

Research Article

Analysis of the Carrying Capacity of Tourism Attraction in Realizing Sustainable Banyuwangi Tourism

Auda Nuril Zazilah*, I Putu Sudhyana Mecha, and Putu Ngurah Rusmawan

Manajemen Bisnis Pariwisata, Politeknik Negeri Banyuwangi, Banyuwangi, Indonesia

Abstract.

Mass tourism is profitable for businesses and managers of tourist attractions. However, there are negative impacts, including environmental damage and the emergence of visitor dissatisfaction. As a destination, Banyuwangi has a fairly high level of tourist visits. Cacalan Beach is one of the tourist attractions in Banyuwangi which has a high number of visits. Cacalan Beach has various activities. Based on these problems, it is necessary to analyze the carrying capacity of the Cacalan Beach environment. This study uses the environmental carrying capacity method in the form of physical, real, managerial, and effective carrying capacity to produce the maximum value of the capacity or carrying capacity of Cacalan Beach. The results showed that the physical carrying capacity of recreational activities was 1.731 people, 220 people for canoe, and 80 people for camping. Considering environmental factors, a real carrying capacity of 213 people was obtained for recreational activities. Moreover, by looking at the number of existing managers, a managerial carrying capacity value of 85% was obtained which resulted in an effective carrying capacity of 181 people. This value is smaller than the average number of visitors to Cacalan Beach.

Keywords: effective carrying capacity, physical carrying capacity, Cacalan Beach

Corresponding Author: Auda Nuril Zazilah; email: audanuril@poliwangi.ac.id

Published: 29 August 2024

Publishing services provided by Knowledge E

© Auda Nuril Zazilah et al. This article is distributed under the terms of the [Creative Commons Attribution License](#), which permits unrestricted use and redistribution provided that the original author and source are credited.

Selection and Peer-review under the responsibility of the ASABEC 2023 Conference Committee.

1. Introduction

Post-pandemic recovery is a great opportunity for the tourism sector to increase people's enthusiasm for traveling to a tourist attraction. The pandemic recovery period is being used by tourist attraction managers to compete to attract the attention of visitors so that the number of tourist visits to a tourist attraction can increase rapidly. This situation is a positive thing that can increase economic activity in tourist attractions and provide motivation for managers to continue developing their tourist attractions. In the world of tourism, this condition is known as mass tourism.

Mass tourism is indeed a profitable thing for business actors and tourist attraction managers. However, when a mass tourism phenomenon occurs, the negative impact that can be caused is environmental damage and the emergence of visitor or tourist

 OPEN ACCESS

dissatisfaction. Apart from that, mass tourism can cause traffic jams, accumulation of rubbish, destruction of facilities and tourist attractions as a result of the actions of tourists who cannot be controlled. The phenomenon of mass tourism is in contrast to the concept of sustainable tourism which is the goal for every tourist attraction management.

As a tourist destination, Banyuwangi has a fairly high level of tourist visits. Banyuwangi has various tourist attractions in the form of beaches, waterfalls, mountains, national parks and so on. Cacalan Beach is one of the tourist attractions in Banyuwangi which has quite a high number of visits. Cacalan Beach is located in Klatak Village, Kalipuro District, Banyuwangi Regency. Cacalan Beach is located in the city center, has safe waves and has various rides such as canoeing, horse riding, karaoke, photo spots, sunset spots and is equipped with an open meeting hall and a choice of food stalls [1]. The Cacalan Beach manager said that the number of visitors to Cacalan Beach was around 150 to 250 people on Monday to Friday and around 1000 people on Saturday and Sunday.

This beneficial phenomenon must be anticipated for its negative impacts. In order to realize sustainable tourism, not only from an economic perspective, the management of Cacalan Beach and the Banyuwangi Regency Government must have guidelines regarding the carrying capacity of Cacalan Beach so that it continues to provide satisfaction to tourists while also paying attention to the environmental aspects of Cacalan Beach. Biophysical aspects of the environment in tourist areas or environmental carrying capacity are still often neglected [2].

Environmental carrying capacity is divided into four aspects, namely physical carrying capacity, real carrying capacity, management carrying capacity and effective carrying capacity [3]. Therefore, a study was made regarding the carrying capacity of Cacalan Beach. In this way, a value is obtained which states the maximum number of tourists or visitors who can visit Cacalan Beach while still getting satisfaction and paying attention to environmental factors.

