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Analysis of Suitability of the Mangrove Ecotourism Area Pandan Alas Sriminosari Village Labuhan Maringgai East Lampung

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ABSTRACT The Sriminosari village is a coastal village in East Lampung district that had mangrove forests. Now, mangrove forests of Sriminosari used as a mangrove ecotourism area and will be developed as a form of proper management to ensure the conservation and sustainability of rehabilitation while simultaneously pushing the economy of local communities. The purpose of this research is to calculate the ecotourism suitability index as a support in the development of mangrove ecotourism activities. This research used is survey methods and identification of ecotourism activities is carried out by visual identification and interview. The Observation station is determined by 5 stations are purposive. The results showed that mangrove ecosystem Sriminosari Village in the category of very fit (S1) at 5 stations with index value the suitability of tourism (IKW) at each station that is the station I of 76.92% in category (S1), station II of 89.74% in category (S1), station III of 89.74% in category (S1), station IV of 92.31% in category (S1), and station V of 92.31% in category (S1). The mangrove ecosystem Pandan Alas Sriminosari Village has the potential to be developed as an ecotourism mangrove. Keywords: Mangrove ecotourism, Tourism suitability index, Sriminosari

1. INTRODUCTION Mangrove forests in Indonesia have almost 25% of the world's mangrove forests of 15.24 million ha [1]. In the Asian region, mangrove forests in Southeast Asia are the widest reach 5.11 million ha. Indonesia became the biggest country in Asia to have mangrove forests with a total area of approximately 3.6 million ha. One of them scattered in the coastal area of Labuhan Maringgai Lampung Regency East Lampung Province [2]. As time goes by, the lack of knowledge, awareness and appreciation of efforts to the maintenance of the sustainability of mangrove forests as well as synergy stakeholders related mangrove ecotourism

management and development environmentally friendly, be the reason for ecotourism management and development to date has not yet been done optimally both in terms of management of ecotourism, the development of infrastructure as well as the readiness and the quality of human resources. This will have an impact on the sustainability of ecotourism development, decreasing the quality and sustainability of mangrove ecosystem itself. Improvements towards ecotourism management and development of mangrove in East Lampung district is indispensable and should be done with a serious effort. Including the management of construction must be placed on the biophysical basis by the needs of the intended development such as the area of ecotourism that will be developed should be adjusted with the potential and resource allocation [3]. Therefore, to support the management and development of ecotourism sustainable mangrove is very important to do research on mangrove ecotourism district suitability analysis so that the output generated can help stakeholders related ecotourism management and development of mangrove forests in the coastal areas of East Lampung district especially in the village of Sriminosari. 2. RESEARCH METHODS 2.1. Study Area The research was done in the area of mangrove forests in the village of Sriminosari sub-district of Labuhan Maringgai East Lampung district that is currently being developed as an ecotourism district.

 The research was carried out in NovemberJanuary 2019. mangrove type density, and the types of biota. While secondary data are tidal data, publication reports, literature studies, and supporting maps. 2.3. Data Analysis 2.3.1 Mangrove Tourism Suitability Analysis Tourism activities that will be developed, adapted to the potential of natural resources and the allocation because it requires a certain criterion. Determination of Tourism Suitability Index (IKW) is done by using the following formula [4]: Figure 1 Research location Determination of station observations done with the purposive sampling method and must be indicated or

represent any zone of mangrove forests in the area of study that is as much as 5 point stations. The selection of the station is done with consideration of the difference in thickness of the mangrove, mangrove thickness given is the main parameter in the suitability of tourism. 2.2. Data Sources The data used in the analysis are the primary data and secondary data. Primary data is the thickness of the mangrove, mangrove species, Description: IKW = Tourism Suitability Index Ni = The value of the parameter to-i (weight x score) Nmaks =The maximum value of a tourism category The level of compliance of classification is divided into four areas, namely: S1 = Very Suitable, with a value of 75 – 100% S2 = Accordingly, with a value of 50 - < 75 % S3 = As conditional, with a value of 25 - < 50 % N = Not suitable, with a value < 25% Maximum value = 39 Table 1. Land suitability matrix and criteria to mangrove ecotourism. No Parameter weight Category Score Category Score Category Score Category Score S1 S2 S3 N 1 Mangrove 5 >200- thickness >500 3 2 500 -200 1 <50 0 500 (m) Mangrove 3 > 10-15 2 density >15-20 3 2 50-10 1 <5 0 (100 m2) 3 Mangrove 3 >5 3 3 – 5 2 1 - 2 1 0 0 type 4 Tidal (m) 1 0 - 1 3 >1–2 2 >2-5 1 >5 0 5 Biota object 1 Fish, 3 Fish, 2 Fish, 1 One of 0 shrimp, shrimp, mollusca the crabs, crabs, aquatic mollusca, mollusca, biota reptiles, birds Source: [4]. Advances in Engineering Research, volume 202 65 3. RESULTS AND DISCUSSION 3.1 Mangrove Ecotourism Suitability Analysis 3.1.1. Mangrove Thickness Based on the results of the calculation of the thickness of the mangrove Pandan Village Sriminosari conducted at 5 station points by analyzing Google Earth satellite imagery and visualization using Drone Dji Phantom 4 (recording on January 19, 2019) mangrove thickness obtained ranged from 399 to 1,492 meters with an average thickness of 810 2 meters. The thickness of the mangrove at each location research station (see Figure 2). At the location of Station 1 it was found that the thickness of the mangrove reached 399 meters because at this Station I the mangrove ecosystem grew very close to the ponds and residents' fields. Similarly, at the locations of Station II and Station III which also grew very close to the ponds and rice fields owned by residents, mangrove thickness values were obtained, each reaching 543 meters and 712 meters. Figure 2 Mangrove thickness. 3.1.2. Species and density of the

