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Identification and analysis of Marine Ecotourism Potential in Pacitan, East Java, Indonesia

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ABSTRACT

Pacitan Regency, located on the western part of East Java, has a potential to be developed as an ecotourism area. The coastal village with 23 sites has become a local tourist destination for people of East Java and the number of visits has increased. On the other hand, there has been no management of the tourist areas. The purpose of this research is to examine the potential and management of potential destinations. The research employs a purposive technique by determining the location for data sampling through certain considerations based on weighted scores and multiplication of each parameter. Based on the results of research, there are 3 identified categories namely index of conformity recreational area of ecotourism category which includes leisure travel (84%), beach sports 76% and jet sky with a value of 88%.

Key words : *Ecotourism, East Java, Marine ecotourism*

Introduction

Tourism in coastal areas can provide benefits for the surrounding communities if the areas are managed well. On the other hand, if they are not well managed, there will be an exploitation of natural resources, which could result in damaged areas. Explorations of natural resources and human resources in the area of the coastal village should be done in a good and proper way. This certainly cannot be done alone, but through the cooperation of various elements of the society, Government, foundations, local communities, and private investors.

One of the initial steps in the development of ecotourism is creating a good and friendly marine environment by designing a profile of the coastal village as a destination for Ecotourism. This profile can then be distributed to various interested parties. Interested parties further build, develop, and market the marine ecotourism in coastal villages of institutional-based (community groups).

Pacitan Regency is a regency located on the western part of East Java with a coastline of about 92,253 km (Sukandar *et al.,* 2017). The region has seven subdistricts of coastal and 23 coastal villages that have territorial waters of the sea; three of which are the villages of Kebonagung, Sendang, and Widoro. There are community group supervisors (POKMASWAS) in each village. The natural resource available in Pacitan Regency includes the ecosystem of mangroves, coral reefs and beaches. Almost all natural resources in Pacitan are located

in the village of Sendang, Kebonagung, and Widoro.

The beach at the coastal village of Pacitan Regency has white sand with rock, mud, or even rock cliffs that surround it. This research aimed to identify and anlayze tourism potency of Pacitan Regency.

Materials and Methods

Time and Place of Research

The research was conducted from November to December 2017 at the coastal village of Pacitan Regency including Kebonagung, Sendang, and Widoro (Fig. 1).

This research employed purposive sampling technique for determining the station. The method used for determing station observations was purposive sampling technique. Data were obtained from some sources with certain considerations (Safina *et al*., 2014). Pacitan Regency has 16 community groups known to have supervisors who are scattered in 19 coastal village. One of the groups which is well developed in comparison to the rest of the groups is Pokmaswas on the village Mulyo Sekawi Sendang Kebonagung, village and the village of Widoro. This potential determined dots coordinates research station at 3 coastal villages of Pacitan Regency (Table 1).

Table 1. The point coordinates research station

No	The Sampling Point	The Coordinates Point
1	Station I	$8^0$12′57.15"S $110^0$55′58.39"E
2	Station II	$8^0$1′49.28"S $110^0$56′51.73"E
3	Station III	$8^0$10′41.16"S $111^0$7′8.64"E

Tools and Materials

The tools and materials used in this research were divided into two major sections (Table 2), i.e. tools for ecotourism sampling and the functions (Table 2).

Analysis of Suitability.

The analysis of the data used is the analysis of the suitability of the tourism site by using the marine tourism suitability matrix based on Zoning Plans Guidelines Coastal and Small Islands (RZWP3K) District CTF Year 2013. The data were analyzed using nautical tourism suitability matrix, composed of a matrix of recreational Beach Beach Tourism, matrix snorkeling trips and matrix diving trips (Yulianda, 2007).