Research related to carrying capacity has been carried out by several researchers, such as research conducted by Herlambang et al. [3] entitled the carrying capacity of the Tirta Nirwana Songgoriti tourism environment. Apart from that, research related to carrying capacity has also been carried out by Akliyah and Umar [4] with the title analysis of the carrying capacity of coastal tourist areas throughout Alor Regency in supporting sustainable tourism as well as research conducted by Ihwanuddin [5] entitled Analysis of the Carrying Capacity of the Dalegan Beach Tourism Area, Panceng

District, Gresik Regency. International research related to the carrying capacity of tourist attractions has also been carried out by Sharma [6]. The similarity with this research is regarding the carrying capacity of tourist attractions. The difference between this research and the three studies is that there are activities added to the physical carrying capacity analysis. In the Cifuentes method, the analysis of physical carrying capacity is limited to recreational activities. Meanwhile, in this research, the analysis of physical carrying capacity is not only for recreational activities but also for canoeing and camping activities.

2. Research Methods

The analytical method used in this research uses the environmental carrying capacity method which is divided into four analyses, namely physical carrying capacity analysis, real carrying capacity analysis, management carrying capacity analysis and effective carrying capacity analysis.

Calculation of the physical carrying capacity of tourism using a formula

$$PCC = A \times \frac{1}{B} \times R \quad (1)$$

where

A = area of tourist attraction

B = The area needed by tourists to travel while remaining satisfied

Rf = Rotation factor, namely the comparison of the opening hours of a tourist attraction with the average length of tourist visit

The PCC value indicates the maximum number of visitors who can physically visit a tourist attraction and still feel satisfied [7]. Calculation of real carrying capacity using the formula

$$RCC = PCC \times Cf_1 \times Cf_2 \times \dots \times Cf_n \quad (2)$$

The RCC value shows the capacity of tourists by considering the physical and biophysical factors of the environment at the tourist attraction [8]. Calculation of management carrying capacity using a formula

$$MC = \frac{Rn}{Rt} \times 100\% \quad (3)$$

Rn is the number of active management who works every day

Rt is the number of management officers available.

The MC value shows the management capacity involved in managing tourist attractions [9]. Calculation of effective bearing capacity using the formula

$$ECC = RCC \times MC \quad (4)$$

Where

ECC = effective carrying capacity

RCC = real carrying capacity

MC = management carrying capacity.

The ECC value shows the maximum number of tourists so that the tourist area can accommodate tourists while still paying attention to tourist satisfaction and environmental factors of tourist attractions [9].

3. Result and Discussion

There are four carrying capacities analyzed, namely physical, real, management and effective carrying capacity.

3.1. Physical Carrying Capacity (PCC)

Cacalan Beach is located in the Sukowidi neighborhood, Klatak sub-district, Kalipuro sub-district, Banyuwangi regency with a beach area of around 15,000 m^2 . Cacalan Beach opens from 06.00 WIB to 21.00 WIB every day. Based on the manager's information, it was found that on average each tourist or visitor takes around 2 hours to visit Cacalan Beach. Based on Cifuentes Theory [8] states that the area needed for tourists or visitors to travel is around 65 m^2 . Hence it is obtained

$$PCC = 15000 \times \frac{1}{65} \times 15 : 2 = 1.730,77 \approx 1.731$$

So we get a physical carrying capacity of 1,731 which states the maximum number of visitors or tourists who can visit Cacalan Beach every day and still get satisfaction.

Cacalan Beach has some distinctive and famous attraction, namely canoe and a camping area. To be more specific in determining the maximum number of visitors at each attraction, we apply the physical carrying capacity formula to each attraction. For canoe,

$$PCC = 3000 \times \frac{1}{500} \times 11 : 0.3 = 220$$

So the maximum number of visitors who can play canoe and still get satisfaction is 220 people. For camping,

$$PCC = 2000 \times \frac{1}{25} \times 24 : 24 = 80$$

So the maximum number of visitors who can camp and still get satisfaction is 80 people. For the next calculation of carrying capacity, the physical carrying capacity calculated is for recreational activities.

3.2. Real Carrying Capacity (RCC)

In real carrying capacity, the factors that are taken into account are not only the area of the tourist attraction and the operating hours of the tourist attraction, but also taking into account environmental biophysical factors. There are four factors that constitute environmental biophysical factors, namely flora diversity, fauna diversity, slope, sensitivity to soil erosion and rainfall. The following are the types and amounts of flora at Cacalan Beach.

