a survey method with the determination of research stations by purposive sampling. Based on the study's results, an average travel suitability index value was obtained of 88% and was categorized in the very appropriate category. The carrying capacity of the Kade Tigo Beach area is 9,000 people a day, 270,000 people a month, and 3,285,000 a year.

Keywords: Kade Tigo, Tourist Suitability Index, Carrying Capacity

1. INTRODUCTION

Ecotourism is a part of tourism that includes the potential of natural resources, the environment, and natural and cultural uniqueness. The difference with other types of tourism is that ecotourism includes elements of conservation and education. Ecotourism focuses on three main things, namely natural or ecological sustainability, providing economic benefits, and being psychologically acceptable in social life. That way, ecotourism activities directly provide access for everyone to see, know, and enjoy local communities' natural, intellectual, and cultural experiences. Ecotourism activities can increase income from nature conservation, a tourist attraction, and generate economic benefits for people living in and surrounding areas (Yoswaty & Samiaji 2013).

The Tapanuli Tengah Regency has a reasonably long coastline with an arrangement of coconut trees, which further complements the perfection of the Kade Tigo Barus coast, located about 65 km from Pandan, the capital city of Tapteng. The Kade Tigo Beach tourist attraction offers extraordinary views. Many tourists call Kade Tigo Beach the "Bali of Tapteng." The coastline stretches as far as the eye can see. Kade Tigo Beach offers a beautiful natural atmosphere. Vast stretches of white sand with coconut trees growing around the beach. There are many activities that visitors can do, including enjoying the natural charm of the beach, playing in the waves on the beach, swimming, and sunbathing (Priscilla, 2019)

2. RESEARCH METHODS

Time and Place of Research

This research was carried out in February–May 2021 at Kade Tigo Beach, Barus District, Tapanuli Tengah Regency, North Sumatra Province (Figure 1).

Method

The method used in this research is a survey method. Determination of research stations was carried out using the purposive sampling method. This method is used to determine the characteristics of each station (3 location points) and is considered to represent the condition of the waters of the study area. A map of the location of research sampling points can be seen in Figure 1.

At each station, measurements of water quality parameters were carried out. Primary data collection that does not require measurements was carried out by observing at the research location and conducting interviews with the community and stakeholders in the Kade Tigo Beach area. Meanwhile, secondary data was collected from literature studies and related agencies in Tapanuli Tengah Regency,

such as the Tourism Office, Maritime Affairs and Fisheries Service, Central Bureau of Statistics, and the Kade Tigo Village Office.

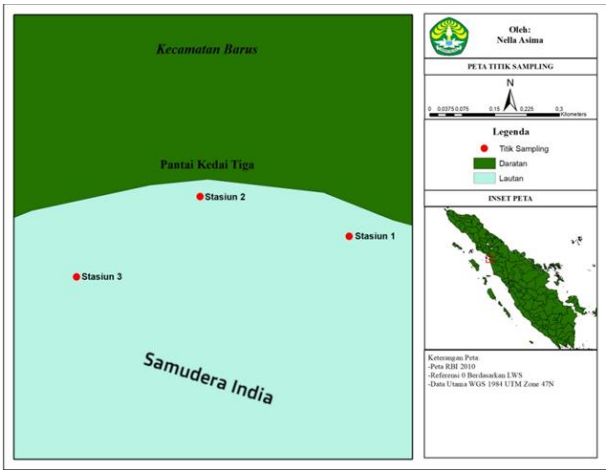

Figure 1. Kade Tigo Beach as a research location

Data Analysis

Tourism Suitability Index

Tourism suitability analysis refers to Yulianda (2007), namely:

$$IKW = \sum_{i=0}^{n} \left(\frac{Ni}{Nmaks} \right) \times 100\%$$

Information:

IKW : Tourism Suitability Index (%)
Ni : Value of the ith parameter
Nmax : Maximum value of a tourism category (84)
i : suitability parameters
n : number of parameter types

