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FEASIBILITY STUDY, CARRYING CAPACITY AND ECOTOURISM ACTIVITIES IN THE BLEKOK VILLAGE MANGROVE AREA OF SITUBONDO REGENCY

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ABSTRACT: Blekok Village is one of the mangrove areas that was developed as conservation-based ecotourism by the Situbondo Regency Government since 2017. The Blekok village is located in Pesisir Hamlet, Klatakan Village, Kendit District, Situbondo Regency. This area has been designated as a mangrove area inhabited by water birds of the type Ardeidae called birds blekok by the surrounding community. Over time Blekok village has been increasingly crowded by tourists both inside and outside the country. The mangrove ecotourism area was developed as an appropriate form of management to ensure the sustainability of conservation and rehabilitation while at the same time encouraging the economy of local communities.The aim of this research are to calculate the tourist suitability index, calculate the carrying capacity of the region and identify ecotourism activities that can be carried out in the mangrove area of Kampung Blekok. The methods used in this study are qualitative and quantitative. Tourism suitability assessment uses the Regional Suitability Index (IKW), calculation of Regional Carrying Capacity and identification of ecotourism activities carried out with a 4A assessment (Attraction, Amenity, Accessibility, Ancilliary). Data collection uses visual observation techniques, interviews and documentation.The results showed that the mangrove area of Kampung Blekok Situbondo Regency was suitabel for mangrove tourism activities with a suitability value of 82,05%. The area that can be utilized for ecotourism covers 6.471,9 and the carrying capacity of the area for tourism activities is 648 people / day (open 10 hours/day). For the types of tourism activities that can be carried out in the mangrove ecotourism area totaling 8 activities, they are photography (photography), mangrove tracking, bird watching, observation tower, observation of mangrove (education), nursery of mangrove, boat tourism (boating) and enjoy the atmosphere of the sunset.

Keywords: Regional Carrying Capacity, Mangrove Ecotourism, Tourism Suitability Index

1. INTRODUCTION

Within the tourism industry, the issue of sustainable mass tourism has been on the agenda for quite some time. The problems of mass tourism are well established among researchers, politicians and tourist producers [1]. For the last decades, there has been a debate on how to achieve a more balanced approach to the development of mass tourism. The main issue is still the conflict between tourism and the natural environment [2]. In fact, tourism development policies, especially in developing countries like Indonesia, prioritize economic growth, ignore environmental sustainability and ignore the interests of local communities. The development of existing tourism infrastructure often results in environmental degradation such as a reduction in open beach space, destruction of river banks, and environmental pollution due to littering by tourists.

The old paradigm of tourism development tends to be mass tourism characterized by large-scale development, rapid growth, exploitation of natural resources without regard to environmental sustainability and the exclusion of local community interests. The negative impact of mass tourism on the environment began to be felt. Thus, alternative tourism develops which prioritizes environmentally friendly and sustainable tourism. The new paradigm of tourism emerged as a critique of mass tourism, known as ecotourism. Ecotourism is a tour to natural areas in order to conserve or save the environment by providing livelihoods for the local population. Ecotourism can also be interpreted as a form of business or economic sector of natural tourism which is formulated as part of sustainable development [3]. The Quebec Declaration under the auspices of the United Nations Environment Program (UNEP) and the World Tourism Organization (WTO) in 2002 clearly states that ecotourism is a form of tourism that adopts the principles of sustainable tourism.

Marine ecotourism is a type of special interest tourism that has activities related to marine activities, both conducted under the sea and above sea level [4]. Marine ecotourism covers three

areas, namely at the top surface of the sea, underwater of the sea and on coastal area. Marine ecotourism is an environmental tour based on marine attractiveness in locations or areas that are dominated by water or marine. Marine Ecotourism, presenting unique marine natural ecosystems in the form of mangrove forests, marine parks, as well as a variety of fauna, both fauna at sea and around the coast (Maritime Research and Human Resources and Maritime Affairs Ministry of Maritime Affairs and Fisheries, 2018). One of the marine ecotourism in Situbondo Regency is the Kampung Blekok mangrove ecotourism area. Mangrove forest is a forest that grows on brackish water swamps located on the coastline and is affected by tides [5].