The following are the types and numbers of fauna at Cacalan Beach

Based on the results of the Simpson diversity index calculation, it was found that the correction factor value for flora was 0.22201541. As for the results of calculating the fauna diversity index, it was found that the correction factor value for fauna was 0.762187872. Apart from the correction factor value for flora and fauna diversity, other factors that are considered in real carrying capacity are slope, sensitivity to soil erosion and rainfall.

For the slope factor, Parwati et al. [10] stated that the Cacalan Beach area has a slope of 0-3%. This results in a Mn value of 20 in accordance with the Decree of the Minister

TABLE 1: Calculation of flora diversity.

No.	Flora	Number(n_i)	n_i/N	$(n_i/N)^2$
1	Trembesi	8	0.03125	0.000976563
2	Cemara	95	0.37109375	0.137710571
3	Waru	47	0.18359375	0.033706665
4	Bakau	25	0.09765625	0.009536743
5	Damar	44	0.171875	0.029541016
6	Ketapang	4	0.015625	0.000244141
7	Bringin	1	0.00390625	0.000015288
8	Pole	7	0.02734375	0.000747681
9	Kelapa	25	0.09765625	0.009536743
	N	256	1	0.22201541

TABLE 2: Calculation of fauna diversity.

No.	Fauna	Number(n_i)	n_i/N	$(n_i/N)^2$
1	Merpati	25	0.86206896	0.743162901
2	Kucing	4	0.13793103	0.01902497
	N	29	1	0.762187872

of Agriculture Number 837 of 1980 concerning criteria and procedures for determining protected forests. Thus it is obtained that the Mt value is 100 which results in the correction factor value for slope being $1-0.2=0.8$.

Based on Decree of the Minister of Agriculture Number 837 of 1980 concerning criteria and procedures for determining protected forests, Beach sand soil is a type of regosol soil that has a score of 75 or the highest and is a very sensitive soil type classification. Thus, the correction factor value for soil sensitivity is obtained, namely 1 [11].

Based on data from the Central Statistics Agency, it was found that during 2011 to 2018 there were 41 dry months and 63 wet months, resulting in a rainfall index value of 0.651. Herlambang et al. [3] stated that 0.651 was determined as the Mn of the rainfall correction factor. For the Mt value, the rainfall factor is 7, which is the highest value in the Schmidt-Ferguson classification [3]. Based on the correction factor formula, the value of the rainfall correction factor is $1-0,092971=0,907029$. Thus, the real carrying capacity value is

$$RCC = 1731 \times 0.22201541 \times 0.762187872 \times 0.8 \times 1 \times 0.907 = 212,53 \approx 213$$

So we get a real carrying capacity of 213 which states the maximum number of visitors or tourists who can visit Cacalan Beach every day while still getting satisfaction and paying attention to environmental factors.

3.3. Management Carrying Capacity (MCC)

At Cacalan Beach, there are 35 management people involved in managing the tourist attraction. Every day, an average of 30 people are actively working. Therefore, it is obtained

$$MC = \frac{30}{35} \times 100\% = 85\%$$

It shows that the management carrying capacity at Cacalan Beach is 85%. The greater the value of management's carrying capacity, the greater the expectations of services provided to tourists or visitors. In managing tourist attractions, the management part is very important in developing a tourist attraction. Management will determine marketing strategies, arrange financing, supervise tourists or visitors. Increasing management capacity is really needed by management for better management of tourist attractions.

3.4. Effective Carrying Capacity (ECC)

Effective carrying capacity is a combination of real carrying capacity and management carrying capacity, so that it is the maximum number of tourists or visitors so that the tourist attraction area can accommodate tourists [3].

$$ECC = RCC \times MC = 213 \times 85\% = 181,05 \approx 181$$

So an effective carrying capacity of 181 is obtained, which states the maximum number of visitors or tourists who can visit Cacalan Beach every day while still getting satisfaction, paying attention to environmental factors and paying attention to the number of managers.

Looking at data on the number of visitors to Cacalan Beach, it is found that in 2022 the number of visitors to Cacalan Beach will be 151,622 people, which means the average number of visitors per day will be 415 people. In the period January 2023 to May 2023, the average number of visitors to Cacalan Beach each month was 12,182 people, which means the average number of visitors per day was 406 people.

