Suitability and Carrying Capacity Analysis of Marine Ecotourism at Bahak Beach, Probolinggo Regency, East Java

Mimit Primyastanto[1], Mentari Puspa Wardani[2], Supriyadi Supriyadi[2*], Amalia Febryane Adhani Mazaya[2], Ema Dwi Nadila[2], Septiana Koni'Atun Nisa'[2], Farhan Ardi Susanto[2,] Bagas Muhtar Efendi[2]

[1]Fisheries Agrobusiness, Faculty of Fisheries and Marine Science, Brawijaya University, Malang 65145, Indonesia

[2]Fisheries Socioeconomics (Kediri City Campus), Faculty of Fisheries and Marine Science, Brawijaya University, Kediri 64111, Indonesia

*Corresponding Author: supriyadi67@ub.ac.id

Keywords:
Bahak Beach; carrying capacity; marine ecotourism; tourism suitability

ABSTRACT

Bahak Beach is one of the destinations that has been developed into a marine tourism area in Probolinggo Regency. Bahak Beach offers various tourist attractions, utilizing the presence of mangrove and beach ecosystems. The objective of this research is to analyze the suitability and carrying capacity of the marine ecotourism area at Bahak Beach, Probolinggo Regency. The research was conducted in October 2024. The data for this research were obtained through primary sources, using structured observations and interviews. This study employs a quantitative descriptive method, with data analysis focused on carrying capacity and the Tourism Suitability Index (IKW). The results of the carrying capacity analysis for the marine ecotourism area at Bahak Beach show a value of 74% (Moderately Suitable) and Carrying Capacity analysis yielded the equation PCC > RCC > ECC with values of 1934 > 1221 > 244. The analysis of the Tourism Suitability Index (IKW) for the tourist attractions at Bahak Beach reached 75% (Highly Suitable). It is recommended to further develop and sustain the marine ecotourism at Bahak Beach by adding attractions for children and enhancing the competencies of ecotourism managers through training.

INTRODUCTION

Marine tourism is all activities that make marine natural resources along with the diversity of content and potential of the region as a tourist attraction that can be enjoyed (Raymond et al., 2022). Activities commonly carried out in marine tourism include snorkeling, fishing, or simply enjoying the natural beauty that exists (Nazhima and Arida, 2019). Marine tourism is a tourism subsector that contributes to increasing regional income as well as strengthening the positioning of the destination image in an area (Nugraha, 2020).

Bahak Indah Beach (PBI) Tongas, is a Probolinggo beach tourist attraction located in Curahdringu Village, Tongas District. If you visit Bahak Indah Beach, a good atmosphere is to come in the afternoon to enjoy the Sunset and the beautiful sea panorama. If you come in the morning, you will find many fishermen returning from fishing and bringing fresh fish caught (Sholihah and Hanifah, 2023). The main activity of utilization around the mangrove ecosystem at Bahak Beach which has the potential to be developed is marine ecotourism (Maghfirah et al., 2023)

Sustainable tourism is an approach to tourism development that emphasizes the preservation of resources needed for future tourism development. The concept emphasizes the importance of considering economic, social, and environmental impacts in a balanced manner, as well as meeting the needs of visitors, industry, the environment, and local communities (Rahmat, 2021). The main objective of this concept is to create tourism that can survive in the long term, ensuring that tourism can continue to grow without damaging the environment and providing economic benefits to local communities (Putranto et al., 2024)

Based on the description above, researchers are interested in examining how the suitability and carrying capacity of tourism in the Bahak Beach area so that the tourist attraction is well managed and is expected to be a solution in overcoming the problems that occur.

LITERATURE REVIEW

This research was conducted at Bahak Beach, Curah Dringu Village, Tongas District, Probolinggo Regency in October-November 2024. The research method used was quantitative descriptive analysis. Primary data were obtained through interviews and direct observation in the field. Secondary data includes report data and other related reference materials.