Blekok Village is one of the mangrove forest areas developed as a conservation-based ecotourism by the Situbondo District Government since 2017. Administratively, Blekok Village is located in the Pesisir Hamlet, Klatakan Village, Kendit District, Situbondo Regency. It is called Kampong Blekok because in the mangrove area it is the habitat of thousands of water birds, especially of the Ardeidae type (blekok/kontul) with various species. The area is also an original mangrove forest area which has several types of mangroves with an area of approximately 6.3 hectares. Blekok village is the largest habitat of waterbirds in the [5] DLH Situbondo Regency, 2018). The existence of waterbirds (blekok) is an attraction of its own and distinguishes it from other mangrove tourism areas. Over time Blekok village is increasingly crowded with tourists both at home and abroad.

Mangrove ecotourism areas are developed as a form of appropriate management to ensure the sustainability of conservation and rehabilitation while at the same time encouraging the economy of the local community. Through the development of ecotourism, tourists and all components related to the organization of tourism are invited to be more sensitive to environmental and social problems that exist in the Blekok village. It is hoped that the natural resources in Blekok village, especially mangroves, can be sustainable and tourists have a high appreciation of the environment. In addition, the community around the tourist attraction can feel the benefits of organizing tourism. Ecotourism tourists generally come with the aim of finding opportunities to unite with nature and local culture by away from the hustle and bustle of urban atmosphere [6].

The concept of sustainable tourism, tourism development must pay attention to environmental aspects in order to preserve the sustainability of tourism development which includes anticipation of the demands of the needs of future generations [7] [17]. The most important aspect in the concept of utilizing natural resources for tourism purposes is the suitability of resources and the carrying capacity of regions that support tourism activities [8], aspects of carrying capacity in ecotourism areas that need to be considered are the number of tourists/year; the duration of tourist visits; how often ecologically "vulnerable" locations can be visited, etc. This study aims to determine the suitability of the Blekok village area for the development of mangrove ecotourism, determine the carrying capacity of the area and identify any ecotourism activities that can be done in the Blekok Kampung mangrove area.

2. METHODS

This research was conducted in Blekok Village, Klatakan Village, Kendit District, Situbondo Regency, East Java Province as shown in Figure 1. The method used in this research is descriptive quantitative methode supplemented with qualitative analysis. The data needed in this study are primary and secondary data. Primary data obtained from observations, interviews, documentation and measurements in the field. Observation was conducted to obtain the data related to tourism suitability parameters, and it was conducted through direct on-site observation as well as recording systematically to any events that appeared on the research sites [8] . Secondary data were obtained from documents from the Situbondo Regency Environmental Agency. This study uses three analysis techniques including the appraisal of tourism suitability using the Tourism Suitability Index (IKW), the calculation of the Regional Carrying Capacity and identification of ecotourism activities carried out with a 4A assessment (Attraction, Amenity, Accessibility, Ancilliary).

Source: Google Earth, 2018

Fig 1. Research Location in the Tourism Village of Blekok village, Situbondo Regency

Tourism suitability analysis uses tourism suitability index which is arranged based on the importance of each parameter to support activities in the area [1]. Mangrove tourism suitability

analysis refers to the Criteria Guide for the Establishment of the Marine Ecotourism Zone [10] namely:

$$\textbf{IKW} = \sum\left(\frac{Ni}{Nmaks}\right)$$

Information:
IKW : Tourism Suitability Index for mangrove
Ni : parameter value -i
Nmaks : Maximum value of the travel category
i : Tourism suitability parameters
n : Number of Parameter Types

Table 1. Resource Suitability Matrix for Mangrove Tourism

No	Parameter	Value	Category	Score
1.	Mangrove Thickness (m)	5	>500	3
			>200-500	2
			50-200	1
			<50	0
2.	Mangrove Density (100 m²)	3	>15-20	3
			>10 – 15; >20	2
			5-10	1
			<5	0
3.	Type of Mangrove	3	>5	3
			3-5	2
			2-1	1
			0	0
4.	Tidal zone (m)	1	0-1	3
			>1-2	2
			>2-5	1
			>5	0
5.	Biota Object	1	Fish, Shrimp, Crabs, Mollusks, Reptiles, Birds	3
			Fish, Shrimp, Crabs, Mollusks	2
			Fish, Shrimp	1
			One of the water Biota	0

Source : (Maritime Research and Human Resources and Maritime Affairs Ministry of Maritime Affairs and Fisheries, 2018)

