



## **Regional Carrying Capacity of Tourism Areas in Lake Toba (Case Study: Parbaba White Sand Beach Tourism Area, Samosir Regency)**

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### **ABSTRACT**

The development of the Lake Toba area and its surroundings into a coastal tourist destination will be greatly influenced by the quality of Lake water. Sustainable tourism development by taking into account environmental aspects has not been a top priority, so that problems in the development and development of the tourism industry on Lake Toba. Aspects of the carrying capacity of tourist areas need to be analyzed, as a basis for the development of tourist areas. It is necessary to analyze the carrying capacity of tourist areas, which exist on Lake Toba, especially at the Parbaba White Sand Beach tourist area. The purpose of this research is to determine the carrying capacity of the area as the basis for tourism development on Lake Toba, especially in the area of Pasir Putih Parbaba Beach, Samosir Regency. The total regional carrying capacity is 1,742 people / day, then the potential carrying capacity is 10% of 1,742 which is 174 people / day.

Based on the results of the analysis of the carrying capacity of the area for beach recreation with an area of 1,400 m2 can accommodate 448 visitors per day with a time of 3 hours per visit. the potential for tourism development on Lake Toba, especially in the Parbaba White Sand Beach tourist area, Samosir Regency, can still be done while still considering the area and the impact of the aquatic environment.

Keywords: Carrying capacity, Lake Toba, Tourism

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### **1. Introduction**

Samosir Regency has tourism potential based on natural scenery, spiritual tourism, cultural tourism and the waters of Lake Toba. The beach in Samosir Regency is one of the natural areas that utilize Lake Toba. The strategic location of Samosir Regency, in the middle of Lake Toba, and the many natural and cultural areas contained therein, are a special area for tourists (Pardede and Suryawan, 2016). The development of the Lake Toba area and its surroundings into a beach tourism destination will be greatly influenced by the water quality of Lake Toba, both as a whole and per autonomous region. Tourism development is needed because tourism can create jobs and can improve the economy and income of local communities.

Tourism development that has not considered the regional carrying capacity, will result in disturbances to tourist sites in the future. Sustainable tourism development by taking into account environmental aspects has not been a top priority, so that problems in the development and development of the tourism industry on Lake Toba. Aspects of the carrying capacity of tourist areas need to be known and analyzed, as a basis for the development of tourist areas.

Carrying capacity is the maximum number of people who can visit a tourist spot at the same time without causing damage to the physical environment, economy, socio-culture and decreased tourist satisfaction. The development of a tourist area has good planning if the number of visitors does not exceed its carrying capacity (Sari et al, 2015). The carrying capacity of a tourist area is not only determined by the purpose of tourists but also influenced by the components of the biophysical environment of the tourist area. On the other hand, the socio-cultural environmental component also plays a role in the preservation of carrying capacity. On their visit to a tourist area, tourists aim to do various kinds of tourism activities (Prakoso et al, 2023).

Therefore, it is necessary to analyze the regional carrying capacity, which is on Lake Toba, especially at the Parbaba White Sand Beach tourist area. This is done as an effort to develop sustainable tourism. The purpose of this study was to determine the regional carrying capacity as the basis for tourism development on Lake Toba, especially in the area of Pasir Putih Parbaba Beach, Samosir Regency.

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### **2. Research Method**

This research was conducted in April 2023 at the Parbaba White Sand Beach Tourism Object in Samosir Regency. This location was chosen because it is one of the most visited tourist attractions in the Lake Toba region.

The carrying capacity analysis is shown for tourism development by utilizing the potential of natural resources in a sustainable and sustainable manner. The carrying capacity of the area is the maximum number of visitors that can be physically accommodated in the area provided at a certain time without causing disturbances to nature and humans (Bibin and Mecca., 2020). According to Domo et al. (2017), the regional carrying capacity is calculated so that the maximum number of visitors that can be physically accommodated in the available area at any given time without causing disturbances to nature and humans is known. The formula used in this analysis also refers to Yulianda (2019):

$$RCC = K \times Lp/Lt \times Wt/Wp \quad (1)$$

Description:

RCC = Regional Carrying Capacity

K = visitor ecological potential per unit area

Lp = total area or visitor area that can be utilized

Lt = Unit area that can be used for certain activities

Wt = Time provided by the area for tourism activities in 1 day

Wp = Time spent by visitors for each specific activity

After calculating using equation 1, the results obtained are compared with the ecological and visitor values in the tourist location area, which can be seen in table 1.