Measurement of Tourism Suitability Index (IKW) refers to (Yulianda, 2007) which has been modified. The observation parameters of tourism suitability for beach tourism, mangrove tourism, camping, boating, and fishing are described in Table 1, Table 2, and Table 3 as follows.

Table1. Matrix of Suitability Area for Beach Tourism Recreation Category

No.	P	W	S1 Category	S	S2 Category	S	S3 Category	S	N Category	S
1.	Water depth (m)	5	0-3	3	> 3-6	2	>6 - 10	1	> 10	0
2.	Beach type	5	White sand	3	White sand, little coral	2	Black sand coral, slightly steep	1	Mud, rocky, steep	0
3.	Beach width (m)	5	>15	3	10-15	2	3-<10	1	<3	0
4.	Water Bottom Material	3	Sand	3	Sandy coral	2	Muddy sand	1	Mud	0
5.	Current	3	0-0,17	3	0,17-0,34	2	0,34-0,51	1	>0,51	0

No.	P	W	S1 Category	S	S2 Category	S	S3 Category	S	N Category	S
	speed (m/s)									
6.	Coastal Slope (º)	3	<10	3	10-25	2	>25-45	1	>45	0
7.	Water clarity (m)	1	>10	3	>5-10	2	3-5	1	<2	0
8.	Coastal Land cover	1	Coconut, open land	3	Shrubs, scrub low, savana	2	High scrub	1	Mangrove forest, settlement, harbor	0
9.	Dangerous Biota	1	None	3	Sea urchin	2	Sea urchin, stingray	1	Sea urchin, stingray, lepu, shark	0
10.	Freshwater availability (distance/km)	1	<0,5	3	>0,5-1	2	>1-2	1	>2	0

Note: P (Parameter); W (Weight); S (Score)

Table 2. Matrix of Suitability Area for Mangrove Tourism Category

No	Parameter	W	S1 Category	S	S2 Category	S	S3 Category	S	N Category	S
1.	Mangrove thickness (m)	5	> 500	3	> 200 -500	2	50 - 200	1	< 50	0
2.	Mangrove density (100 m^2)	3	> 15 -20	3	> 10- 15 >20	2	5-10	1	< 5	0
3.	Mangrove type	3	> 5	3	3 - 5	2	1 - 2	1	0	0
4.	Tides (m)	1	0-1	3	> 1 - 2	2	> 2 - 5	1	> 5	0
5.	Object biota	1	Fish, shrimp, crabs, mollusks, reptiles, birds	3	Fish, shrimp, crabs, mollusks	2	Fish, mollusks	1	One of the aquatic biotas	0

Note: P (Parameter); W (Weight); S (Score)

Table 3. Matrix of Suitability Area for Camping, Boat and Fishing Tourism Category

No	Parameter	Weight	Category	Score Camping
	Camping			
1	Beach width (m)	5	x> 10	3
			7 < x ≤ 10	2
			5< x ≤ 7	1
			≤ 5	0
2	Plain overlay	5	Grass/sand	3
			Clay soil	2
			Mud/flat rock	1
			Rock/unstable soil	0
3	Lakeside vegetation	3	Coconut, cypress, acasia	3
			Tree system and some scrub	2
			High scrub	1
			High scrub and swamp	0
4	Coastal slope (^{0})	3	x< 5	3
			5< x ≤15	2
			15< x ≤ 30	1

No	Parameter	Weight	Category	Score Camping
			> 30	0
5	*Object view*	1	Sea, forest, mountains, river	3
			Sea and 2 out of 3 scenes	2
			1 out of 4 scenery	1
			No scenic objects	0
	Boats			
1	Water Depth (m)	5	$2 \leq x < 3$	3
			$3 < x \leq 5$	2
			$1 < x \leq 3$	1
			$x \leq 1$	0
2	Current speed (cm/sec)	5	$0 < x \leq 10$	3
			$10 < x \leq 25$	2
			$25 < x \leq 50$	1
			>50	0
3	Smell	3	No odor	3
			Slight odor	2
			smells	1
4	Vegetation living by the lake	3	Coconut, cypress, acacia	3
			Tree system and some scrub	2
			High scrub	1
			High scrub and swamp	0
5	Watercolor	1	Clear green	3
			Brownish green	2
			Blackish brown	1
6	Harmful Biota	5	None	3
			Available	0
	Fishing			
1	Fish abundance	5	Very abundant	3
			a lot	2
			a little	1
2	Type of fish	3	more than 4	3
			2 - 4	2
			<2	1
3	Water depth	1	$1 \leq x < 3$	3
			$3 < x \leq 5$	2
			x<1; x>5	1