DDK (Regional Carrying Capacity) is a calculation method to find out the maximum number of visitors that can be physically accommodated in the area provided at a certain time without causing disturbance to nature and humans. DDK calculation uses the following formula [4]

$$DDK = K \times Lp / Lt \times Wt / Wp$$

Information :

DDK : Regional Carrying Capacity (people/day)
K : Ecological potential of visitors per unit area (people per m²)
Lp : Area or length of area that can be utilized (m²)
Lt : Area units for certain categories (m²)
Wt : The time provided by the manager for tourism activities in one day (hour)
Wp : Time spent by visitors for each specific activity (hour)

Table 2. Ecological potential of visitors (K), Unit activity area (Lt), time of visit (Wp) and time provided by attractions (Wt)

No	Type of activity	K (∑ Visitors)	Unit area (Lt)	Time needed is (Wp) / hour
1.	Diving	2	2000 m²	2
2.	Snorkeling	1	500 m²	3
3.	Seagrass Tourism	1	250 m²	2
4.	Mangrove Tourism	1	50 m²	2
5.	Beach Tourism	1	50 m²	3
6.	Sport tourism	1	50 m²	2

Source : [3]

Identification of potential tourist attractions according to [16] based on 4A (Attraction, Accessibility, Amenity and Anciliary. There are three attractions or attractions that can attract tourist arrivals, namely 1) Natural Resources (natural), 2) Cultural tourism attractions, and 3) Man-made attraction itself. Accessibility is synonymous with transferability, namely the ease of moving from one region to another. If an area is not available with good accessibility such as airports, ports and highways, then there will be no tourists that affect the development of accessibility in the area. Amenity or amenity is all kinds of facilities and infrastructure needed by tourists while in the tourist destination. Anciliary or additional services must be provided by the government both for tourists and for tourism actors. Among them are promotion, construction of public facilities and physical infrastructure (roads, railroads, drinking water, electricity, telephones, etc.) as well as coordinating all kinds of activities and with all forms of regulations**.**

Table 3. Variables and Data Sources

Variable	Indicator	Data source	Data collection technique
Attraction	• Tourist attractions (natural, cultural & man-made) • Interesting tourist attractions • A good educational tourism program	Visitors	Observation, interview & documentation
Accessibility	• Road access • Availability of transportation facilities (land, sea, air) • Internet and Telephone Networks • Directions	Visitor, Manager	Observation, interview & documentation
Amenity	• Fasilitas café / warung / restoran • Pelayanan café / warung / restoran • Kondisi Fasilitas Umum • Fasilitas Hotel/ Homestay / Villa / Resort	Visitor, Manager	Observation, interview & documentation
Anciliary	• Management • Promotion • Tourist Information • Travel Agent	Pengunjung, Pengelola	Observation, interview & documentation

Source : Variable of tourist attraction with modification [17]

3. RESULTS AND DISCUSSION

In general, mangrove forests are defined as forest types that grow in tidal areas (especially protected beaches, lagoons, river mouths) that are inundated at high tide and are free of flooding at low tide whose plant communities tolerate salt [11]. Based on the results of interviews with residents and administrators of the Tourism Awareness Group (POKDARWIS) in Blekok Village, the mangrove forest in Blekok Village in Situbondo district is currently the result of planting by residents since 1994. Mangrove planting is based on the geographic location of Pesisir Hamlet, Klatakan Village in the region north coast of java. This causes every time the tide rises, the water enters the residents' settlements. But this time it has never happened again, because the tidal waves of sea water are blocked by mangrove roots. From here finally residents awareness of the importance of mangrove forests is increasing. At present the function of the mangrove ecosystem in Blekok Village is not only as a barrier to waves, but also a habitat for thousands of water birds, especially of the Ardeidae species (blekok/kontul) with various species. The existence of the existing mangrove and Blekok ecosystem is not only beneficial from the ecological side but also in terms of the economy and tourism development.

3.1 Suitability of Mangrove Tourism

The tourism suitability index states how appropriate the existing resources in an area or area to be developed as mangrove tourism based on the mangrove tourism suitability analysis guide refers to the Criteria for Establishing a Marine Ecotourism Zone. Mangrove tourism utilizes mangrove habitat along with biota and its environment as a tourist attraction. The suitability of mangrove tourism considers five parameters and four scoring classifications. These parameters include the thickness of the mangrove (m), the density of the mangrove (100 m^2), the type of mangrove, Tidal and Biota Objects. The results of observations and measurements in the field can be seen in table 4.