Next, a suitability class for beach recreation tourism activities is prepared. In this research, suitability classes are divided into 4 (four) suitability classes (Yulianda, 2007), namely:

Table 1. Classification of tourism suitability index values

No.	Classification	Mark
1.	Very suitable (S1)	83 – 100 %
2.	Compliant (S2)	50 – <83 %
3.	Conditionally compliant (S3)	17– <50 %
4.	Not suitable (TS)	<17%

Regional Carrying Capacity

Calculation of the area's carrying capacity is obtained using calculations or formulas that refer to Yulianda (2007), namely:

$$DDK = K \times \frac{Lp}{Lt} \times \frac{Wt}{Wp}$$

Information:

DDK : Carrying Capacity of Area (people)
K : Ecological potential of visitors per unit area (person)
Lp : Area (m^2) that can be exploited
Lt : Unit area for a certain category (m^2or m)
Wt : Time allocated for activities in one day (hours)
Wp : Time spent by visitors for each activity (hours)

3. RESULT AND DISCUSSION

General Conditions of Research Locations

Kade Tigo Beach is located in Barus District, Tapanuli Tengah Regency, North Sumatra Province. Barus District is located on the west coast of Sumatra, with a height of 0–3 meters above sea level. The area of Barus District is 21.81 km^2. Barus District is located at coordinates 02002'05"–02009'29" N and 98017'18"–98023'28" E with regional boundaries to the north with Andam Dewi District, to the south with Sosor Gadong District, to the west with the Indian Ocean, and to the east it is bordered by North Barus District (BPS Tapanuli Tengah, 2021). One of the beaches that have the potential to be developed in Central Tapanuli is Kade Tigo Beach. This beach has white sand and coconut tree cover.

Measurement of Seawater Quality Standards

Most of the water quality parameters of Kade Tigo Beach have met the existing

standards, which refer to the Minister of Environment Decree No. 51 of 2004. This means that the beach meets the requirements to be used as a marine ecotourism object. The results of measuring water quality parameters can be seen in Table 2.

Table 2. Seawater quality standards for marine ecotourism

No.	Parameter	Unit	Station 1	Station 2	Station 3
	PHYSICS				
1.	Brightness	M	1.80	1.81	1.90
2.	Smell	-	No smell	No smell	No smell
3.	Rubbish	-	Nil	There is	Nil
4.	Temperature	°C	34.9	34.1	33.7
	CHEMISTRY				
1.	pH	-	7,68	8.33	8.31
2.	Salinity	^{0}/00	23	22	22

From the table above, it can be concluded that Kade Tigo Beach has met the requirements to be used as marine ecotourism in terms of coastal water quality parameters.

Measurement and Analysis of Tourism Suitability Parameters

Measurement of tourism suitability parameters is needed to determine the characteristics of the tourist environment. Determining the total value of tourism suitability parameter scores comes from multiplying the weights and scores obtained from each parameter for each type of tourism activity. The Tourism Suitability Index is seen from the percentage of suitability obtained from the total value of all parameters divided by the maximum value of a tourism category. The results of measuring tourism suitability parameters at stations 1, 2, and 3, along with analysis of tourism suitability parameters for Kade Tigo Beach, are presented in Table 3.

Table 3. Measurement and analysis of tourism suitability parameters

No.	Variable	Weight	Station 1			Station 2			Station 3		
			Mark	Score	Ni	Mark	Score	Ni	Mark	Score	Ni
1.	Depth(m)	5	1.80	3	15	1.81	3	15	1.90	3	15
2.	Beach type	5	White sand	3	15	White sand	3	15	rocky	0	0
3.	Beach width (m)	5	20.8	3	15	16,9	3	15	16.3	3	15
4.	Water base materials	3	Sand	3	9	Sand	3	9	Sand	3	9
5.	Current speed (m/s)	3	0.25	2	6	0.07	3	9	0.095	3	9
6.	Beach slope (°)	3	2.0617	3	9	2.0732	3	9	2.1761	3	9
7.	Water Brightness (%)	1	100	3	3	100	3	3	100	3	3
8.	Beach land closure	1	Coconut, open land	3	3	Coconut, open field	3	3	Coconut, open land	3	3
9.	Dangerous biota	1	Stingrays, lionfish	0	0	Stingray	0	0	Stingray	0	0
10.	Availability of fresh water (km)	1	0.2	3	3	0.1	3	3	0.25	3	3
	Total				78			81			66
	IKW (%)				92			96			78
	KPI Average (%)				88						