Source: Yulianda (2007)

Description:

Maximum score tourism beach recreation = 84

Maximum score for mangrove tracking = 57

Maximum score for camping = 51

Maximum score for boat = 66

Maximum score for fishing = 27

S1   = Very suitable, with a value of 75 - 100%

S2   = Moderately suitable, with a score of 50 - < 75 %

S3   = Conditionally suitable, with a value of 25 - < 50%

N   = Not suitable, with a score of < 25 %

METHOD

The research was conducted at Bahak Beach, Bahak Hamlet, Curahdingu Village, Tongas District, Probolinggo Regency, East Java Province at coordinates -7.7259° S and 113.1191° E in November-December 2025 (Figure 1). The tools and materials used included a camera, smartphone, questionnaire, stationery and gauge. The research method used was quantitative analysis and documentation base on Yulianda (2007). The data collected relates to the tourism potential at Bahak Beach, the physical and biological parameters of marine tourism (recreation, mangrove tracking, fishing and camping) at Bahak Beach to then calculate its physical carrying capacity.
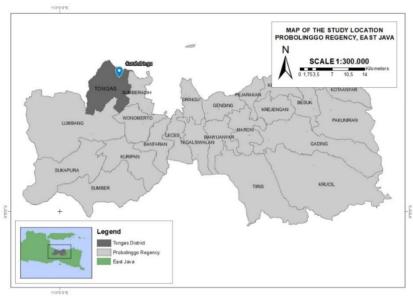

Figure 1. Research Location Maps

Data analysis was carried out using the Tourism Suitability Index (IKW), with a suitability matrix arranged based on the level of importance of each parameter to support activities in the area. The formula used for mangrove tourism suitability as follows according to (Yulianda, 2007).

$$IKW = \quad [Ni/Nmaks] \; x \; 100\% \qquad\qquad (1)$$

Description:
IKW   = Tourism Suitability Index
Ni   = Value of i-th parameter (Weight x Score)
N_{max} = Maximum value of a tourism category

Area Carrying Capacity (CC) is the maximum number of visitors that can be physically accommodated in the area provided at a certain time without causing disturbances to the natural and human environment (Yulianda, 2007). The concept of environmental carrying capacity is applied as a calculation method to determine

the number of living organisms that can be supported by an ecosystem in a sustainable manner, without destroying the balance in the ecosystem (Ruwayari *et al.*, 2020). According to Yulianda (2007) following is the CC formula:

$$CC = K \ x \ \frac{Lp}{Lt} x \frac{Wt}{Wp} \qquad (2)$$

Description:

CC	= Carrying capacity of the area
K	= Ecological potential of visitors per unit area.
Lp	= Area or length of area that can be utilized.
Lt	= Unit area for certain categories.
Wt	= Time provided by the area for tourist activities in one day.
Wp	= Time spent by visitors for each specific activity

The analysis of the carrying capacity of the area also uses the protected area carrying capacity model developed and modified by adjusting several factors developed by. The protected area carrying capacity formula consists of physical carrying capacity (PCC), real carrying capacity (RCC), and effective carrying capacity (ECC) with the following formula.