The level of compliance of marine tourism is divided into four (4) classifications which include

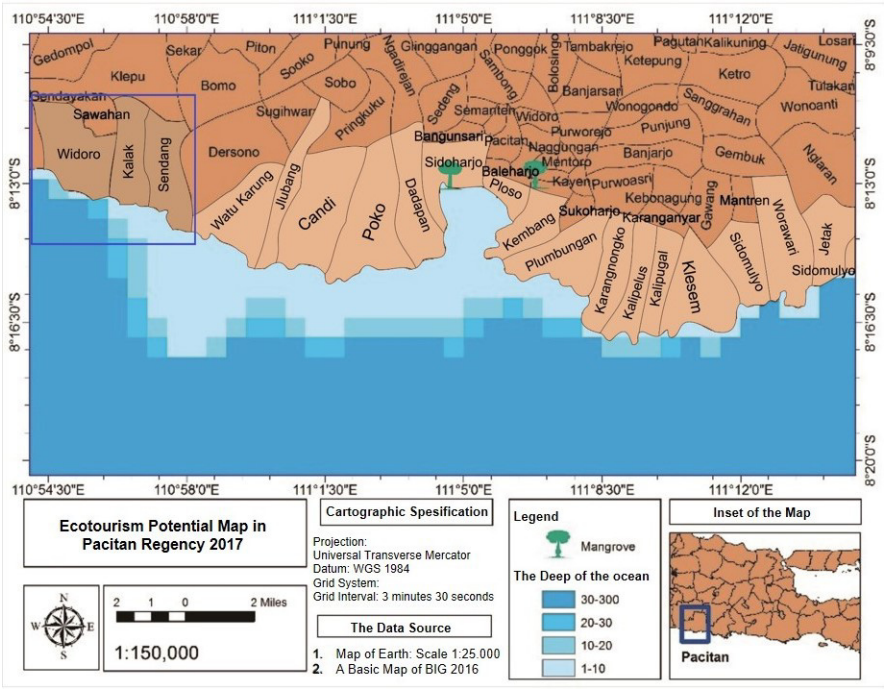

Fig. 1. Pacitan Regency Mangrove Potential Map

Table 2. Tools and materials used during research

No	Tools and Materials	Functions
1	Stationery	Noting the observations in a field
2	Questionnaire	As the list of questions
3	Camera	Documentation of research
4	Snorkeling tool	Observations of biota are dangerous
5	GPS *(Global Positioning System)*	Determine the point coordinates of the sampling point
6	Desktop PC	As a data processor
7	Other literature	Secondary data support research

Table 3. The classification level of compliance based on total weight x score

No	Classification	Values
1	Great fit (S1)	83 – 100 %
2	fit (S2)	50 - <80 %
3	Corresponding conditional (S3)	17 - < 50 %
4	Inappropriate (N)	< 17 %

Source: Modification analysis results

great fit (S1), fit (S2), Corresponding conditional (S3) and inappropriate (N) (Table 6). The formula used to determine the nautical tourism is suitability (Yulianda, 2007):

$$IKW = \Sigma \left[\frac{Ni}{Nmax} \right] \times 100\%$$

Details:

IKW : Index of the suitability of tourism (recreational boating, swimming)

Ni : The value of the parameter to-i (Weight x Score).

Nmax : The maximum value of category.

Power Analysis Support

Power support is calculated so that the known maximum number of visitors that can physically fit in the area is available at any given time without causing interference on nature and man (Ramadan *et al.,* 2014). Power analysis support for the development of nature tourism uses the concept of power support area (DDK) with the use of the following formula (Yulianda, 2007):

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

Details :

DDK : Power Support Area (people)

K : Ecological potential visitors per unit area (people)

Lp : Area (m^2) or length (m) area which can be utilized

Lt : Unit area for certain categories (m^2 or m)

Wt : Time is provided for activities in one day (hours)

Wp: Visitor time spent for each activity (hours)

The potential visitor is determined by the condition of ecological resources and the types of activities being developed (Table 4). Time visitor activity (Wp) is calculated based on the length of time spent by visitors to conduct tourism activities. The time visitors are taken into account by the time provided for the regions (Wt). The time the area was opened in the area for a long time one day, and the average time worked about 8 hours (8-16). Prediction of the time used for each activity can be seen in Table 4.

Table 4. Ecological potential visitors (K) and area of activity (Lt)

The Types of Activities	K (Σ Visitors)	Unit Area (Lt)
Recreational Beach	1	50 meter
Beach Sports	1	50 m^2
Jet Sky	2	1000 m^2

Source: Yulianda (2007) with modifications

Table 5. Prediction of the time used for each activity

No	Actities	The Time it Takes (Wp)	Total Time 1 Day (Wt)
1	Recreation	3	8
2	Beach Sports	3	6
3	*Jet Sky*	2	8

Source: Yulianda (2007) with modifications

Results

The Condition of Coral Reefs

The observation of coral reef ecosystem was carried out in the territorial waters of the Gulf, district Tawang Ngadirojo. The condition of the coral reefs in the region showed the percentage cover of 41.2%

(Fig. 2). According to Kep. Men. LH No. 4 of the year 2001, based on percent closure of living coral, the location of the observation was in the category of moderate damage. Fig. 2 The percentage of coverage of the substrate base in the Tawang bay, Pacitan.