Table 3 shows that the average value for the tourism suitability index (IKW) for Kade Tigo Beach is 88%. According to Yulianda (2007), this value can be categorized as very suitable because it is 83 – 100%. Category S1 (very suitable) means that no limiting severe factors are found for the use of ecotourism or only have insignificant barriers or no natural effect on ecotourism activities.

Regional Carrying Capacity

Carrying capacity indicates the maximum number of visitors that can be physically accommodated in an available area at a particular time without causing disturbance to nature and humans (Domo et al., 2017). Calculating the Area Carrying Capacity is intended to prevent excessive utilization. This is an effort to prevent ecosystem destruction from an early age (Nugraha et al., 2013). According to Yulianda (2007), it is stated that the ecological potential of visitors per unit area is 50 m^2 of beach area for each person. The time visitors need is the average time spent by visitors in tourist areas, and the time provided by the area manager every day is 9 hours. The results of the analysis of the carrying capacity of the Kade Tigo Beach tourist area are presented in Table 4.

Table 4. Results of regional carrying capacity analysis

Ecological Potential (K) (person)	Beach Area (Lp) (m^2)	Unit Area (Lt) (m^2)	Available Time (Wt) (O'clock)	Visit Time (Wp) (hours/person)	Regional Carrying Capacity (DDK) (person) in a day	Regional Carrying Capacity (DDK) (people) in a month	Regional Carrying Capacity (DDK) (person) in a year
1	150,000	50	9	3	9000	270,000	3,285,000

The research results found that the Kade Tigo Beach tourist attraction area can accommodate 9000 tourists per day or 9000 people with an area utilization of 50 m^2/person for a visit time of 3 hours/person/day. From the daily data obtained, the carrying capacity of the Kade Tigo Beach area for a month is 270,000 people, and for a year, it is 3,285,000 people. From the results of interviews with the Head of Kedai Gedang Village, information was obtained that the number of visitors who come to Kade Tigo Beach is approximately 500 people per day on weekdays and approximately 1000 people on holidays. When compared with the ecological carrying capacity that Kade Tigo Beach can accommodate, the number of tourists or visitors is still relatively small and not over capacity (not exceeding the maximum capacity). Yulianda (2007) stated that environmental carrying capacity, besides being defined as the maximum intensity of use of natural resources, also limits physical development, which can disrupt the sustainability of tourism development without destroying nature. Determination of carrying capacity should also be linked to accommodation facilities and the construction of recreational facilities at each tourist spot.

4. CONCLUSIONS

From the study results, the Kade Tigo Beach area, in general, has almost the same characteristics. This can be seen from the results of the percentage of suitability at stations 1 to 3, which are similar. The tourism suitability index for Kade Tigo Beach is 88% and is in the Very Suitable category. The area's carrying capacity is as many as 9,000 people per day, as many as 270,000 people per month, and as many as 3,285,000 for a beach area of 150,000 m^2. The main attraction of Kade Tigo Beach is the beautiful view of the beach with clear coastal waters, stretches of white sand, and coconut trees. Apart from that, the area around Kade Tigo Beach is also suitable for tourists interested in a tourist destination's historical and cultural uniqueness.

Research carried out at Kade Tigo Beach still shows several things that need to be improved at Kade Tigo Beach. These things include transportation access to Kade Tigo Beach is still very limited, existing facilities and infrastructure are still poorly maintained, there is still a lack of information or promotion about Kade Tigo Beach on social media, and the need to develop elements of education and conservation for communities around the beach. Alternatively, tourists can create

sustainable marine ecotourism.

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