Physical Carrying Capacity (PCC)

Physical Carrying Capacity (PCC) is the maximum quantity of visitors that can be received by a certain area within a certain period (Lucyanti et al., 2019). According to the physical carrying capacity (PCC) formula is as follows:

$$PCC = \frac{A}{Au} Rf \qquad (3)$$

Description:

PCC	= Physical carrying capacity
A	= Tourism area (m^2)
Au	= Area required per tourist (m^2)
Rf	= Rotation factor (number of visits per day)

Real Carrying Capacity (RCC)

Real Carrying Capacity (RCC) is the maximum number of tourists allowed to visit a tourist attraction based on the correction factor (CF) taken from the characteristics of the object applied to the physical carrying capacity (PCC) (Lucyanti et al., 2019). According to the real carrying capacity (RCC) formula is as follows:

$$RCC = PCC \ x \ Cf_1 \ x \ Cf_2 \ x \ Cf_3 \ x \ldots \ldots Cf_n \qquad (4)$$

Description:

RCC	= Real carrying capacity
PCC	= Physical bearing capacity

Cf1....Cfn = Correction factor

Effective Carrying Capacity (ECC)

Effective Carrying Capacity (ECC) is the optimum number of tourists for the area to accommodate tourists (Lucyanti *et al.,* 2019). According to the effective carrying capacity (ECC) formula is as follows:

$$ECC = RCC \ x \ MC \tag{5}$$

Description:

ECC = Effective carrying capacity

RCC = Real carrying capacity

MC = Management carrying capacity

$$MC = \frac{Rn}{Rt} \ x \ 100\% \tag{6}$$

Description:

MC = Management carrying capacity

Rn = Number of management staff actively working/day

Rt = Number of management staff available

RESULT AND DISCUSSION

Tourism Suitability Index (IKW) of Bahak Beach Marine Ecotourism

Analysis of mangrove ecotourism suitability considers five parameters with four assessment classifications. The parameters of ecotourism suitability are mangrove thickness, mangrove density, mangrove type, and tides and biota objects (Nugraha et al., 2019; Yulianda, 2007).

The results of the analysis of the suitability of beach recreation tourism and mangrove tourism in the marine ecotourism area of Bahak Beach, Probolinggo Regency with consideration of tourist attraction parameters show the results of the value that most are above 70% except Boat Tour. So that it can be said that tourist attractions in marine ecotourism Bahak Beach are in the category of moderately suitable to very suitable category. Complete data can be seen in Table 4.

Table 4. Bahak Beach Recreation Tourism Suitability Index (IKW)

Tourism Activity	IKW (%)	Category
Beach Tourism	73,81	Moderately Suitable
Mangrove Tourism	64,10	Moderately Suitable
Camping	86,27	Very Suitable
Boat Tour	42,37	Conditionally Suitable
Fishing	100	Very suitable

Source: Proccessed Data (2024)

From the calculation results in Table 4 shows that the IKW value of tourist attractions on Bahak Beach is still in the category range from conditionally suitable to very suitable. The difference in value is based on the potential parameters of

tourism suitability for each attraction at Bahak Beach. Bahak Beach is not suitable for boat tourism activities as indicated by the IKW value of 42.37% with a conditionally suitable category because the location has dangerous biota, namely sharks and does not yet have a safe barrier between the boat tour location and the presence of sharks so that this location does not meet the IKW of boat tourism and shows the need for improvement in several aspects so that the area becomes an area that is very suitable for ecotourism. The presence of dangerous aquatic animals is important to consider in aquatic tourism because it is related to the safety and security of visitors. Risks that can occur when not paying attention to dangerous biota include injury or poisoning caused by direct encounters with predators or venomous species, and other infectious diseases that can be transmitted by species that have a life cycle associated with the aquatic environment (WHO, 2003).

The suitability of beach tourism attractions in the marine ecotourism area of Bahak Beach has a moderately suitable category because this location has black and craggy beach sand, shallow water depths of less than 3 m, gentle slope of the beach, moderate current speed and availability of fresh water which is sufficient to fulfill beach tourism activities, but there are dangerous biota, namely sharks. Waters with a slope of less than 10° are very suitable for beach tourism (Sucahyo et al., 2025) Mangrove tourism attractions at Bahak Beach are quite suitable because they have a high mangrove thickness, a fairly high mangrove density with Rhyzopora Sp and Avicenna s.p mangrove types and have many biotas such as fish, shrimp, crabs, and shellfish that live around the mangrove location. The suitability of the area used by visitors must pay attention to the ability of nature to tolerate visitor activities so that its authenticity is maintained. If natural conditions and resources are adequate, the level of suitability for tourism utilization will also be appropriate (Yanti et al., 2021).