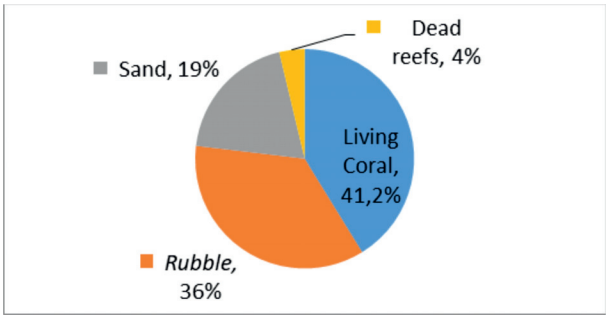

Fig. 2. The percentage of coverage of the substrate base in the bay of Tawang, Pacitan.

The basic substrate in the Bay of Tawang district is dominated by coverage of hard corals amounting to 41.2%, coral fragments by 36%, sand 19% and dead coral (RKC) of 4%. The water condition is dirty and shipping activity becomes the main factor which causes the decreasing coral cover in the area. This is confirmed by a large number of fragments of coral (Rubble). Corals found in the waters of Tawang district are divided into four Genus namely *Stylophora* sp., *Porites* spp., *Echinophora* sp., and *Montipora* sp. From Stylophora coral cover observations sp. has the highest percentage of 40%, i.e. *Porites* spp. by 10%, *Echinophora* sp. by 30%, and *Montipora* spp. of 20% (Fig. 3).

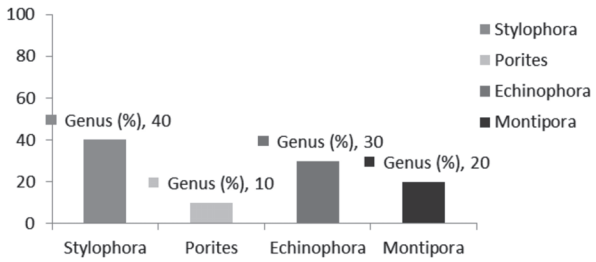

Fig. 3. A genus of coral in the Gulf of Tawang district

The form of the growth of coral in the waters of the coral forms the edge of Tawang (fringing Reef). Its development can reach a depth of 40 meters with growth upwards and outwards towards the sea. In the process of development, this circularly shaped reef which is characterized by the presence of some form of ban or the deposition of dead coral that surrounds the island. On the steep beaches, coral growth is clearly leading vertically and distributed almost evenly in the Bay of Tawang (Table 5).

The Condition of Seagrass and Algae

The results of the identification of the found vegetation seagrass Enhalus acoroides form that can survive in a few spots. It also found seaweed *Gracilaria* sp. in the Bay of Tawang district of Pacitan. Seagrass ecosystem's spawning some biota such as fish, coral rabbitfish and some kind of sea stars, seagrass is also food for the turtle too. Seagrass meadow also plays a role as an intermediary in the transfer of material from the mangrove ecosystem to the coral reef ecosystem. Biota of the seagrass can

Table 5. The distribution of species of coral in the Gulf of Tawang district

No.	Family	Genus	Type	Station		Total
				1	2	
1	Pocillophoridae	*Stylophora*	*Stylophora* sp.	+	+	2
2	Poritidae	*Porites*	*Porites* sp.	-	+	1
3	Apiaceae	*Echinophora*	*Echinophora* sp.	+	+	2
4	Acroporidae	*Montipora*	*Montipora* sp.	+	-	1
		Total		3	3	6

Details: +: found - : not found

Table 6. The results of the calculation of the suitability of the tourist

No	Types of Tourist Activities	The Results of Calculations	Category
1	Recreation of Beach	84 %	Great fit (S1)
2	Beach Sports	76 %	Great fit (S1)
3	*Jet Sky*	88 %	Great fit (S1)

also be quiet coral reefs, because sometimes, the biota of the seagrass, either deliberately or not able to coral reef ecosystems.