In the range of 400, this value is far below the physical carrying capacity value obtained, namely 1,731 people. By paying attention to the large area of Cacalan Beach provided for attractions or attraction for visitors and the length of time visitors can relax, the 400 visitors who visit Cacalan Beach every day can still be considered satisfied or satisfied. However, when looking at the environmental factors of Cacalan Beach and the management's ability to handle Cacalan Beach, the 400 visitors who visit every day are considered to exceed the maximum capacity which is the effective carrying capacity value of 181 people.

This is a reminder for managers to be able to formulate policies so that Cacalan Beach meets environmental carrying capacity aspects to support sustainable Banyuwangi tourism. Policies that managers can take include increasing the size of the visitor area, increasing the number of similar flora or fauna which is still small compared to other types and limiting the number of visitors.

4. Conclusion

Based on the results explained above, it can be concluded that the physical carrying capacity at Cacalan Beach Banyuwangi is 1,731 which states the maximum number of visitors or tourists who can visit Cacalan Beach every day and still get satisfaction. The real carrying capacity at Cacalan Beach Banyuwangi is 213 which states the maximum number of visitors or tourists who can visit Cacalan Beach every day while still getting satisfaction and paying attention to environmental factors. The management carrying capacity at Cacalan Beach Banyuwangi is 85%, so that the effective supporting capacity at Cacalan Beach Banyuwangi is 181 is obtained, which states the maximum number of visitors or tourists who can visit Cacalan Beach every day while still getting satisfaction, paying attention to environmental factors and paying attention to the number of managers.

References

- [1] Dinas Kebudayaan dan Pariwisata Kabupaten Banyuwangi. Pantai Cacalan [Internet]. 2023 [cited 2023 Apr 26]. Available from: banyuwangitourism.com/destination/pantai-cacalan
- [2] Lucyanti S, Hendrarto B, Izzati M. Strategi Pengembangan Obyek Wisata Bumi Perkemahan Palutungan Berdasarkan Analisis Daya Dukung Lingkungan Wisata

- di Taman Nasional Gunung Ciremai Kabupaten Kuningan Propinsi Jawa Barat. *Ekosains*. 2014;6(1).
- [3] Herlambang MF, Wicaksono AD, Hidayat ARRT. Kemampuan Daya Dukung Lingkungan Wisata Tirta Nirwana Songgoriti. *Jurnal Tata Kota dan Daerah*. 2016;8(2):57–62.
- [4] Akliyah L, Umar MZ. Analisis daya dukung kawasan Wisata Pantai Sebanjar Kabupaten Alor dalam mendukung pariwisata yang berkelanjutan. *Jurnal Perencanaan Wilayah dan Kota*. 2013;13(2).
- [5] Ihwanuddin Y, Murtini S. Analisis Daya Dukung Kawasan Pariwisata (Carrying Capacity) Pantai Dalegan Kecamatan Panceng Kabupaten Gresik. *Sumber*. 2013;64:310488.
- [6] Sharma R. Evaluating total carrying capacity of tourism using impact indicators. *Global Journal of Environmental Science and Management*. 2016;2(2):187–96.
- [7] Fandeli C, Nurdin M. Prinsip-prinsip dasar mengkonservasi lanskap. Yogyakarta: Gadjah Mada University Press; 2009.
- [8] Cifuentes M. Determinacion de Capacidad de Carga Truistica en Areas Protegidas. Publicacion Patrocinada Por el Fondo Mundial para la Naturaleza-WWF. Serie Tecnica Informe Tecnico No. 194. Centro Agronomico Tropical de Investigacion Y Ensenanza CATIE, Programa de Manejo Integrado de Recursos Naturales. Turrialba, Costa Rica. 1992;
- [9] Siswantoro H, Anggoro S, Sasongko DP. Strategi optimasi wisata massal di kawasan konservasi Taman Wisata Alam Grojogan Sewu. *Jurnal Ilmu Lingkungan*. 2012;10(2):100–10.
- [10] Parwati E, Carolita I, Effendy I. Aplikasi landsat dan sig untuk potensi lahan tambak di Kabupaten Banyuwangi. *Jurnal Penginderaan Jauh dan Pengolahan Data Citra Digital*. 2010;1(1).
- [11] Budiarta IG. Identifikasi potensi lahan dan fungsi kawasan untuk pengembangan kawasan budidaya pertanian lahan kering di Daerah Aliran Sungai Buleleng. *Jurnal ENMAP*. 2020;1(1):1–10.