The location of Bahak Beach is a location that is very suitable for camping and fishing activities because the condition of the beach resources that meet the criteria for camping and fishing tourism. In addition, the availability of safe and comfortable camping area facilities, camping activities can be done in suitable locations. And also, Bahak Beach has a mangrove ecosystem that can be a mangrove tourism attraction for camping tourists. Bahak Beach has abundant fishery resources with various types of fish such as sumbilang fish, mullet, dorang fish so that it becomes a potential location for fishing attractions. Locations with abundance and abundant fish species will attract anglers to dip their hooks (Prusty and Nama, 2021).

Carrying Capacity Area (CC) of Bahak Beach Marine Ecotourism

According to (Pratiwi et al., 2022) carrying capacity area (CC) is the maximum number of visitors who are physically able to be accommodated in the area provided at a certain time without causing disturbances to nature or humans. The calculation of the carrying capacity of the area is intended to prevent excessive utilization. This is an effort to prevent early ecosystem destruction (Nugraha et al., 2019).

The carrying capacity of the marine ecotourism area of Bahak Beach is calculated based on the area of mangrove and beach resources that can be utilized for tourist attractions. In addition, it is also strongly influenced by the time of tourist activities carried out so that tourist activities do not overlap and visitors are not crowded at the same time. Analysis of the carrying capacity of the area based on the calculation of the CC formula. The carrying capacity of the area in this study is calculated on 6 tourist attractions in the Bahak Beach area which can be seen in Table 5.

Table 5. Marine Tourism Carrying Capacity at Bahak Beach

No.	Tourism Activities	K	Lp (m²)	Lp (m²)	Wp (hour)	Wp (hour)	CC	CF1	RCC	MC	PCC
1	Recreation Beach Tourism	1	5937	50	3	11	435	0,604	263	0,2	53
2	Mangrove Tracking	2	285	50	1	11	63	0,997	63	0,2	13
3	Campng	1	500	60	24	24	33	0,916	31	0,2	6
4	Boat Tour	1	3500	500	1	11	77	0,767	59	0,2	12
5	Fishing	1	4700	300	5	11	34	0,687	24	0,2	5
	Total						1949		1228		246

Source: Proccessed Data (2024)

The carrying capacity of the area for beach tourism activities is 435 people/day, mangrove tourism/mangrove tracking of 63 people/day, taking selfies of 1306/day, camping of 33 people/day, boat tours of 77 people/day, and fishing of 34 people/day. The carrying capacity analysis is carried out by comparing the results that have been analyzed, namely (PCC, RCC, and ECC) with the provisions if PCC> RCC> ECC then the carrying capacity of the area is in a good category, meaning that managers can use efforts to increase the number of visitors to the limit of the calculation value of the equation. However, if ECC> RCC and RCC> PCC then the area exceeds the maximum limit of the carrying capacity of the area *(Sasmita et al.*, 2014).

The results of the analysis of the physical carrying capacity (PCC), real carrying capacity (RCC), and effective carrying capacity (ECC) of Bahak Beach obtained the equation PCC> RCC> ECC with a value of 1949>1228>246 so it can be concluded that the marine ecotourism area of Bahak Beach can still accommodate visitors with existing attractions well.

This calculation of carrying capacity considers several pressure or correction factors that affect the ability of the area to support ecotourism activities (Salusu *et al.*, 2023). In mangrove and beach tourism activities, this correction factor can be in the form of marine oceanographic factors, weather, manager readiness conditions and others beyond those previously calculated.

CONCLUSION

Bahak Beach ecotourism area in Probolinggo Regency has a level of tourism suitability that ranges from moderately suitable to very suitable, with the highest tourism suitability index (IKW) in fishing (100%) and camping (86.27%) activities.