Table 4. Resource Observation Results for Mangrove Tourism

No	Parameter	Value	Category	Score	Ni
1.	Mangrove Thickness (m)	5	>200-500	2	10
2.	Mangrove Density (100 m²)	3	>15-20	3	9
3.	Type of Mangrove	3	>5	3	9
4.	Tidal zone (m)	1	>2-5	1	1
5.	Biota Object	1	Fish, Shrimp, Crabs, Mollusks, Reptiles, Birds	3	3
			Total		32
IKW Mangrove Tourism			82,05 %		

Source: Data Processing, 2019

Based on data from field observations, the results of the study showed that the mangrove area of Blekok Village, Situbondo Regency was suitable (S) for mangrove tourism activities with a suitability value of 82.05%. Environmental factors such as nutrients such as leaf litter also influence the growth and development of mangrove ecosystems. Environmental conditions of watersheds and leaf litter that carry nutrients cause an imbalance of competition [12]. Environmental Information System Data in 2016 in DLH Situbondo District, 2018 Mangrove forest in Blekok Village shows an average density of 2000 trees per hectare, so that with an area of 6.3 hectares the estimated number of mangrove stands in Blekok Village is 12,600 trees. Blekok village has a stretch of 6.3 ha mangrove with less than 1 km thick mangrove based on mapping on Google Earth, because this research is the first study so that data about mangroves in Situbondo Regency is very limited. The size of the mangrove area greatly determines the diversity of plant species in it. Large areas allow sufficient space to grow and reduce competition between species in the fight for space, nutrients and sunlight.

There are 8 species of mangroves identified in Blekok village and 3 categories of them, including major mangroves, mangroves that show loyalty to mangrove habitat, are capable of forming pure stands and dominantly characterize community structure, morphologically having special adaptive forms (root shape and viviparity) to the mangrove environment, and has physiological mechanisms in controlling salt, including *Avicennia alba, Avicennia marina, Rhizophora mucronata* and *Sonneratia alba*. Minor mangroves, namely mangrove flora which are unable to form pure stands, so that morphologically do not play a dominant role in the community structure, consisting of *Rhizophora apiculata, Excoecaria agallocha* and *Achantus ilicifolius*. Mangrove Association, namely mangroves never grow in true mangrove communities and usually live with land plants for example *Thespesia populnea (Waru Laut)*.

Tidal Type (tides) of seawater affects the development and zoning of mangrove forests, because the tides and their vertical range will differentiate the period of flooding and surface water circulation so that there is a continuous exchange and change of sediment which causes an increase in oxygen supply and nutrients for respiration and production. Mangrove plants are carried out [13] Tides (tides) is a process of periodic sea level rise and fall caused by the attraction of celestial bodies, especially the moon and the sun [13]. The effect of tidal currents reaches deep layers of water and even the entire mass of water [14] Tides in the mangrove area of Kampung Blekok occur twice, namely in the morning the tides at 04.00-06.00 WIB tides occur at 08.00-10.00 WIB and, then recede back in the afternoon at 15.00-17.00 WIB and tide at night 19.00-21.00 WIB. Tidal type in this area is a mixture of double-tilted prevailing semi diurnal, where in one day there are two tides and two tides with different time periods [15].

Data and information on the diversity of aquatic biota objects in the study site were collected from observations, interviews, and secondary data analyzed descriptively. In the mangrove ecotourism area, Blekok village found several species of fish, shrimp, mangrove crabs (Scylla serrata), mollusks and reptiles, and birds. The majority of bird species in the Blekok village are from the Ardeidae family including Cangkah merah, kuntul besar, kuntul kecil, kuntul kerbau, kowak malam abu, blekok sawah, and kokokan laut. Other families such as Rareidae species of Kareo Padi, Scolopacidae family with species of Gajahan Pemggala and Trinil Pantai, family Charadriidae species of Cerak Jawa. The dangerous biota found in this location is none other than sea urchins**.**

3.2 Regional Carrying Capacity

Measurement of the carrying capacity of the area for the beach recreation category refers to the formula established by [13], where there are several assessment criteria, namely, the area or length of the usable area (Lp), the unit area for a

particular category (Lt), the time provided by the region for tourist activities in one day (Wt), and the time spent by visitors for each particular activity (Wp). Based on these criteria, the results of measuring the carrying capacity of the area are obtained as shown in Table 5.