Seagrass cover percentage average of 30.89% *Thalassia hemprichii* species are found on the beaches of Pindakan (Dewi and Sigit, 2015). *Thalassia hemprichii* are generally found to be abundant and widely spread; often dominant on seagrass meadow mix; the wide range of vertical intertidal approached 25 m; grows on muddy sand substrates or medium coarse sand or coral coarse fractions (Fortes, 1990). Based on the decision of the Minister of State for the environment No. 200 of the year 2004, the value of the mean condition of seagrass Meadow Beach Pidakan categories includes less rich/less healthy. The factors that greatly affect the spread of seagrass in the beach of Pidakan are the substrate, depth, and waves. Only species capable of growing solidly rooted in dead coral habitat. The depth was very influential for the entry of sunlight for photosynthesis. Strong waves because the seagrass roots hit a hard base of waters resulting in less to germinate well.

Species of seagrass next found in Pacitan is *Enhalus acroides* (Huriawati *et al.,* 2016). This seagrass species has potential as a source of industrial chemicals. Utilization of seagrass in particular *E. acoroides* as sources of chemicals and drug requires the proper processing and that it is able to hold in a relatively long and not changing existing content therein. While on the coast of Tawang *Cymodocea rotundata* species found and *Halophila ovalis*, the density of the high enough in some areas in Indonesia. The seagrass grow at the base of sand and coral rubble with clear water has a smaller leaf size and erect Rhizome that is shorter than the seagrass grow at the base of the watery mud murky (Dewi and Sigit, 2015).

The Condition of Mangrove

The coastal area of Pacitan Regency has several mangrove types of commonly found in coastal areas in Indonesia, such as Family Avicenniaceae, the Rhizophoraceae and Sonneratiaceae. The family Aviceniaceae found includes *Avicennia alba*, while the family Rhizophoraceae form of *Rhizophora apiculata*, *Rhizophora mucronata* and *Bruguiera parviflora*. Furthermore, the family Sonneratiaceae encountered is *Sonneratia alba*.

The distribution of *Rhizophora apiculata* in Pacitan is wider than other types. This type of mangrove is distributed in all stations. This is because of the adaptive nature of Rhizophora is generally against salinity and low availability of dissolved oxygen. The adaptation is carried out through a system of excretion on leaves, roots and stems and root respiration system through the breath. So the mangrove is often used in rehabilitation of coastal ecosystems.

At seeding Station, had just done the planting of mangrove *Rhizophora apiculata* so that the majority of these plants still stands high ranges 30-40 cm and in the adjustment of new habitat. So is Siwil Bay Station, in addition to the high forest is dominated by the kind of *Sonneratia alba*, the Bay was also not long ago done planting the *Rhizopora apiculata*. Same is the case at the station Flower, also Siwil Gulf *Rhizophora* still in the stage adaptation. The condition is fairly quiet waters in the Bay makes the *Rhizophor*a grow without any threat of damage because of the big waves.

Type of Beach

Based on the results of research in the field of the coastal village of Pacitan Beach has a substrate range of white sand with a shard of rock, mud, or even rock cliffs that surround them in accordance with the opinion of the Yulianda (2007), that to coastal tourism would be very nice if a sandy beach or in other words the substrate dominated by sand, compared to the rocky beach or beach dominated by coral substrate can interfere with the comfort of travelers. The potential of ecotourism in Pacitan Regency place including Ngiriboyo Beach, Klayar Beach, Buyutan Beach, Tiser Beach and beach Banyu Tibo.

Analysis of the Suitability of The Region

The result of the calculation of an overall marine ecotourism potential includes recreational Beach, snorkel and dive towards the tourist areas can be categorized based on the classification of fit very categories that have been created (Table 6). The table can be in describing if the power of the highest support is a jet sky, then Beach recreational activities and sports are the lowest of the beach. Things are different with tourism potential residing in the island of Bawean, the area's dominant activity was recreational beaches, snorkeling and diving activity was lowest (Sukandar *et al.,* 2017). So, be aware that each region has the potential to serve as a marine tourism, but with activities tailored to conditions in each region (Table 6).