The area carrying capacity analysis shows that Bahak Beach is still able to accommodate the number of visitors according to the calculated capacity, with a physical carrying capacity (PCC) value of 1,949, a real carrying capacity (RCC) of 1,228, and an effective carrying capacity (ECC) of 246. Some tourist attractions, such as boat tours, still require improvement in safety aspects given the presence of dangerous biota such as sharks. Ecotourism management of Bahak Beach needs to be directed at developing safer and more sustainable tourist facilities, increasing the competence of managers, and preserving mangrove ecosystems to support ecological balance and the local economy.

According to the results of a line transect study conducted in the waters of Mibi village, seven species of seagrass were identified: *Enhalus acoroides* (Ea), *Thalassodedron ciliatum* (Tc), *Cymodocea rotundata* (Cr), *Syringodium isoetifilium* (Si), *Halodule pinifolia* (Hp), *Halodule uninervis* (Hu), and *Halophila ovalis* (Ho). The density of seagrass species found at each station is in the very dense category, except for the Enhalus acoroides type. The cover of seagrass species at the research location that has a very dense category is at station I, namely Haludule uninervis, with a cover value of 81.25%.

ACKNOWLEDGEMENT

REFERENCES

Bera, S., Majumdar, D. Das, & Paul, A. K. 2015. Estimation of Tourism Carrying Capacity for Neil Island, South.

Fandeli, C., 2000. Understanding and Basic Concepts of Ecotourism in Ecotourism Business, Fandel, C. and Mukhlison (editors). Student Library, UGM, KSDA Unit, Yogyakarta.

Hens, L. 1998. Tourism and Environment, Free University of Brussels, Belgium.

Lindberg, K. and Hawkins DE, 1993. Ecotourism: A Guide for Planners and Managers. The Ecotourism Society. North Bennington, Vermont

Lucyanti, S., Hendrarto, B., & Izzati, M. (2019). Analysis of Physical, Real and Effective Supportability of Ecotourism on the Island. *Journal of Sylva Lestari*, 7(2), 225–234.

Maghfirah, L., Latuconsina, H., & Dwi Prasetyo, H. (2023). Inventory of Potential and Community Structure of Mudskipper at Coast of Bahak Indah, Probolinggo-East Java. *Journal of Tropical Fisheries Management*, 7 (1), 1-9. https://doi.org/10.29244/jppt.v7i1.43815

META, 2002. Planning for Marine Ecotourism in the UE Atlantic Area. Univ. Of the West England, Bristol.

Mutmainah, H., Kusumah, G., Altanto, T., & Ondara, K. (2016). Kajian Kesesuaian Lingkungan Untuk Pengembangan Wisata di Pantai Ganting, Pulau Simeulue, Provinsi Aceh. *DEPIK Jurnal Ilmu- Ilmu Perairan, Pesisir dan Perikanan*, 5(1), 19-23. https://doi.org/10.13170/depik.5.1.3844

Nazhima, A. A., & Arida, I. N. S. (2019). Tourism Product Development Through the Application of Marine Ecotourism Principles at Labuhan Amuk Beach, Antiga Village, Karangasem, Bali. *Journal of Tourism Destinations*, 6 (2), 252. https://doi.org/10.24843/jdepar.2018.v06.i02.p08

Nugraha, H. P., Indarjo, A., & Helmi, M. (2019). Study of Area Suitability and Supportability for Beach Recreation at Panjang Beach, Bengkulu City. *Diponegoro Journal of Marine Research*, 2(2), 130–139.