Table 1. Ecological Potential of Visitors (K) and Activity Area (Lt)

Type of activity	K ( $\Sigma$ Visitors)	Area Units (Lt)	Information
Beach Recreation	1	25 m	1 person every 10 $\times$ 5 m long beach
Sitting Relax	1	10 m	1 person needs 25 m of space
Sport recreation	1	25 m	1 person every 10 $\times$ 5 m long beach

### 3. Discussion of result

Parbaba White Sand Beach is located on Jalan Raya Simanindo, Parbaba Dolok Village, Pangururan District, Samosir Regency, North Sumatra. The beach area is about 7 hectares. This beach was opened in 2010, managed by the Samosir Regency Tourism Office assisted by the community. This tourist area was originally a field that was converted into a tourist spot, using land that was community land (Sialoho inheritance land) which was managed to become a beach tourist attraction. The community acts as the landlord of the beach area who participates in the management of the beach.

Pasir Putih Parbaba Beach has 3 (three) entrances that can be accessed, each entrance already has a ticket counter for tourists. the location of the beach is close to other tourist areas, such as Situngkir Indah Beach which has a distance of 750 m from Pasir Putih Parbaba Beach and a travel time of 2 minutes. The beach slopes 90m forward from the shoreline so that tourists are safe in doing swimming activities. The white sand is wide, at the end of the beach there is an empty area to enjoy the white sand or do beach volleyball. The area around the beach has many trees as well as rice fields and fields next to the tourist area.

The results of the Regional Carrying capacity at Pasir Putih Beach Parbaba can be seen in table 2.

Table 2: Supportability of Parbaba White Sand Beach Tourism Area April 2023

Type of activity	K ( $\Sigma$ Visitors)	Area Units (Lt)	Information	Time required (Wp-hour)	Total Time 1 day (Wt-hour)
Beach Recreation	20	1400 m <sup>2</sup>	1 person every 10 $\times$ 5 m long beach	3	24
Sitting Relax	10	1914 m <sup>2</sup>	1 person needs 25 m of space	3	9
Sport recreation	18	4002 m <sup>2</sup>	1 person every 10 $\times$ 5 m long beach	2	9

The calculation of the regional carrying capacity is carried out based on the length and area of the beach in accordance with the beach conditions and in accordance with the assumptions of tourists. The area is obtained from field conditions and the unit area is obtained from applicable regulations.

Total regional carrying capacity is 1,742 people/day, then the Potential carrying capacity is 10% of 1,742 which is 174 people/day.

Based on the results of the analysis of the regional carrying capacity for beach recreation with an area of 1,400 m<sup>2</sup> can accommodate 448 visitors per day with a time of 3 hours per visit. The tourist environment will remain sustainable if the number of visits does not exceed it. However, during big days or holidays the surge of visitors cannot be overcome. From observations at the tourist site, many tents are set up tightly to one another. Many visitors feel uncomfortable, because of the density of each tent and mat between one another. There are also people who add (rent) casual tents when tourists are crowded even though the tents provided are actually quite a lot. Nevertheless, the beach manager still monitors the number of visits based on the number of entrance tickets sold to maintain environmental sustainability so that tourism remains sustainable and sustainable. The time of visit that many visitors are interested in is late afternoon (enjoying the sunset).

Visitors also enjoy visits by sitting back and relaxing while spending time looking at the scenery. Observations of the results of the analysis of the carrying capacity of the area for leisure sitting activities obtained an area of 1,914 m<sup>2</sup> the results of observations of 10 people and in the unit area of 100 m activities with a visit time of 3 hours and tourist attractions provide time for 9 hours in one day. Based on the results of the analysis, with an area of 1,914 m<sup>2</sup>, the number of tourists that can be accommodated is 448 people per visit. Other activities that can be enjoyed by visitors are sports tours on the beach. Observation of the results of the analysis of the carrying capacity of the area for sports tourism obtained an area of 4,002 m<sup>2</sup>. This activity can be carried out by 8 people with 2 hours to do the activity, with the time provided 9 hours. The results of the calculation of the carrying capacity of sports tourism at Pasir Putih Beach Parbaba can accommodate 720 people. Carrying capacity is a concept developed for sustainable management of a natural resource and environment, through a measure of its ability (Nugraha et al, 2013).

Based on the results of the analysis obtained, the total regional carrying capacity (RCC) at Pasir Putih Beach Parbaba is 1,742 people/day. The potential carrying capacity (PCC) value obtained from 10% RCC is 174.2 which is rounded up to 174 people / day. According to Sasmita et al. (2014), tourism carrying capacity is the maximum number of people who can visit a tourist spot at the same time without damaging the physical environment. In this case, the emphasis is on controlling the number of tourist visits in a tourist area so that the tourist area is not damaged, both in terms of the environment and facilities.

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#### 4. Conclusions

The regional Support Capacity in beach recreation activities at Pasir Putih Parbaba Beach is 1,742 people / day with a Potential Carrying Capacity of 174 people / day. Based on the carrying capacity value obtained, the potential for tourism development on Lake Toba, especially in the Parbaba White Sand Beach tourist area of Samosir Regency, can still be carried out while still considering the area and the impact of the aquatic environment.

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