Discussion

The results of the calculation from the suitability of the land value data obtained all kinds of nautical tourism activities in the area Pacitan coastal ecotourism. The value conformity obtained include index value the suitability of the region (IKW) category coastal recreational activities, i.e. 84%, 76% and beach sports activities jet sky 88%. This value can be categorized a great fit (S1). The value of the suitability of the land can be said to be appropriate if it gets a value between 75-100% of the total value of weights (Yulisa *et al.*, 2016). From the results of the analysis, the value of the conformity obtained for coastal marine ecotourism in Pacitan is among the range so that it can be said to fit into the category of Nice (very appropriate) developed for tourism.

The coastal regions average Pacitan has the kind of wide sandy beach and wide with the tectonic order uniqueness be dominated by karst landforms. Sights with uniqueness and rarity are not found anywhere else, becomes a potential flagship in developing tourism potential. In addition, according to Mutmainah *et al.* (2016), explained that the parameters of brightness aims to indicate the level of penetration of sunlight into the waters, the results obtained in the research get more brightness value of 6 meters raw water quality meets the sea for maritime tourism and can support in sea life.

The uniqueness of potential coral reefs is located in the region of seeing Pacitan do have differences with the conditions in the South of Malang. Coral reefs around the island Sempu (Strait of Sempu) less than 10 ha. The coral cover in the area of the nature reserve of 50% and in 2013 the coral cover 36% or included in the category broken (Reef Check, 2006). The causes of this damage are suspected due to exploitation on going basis by the surrounding society which resulted in high levels of damage to the reef. Such activities are not environmentally friendly, opening the Sempu Island as tourist areas, as well as the establishment of marine protected areas is not yet in the area that could threaten the status of coral reefs in the waters (Wibawa and Oktiyas, 2016). In addition, changes in water quality can occur directly due to global climate change that lately can increase the temperature of the sea surface resulting in disastrous coral bleaching in bulk (Glynn, 1991; Rachman *et al.*, 2017).

Another potential in conditions of mangrove area in the Pacitan and Malang, has the potential of mangrove with has been the establishment of Mangrove Conservation Clungup (CMC) is a coastal region with the most comprehensive ecosystem in Malang. Area CMC i.e. 81 Ha in the mangrove forests and 117 Ha for the Greenbelt, with the formation of geo coastal mangrove, vegetation of panta sand with coral reefs, as well as panoramic views of the rolling hills typical of the southern coast of Java (Harahab and Setiawan, 2017). There are 3 types of mangrove species at three stations, namely the *Rhizophora apiculata* (anchor), *Sonneratia alba* (punch/Kike), *Ceriopstagal* (height). The first station was in the area near the shoreline with the flow of the river, found three species, namely *r. apiculata*, *s. alba* and *c. tagal*. The second station is adjacent to the mouth of the river and a third Brother adjacent to the settlements inhabitants, found two species i.e. *r. apiculata* and *c. tagal*.

The results of the research conducted by Dewi and Prabowo (2015), said that the potential of the desert located in some of Pacitan seagrass areas, among which are the beaches of Tawang with 37.66% caps, beach and Pidakan Beach with 30.89% cover. Based on the decision of the Minister of State for the environment No. 200 of the year 2004 the value of the mean condition of seagrass Meadow Beach, Pidakan Beach and Tawang categories include less rich/less healthy. Compared to the coverage of seagrass in the South of Malang of 29.32% (category is broken). The density of the lowest type of seagrass found in station 1 species *Thalassia hemprichii* with value 3 ind/m². The density of this type of seagrass in the East Coast Blue Sendang Malang that have the highest value found in the station 2 with species that dominate *Halodule pinifolia* is 83.82 value ind/m². The index value of the most important high can be found at station 2 with value 195.74% dominated by species of *Halodule pinifolia* (Saragih, 2017). Seagrass diversity value throughout the research station belonging to the category because the value is < 1 in Saragih, 2017). Pacitan belongs to small factors that affect these conditions because of the substrate on the beach Pidakan and Tawang district is dominated by the coral die and the composition of sediments affecting the availability of phosphate (Kilminster *et al.*, 2014; Papathanasiou *et al*., 2015).

Conclusion

Coastal marine ecotourism potential of Pacitan Re-

gency can be categorized as having great fit (S1), with an area of suitability index value (IKW) obtained coast recreational activities category i.e. 84%, 76% and beach sports activities jet sky 88%. The area with a sandy beach and unique karst became a tourist attraction and can serve as a potential leading marine ecotourism development. Furthermore, the development of ecotourism in Pacitan Regency Beach to put forward potential physical parameters with parameter did not rule out the management and social.

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