Nugraha, Y. E. (2020). Development of Maritime Tourism at Thousand Mouth Beach as a Sustainable Tourism Attraction in Rote Regency, East Nusa Tenggara. *Journey: Journal of Tourismpreneurship, Culinary, Hospitality, Convention and Event Management*, 2 (2), 25-46. https://doi.org/10.46837/journey.v2i2.46

Pearce, D.G. 1989. Tourism Development. Essex, UK: Longman

Pratiwi, A. B., Darmawan, A., & Arsad, S. (2022). Analysis of Suitability and Supportability of Mangrove Ecotourism Development in Rejoso, Pasuruan, East Java. *Journal of Marine and Fisheries Socio-Economic Policy*,12 (1), 39. https://doi.org/10.15578/jksekp.v12i1.10441

Prusty, S., & Nama, S. (2021). The tale of fishing tourism and its growth fuelling aspects. September 2020.

Putranto, D., Togubu, R. Y., Sopyan, A., Gayatri, A., Barliani, Setyawati, D., & Banundoyo, A. (2024). Sustainable Tourism: Building Regional Economy through Local Wisdom. *Lemondial Business School Journal*, 1–9. www.dnp.go.th/fca16/file/i49xy4ghqzsh3j1.doc

Rahmat, K. D. (2021). Preservation of Cultural Heritage through Sustainable Tourism Utilization. *Journal of Applied Tourism*, 5 (1), 26. https://doi.org/10.22146/jpt.58505

Raymond, R., Putri, A. D., & Siregar, D. L. (2022). Training on Economic Improvement of Galang Baru Village Community through Marine Eco Tourism. *Barelang Devotion Journal*, 4 (1), 66-70. https://doi.org/10.33884/jpb.v4i1.4675

Ruwayari, D., Veronica, Kumurur, & Mastutie, F. (2020). Analysis of Land Support and Capacity on Bunaken Island. *Spatial Journal*, 7(1), 94–103.

Ronting, Ira Andriani, Johan Danu Prasetya, and Dian Hudawan Santoso. "Evaluasi Kesesuaian Lahan Pariwisata di Pantai Ngandong, Desa Sidoharjo, Kecamatan Tepus, Kabupaten Gunungkidul, dI Yogyakarta." In *Prosiding Seminar Nasional Teknik Lingkungan Kebumian SATU BUMI*, vol. 3, no. 1. 2021.

Revolina, E., Hidayat, A., Basuni, S., & Widiatmaka, W. (2020). Kesesuaian Lahan dan Keberlanjutan Pengelolaan Kawasan Wisata Alam Pantai Panjang di Kota Bengkulu. *Jurnal Ilmu Lingkungan*, 18(2), 261–271. https://doi.org/10.14710/jil.18.2.261-271

Sasmita, E., Darsiharjo, & Rahmafiitria, F. (2014). Analysis of Tourism Support Capacity as an Effort to Support Conservation and Tourism Functions in Cibodas Botanical Garden, Cianjur Regency. *Leasure Resort Management*, 11 no 2 14.

Sholihah, I., & Hanifah, L. (2023). Analysis of Business Competition Between Merchants at Bahak Indah Beach Tourism Viewed from the Perspective of Islamic Business Ethics. *Kaffa Journal*, 2(2), 52–70.

Wall, G., 1995. Forces for Change: Tourism Bali, Balancing Environment

Waters, F. (n.d.). Guidelines for safe recreational water. 1.

Watina, S. S., Supriharyono, & Haeruddin. (2018). Analysis of Suitability and Carrying Capacity of Tourism in Tidung Island, Kepulauan Seribu, Indonesia. *Russian Journal of Agricultural and Socio- Economic Sciences*, 78(6), 151-159. https://doi.org/10.18551/rjoas.2018-06.16

Wood, E.M., 1999. Succesful Ecotourism Business. The Right Approach. World Ecotourism Conference. Kota Kinabalu. Sabah.

Yanti, I. W., Paruntu, C. P., Kepel, R. C., Stephanus, V., Tabalessy, R. R., & Masengi, M. C. (2021). Suitability index and carrying capacity of mangrove tourism on Jeflio Island, Indonesia. 14(5), 3145–3156.

Yulianda, F. (2007). Marine Ecotourism as an Alternative Conservation-Based Utilization of Coastal Resources. Department of M FPIK IPB Bogor

Yulianda, F. 2019. Ekowisata Perairan.Bogor. IPB Press