mangrove Based on the results of research in the field of mangrove species found in Sriminosari Village (See Table 2). Table 2. Mangrove species. No. Mangrove Species Station I II III IV V 1 Avicenna marina + + + + + 2 Rhizophora mucronate + + - + + 3 Avicenna officinalis - - + + + 4 Rhizophora apiculata + + + + + Source: Data processed (2019). Then, the density of mangrove species in each station can be seen in Table 3. Table 3. Density of mangrove types in each station. Station of Observation Density (ind/ha) Seedling Stake Tree Station I 166.7 1566.7 2366.7 Station II 233.3 2266.7 2933.3 Station III 333.3 1900 3466.7 Station IV 325 1975 3550 Station V 240 2380 3660 Source: Data processed (2019). The results of the analysis of vegetation data with the quadrant method at 5 sampling stations obtained the average data density of mangrove species at each station. Species density at all observation stations was found mangrove stands> 1,500 ind/ha except in the seedling phase > 1,000 ind/ha. The analysis results obtained vegetation density in the entire observation station that is in the seedling phase ranges from 166.7 - 333.3 ind/ha, the sapling phase ranges from 1566.7 - 2380 ind/ha, and the tree phase ranges from 2366.7 - 3660 ind/ha. The highest density of mangrove vegetation in the seedling phase was found at Station III at 333.3 ind/ha. The highest sapling phase and tree phase were found at Station V which were 2380 ind/ha and 3660 ind/ha. Meanwhile, the lowest vegetation density in the seedling, sapling and tree phases was found in Station I, namely 166.7 ind/ha, 1566.7 ind/ha and 2366.7 ind/ha. 3.1.3. Tidal Tidal data obtained from the Climatology and Geophysics Meteorological Agency (Lampung Maritime Meteorological Station) shows that the average tidal waters of East Lampung Regency included in the Bakauheni Lampung waters in 2018 were 0,6 meters. In 2018 the minimum high tide is 0.1 meters and the maximum or highest tide is 1,1 meters (in January, February, July, and August). Advances in Engineering Research, volume 202 66 (Source: Lampung Maritime Meteorological Station processed, 2019) Figure 3 Graphic of tidal waters of East Lampung regency in 2018. 3.1.4. Biota object. In the Pandan Alas mangrove forest, Sriminosari Village, several biota objects can be found, including birds, crabs and fish. There are about 20 species of birds that can be found from 10 families (See Table 4). Table 4. Biota objects

found in Pandan Alas Mangrove Ecotourism. No. Object of Biota Scientific Name Station I II III IV V 1 Ikan Glodok Cerithidae cinglelata + + + + + 2 Ular Bakau Myron richarsonii - - - + + 3 Kepiting Bakau Scylla sp + + + + + 4 Kupu-kupu Rhopalochera - - + - + 5 Tupai Tupaia sp. + - - + - 6 Burung Blekok Sawah Ardeola speciosa - - + + + 7 Burung Kuntul Molusca Ardea alba - + + + 3.2. Mangrove Ecotourism Suitability Index Analysis Based on the results of calculating the suitability of tourism in the Pandan Alas mangrove area, Sriminosari Village is included in the very suitable category (S1) to be developed as a mangrove tourism with a suitability index value of 92.31%. The results of calculating the tourism suitability index for each station (Table 5). At Station I got a value of 76.92% included in the S1 category (Very Suitable), Station II received a value of 89.74% included in the S1 category (Very Suitable), Station III earned a value of 89.72% included in the S1 category (Very Suitable), Station IV get a value of 92.31% included in the category S1 (Very Suitable), and Station V get a value of 92.31% included in the category S1 (Very Suitable). Table 5. Tourism suitability index (IKW). Station Value IKW (%) Category Station I 76.92 S1 Station II 89.74 S1 Station III 89.74 S1 Station IV 92.31 S1 Station V 92.31 S1 Source: Data processed (2019). According to [6] mangrove ecotourism activities will be achieved well if there is a large enough space in the mangrove ecosystem. Ecotourism management will be able to run if it aims to support sustainable tourism development based on the principle of ecotourism that is aligning between environmental management, ecosystem management, and mangrove ecotourism development. 4. CONCLUSION Based on the results of the IKW calculation, overall, the Pandan Alas mangrove forest in Sriminosari Village is included in the very suitable category (S1) for tourism development when referring to the density, the number of species, tidal and biota diversity parameters with a suitability index value of 92.31%. From these results, the mangrove forest of Sriminosari Village deserves to be used as mangrove ecotourism because the 5 calculated parameters meet the requirements in addition to having an unspoiled mangrove condition and growing very well. REFERENCES [1] Spalding, M., Kainuma, M., Collins, L World Atlas of Mangrove. 2010. Earthscan, London, UK [2] Yulianda, F., Fachrudin, A., Hutabarat, A. A.,

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