Tabel 5. The results of carrying capacity measurement for mangrove tourism

Carrying Capacity Parameter	Measurement results	DDK Mangrove Tourism (people/day)
Ecological potential of visitors (K) Area or length of area that can be utilized (Lp) Area Unit (Lt) Time provided by tourist attraction (Wt) Visit time (Wp)	1 6.471,9 m² 50 m² 10 2	648

Source: Data Processing, 2019

Fig 2. Mangrove Area in Blekok Village is used for Ecotourism

An assessment of the carrying capacity of an area is considered important because it is to know the maximum number of visitors that can be accommodated in 1 day of tourism activities so as not to cause disturbance to both humans and the environment, so that the utilization of coastal tourism is sustainable and in a state of sustainability.

3.3 Tourism Activities

The identification of ecotourism activities is carried out by rating 4A (Attraction, Amenity, Accessibility, Ancilliary). The results showed that the tourist attractions in Blekok village and tourists can be enjoyed quite diverse, both natural, cultural and artificial attractions. Natural attractions include the diversity of mangroves, there are a total of 8 species, mangrove habitat for Blekok birds, river estuary which also serves as a tourist boat dock, mangrove tracking along ± 3.5 km and equipped with selfie spots and resting points at several points, gazebo to enjoy the sunset and sunrise, the waves are calm enough so that they can be used for fishing and boat tours. The cultural attractions of the coastal communities of Kampung Blekok are also very interesting including the economic activities of the community which incidentally are craftsmen of wooden souvenirs, surf boards and dream catcther souvenirs to be sent to the island of Bali. In addition there are also craftsmen souvenirs made from shells. Before there was Ecotourism in Blekok Village, many coastal hamlet communities worked as souvenir craftsmen.

Another attraction is the zero waste movement campaign from the management which is carried out to protect the conservation area of the magrove forest, so that all the facilities in the tourism object are arranged not to use plastic materials. Elsewhere there are observation towers, Blekok bird breeding cages and gazebos jutting into the sea for tourists to enjoy the sunset and sunrise. There are go green themed café facilities in the Blekok village area. Go green cafes that sell food, snacks and crafts. In the mangrove tracking lane made of wood, there are many stalls to relax and café. This café is a donation from CSR of a private bank. Services at stalls and cafes in Blekok Village are carried out by local people with good service because they have received training and assistance from the Environmental Agency of Kab. Situbondo. The overall condition of the public facilities is in good and new condition. For lodging facilities there are several houses that are used as homestays that are managed by residents, so visitors will stay with the family of the homestay owner.

Existing tourist attractions are packaged in tour packages and offered to tourists. The activities offered in the tour package start from mangrove tracking, bird watching, riding a tour boat, learning to make handwork typical of the village of Blekok, educating the types of mangroves and planting mangroves and then closing with learning to use plastic bottle waste to make handwork. The price of a tour package is offered between 30,000 rupiah to 50,000 rupiah per person. All tourism packages are managed by local residents who have received training from the Situbondo District Environmental Agency. Blekok village combines nature tourism, education and wisdom of the local community as the main attraction while still holding the concept of maintaining mangrove conservation. So there are attractions that implicitly invite visitors to love the environment and maintain the balance of the ecosystem.

4 CONCLUSSION

Blekok village mangrove area is suitable to be developed as mangrove ecotourism. The calculation result of Tourism Conformity Index (IKW) for mangrove tourism is 82, 05% which means it is appropriate. This can be seen from the thickness, thickness and types of mangroves in Blekok village which are quite numerous and varied. The area of Blekok Kampung mangrove area that can be utilized for ecotourism is ± 6,471.9 m² and the results of the DDK calculation show the maximum capacity of Blekok Kampung mangrove tourism object is 648 people / day with a service hour of 10 hours per day. For the types of tourism activities that can be carried out in the mangrove ecotourism area totaling 8 activities, they are photography (photography), mangrove tracking, bird watching, observation tower, observation of mangrove (education), nursery of mangrove, boat tourism (boating) and enjoy the atmosphere of the sunse

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