ICMACES

International Conference on Marine and Coastal Engineering and Sciences 2019

August 23 - 24, 2019
Emersia Hotel Lampung, Indonesia

Sponsor by :

Akuakultur TROBOS Aqua AGRINA

Citra, Puspitaningrum

RECTOR REMARKS

Our Prestigious Vice Rectors of the University of Lampung, Head of all Lampung Provincial Officersor their representatives, Dean of all faculties in the University of Lampung,Head of Research and Community Services of UBL, UIN, ITERA and University of Saburai or their representatives, Head of Environment and Marine and Fisheries Agencies throughout Lampung Province,Distinguished Keynotes speakers, participants and guests.

Ladies and Gentlemen
AssalammalaikumWr. Wb.
Good Morning and Welcome to International Conference on Marine and Coastal Engineering & Sciences (ICMACES) 2019
Tabik pun…

First of all I would like to thank all of you tojoinin this International Conference on Marine and Coastal Engineering and Sciences 2019 as one of *Dies Natalis* agendas of the University of Lampung.
I should also take this opportunity to express my appreciation to 6 personsof our keynote speakers:

1. **Prof. RokhminDahuri our former Ministry of Marine Affairs and the Head of Indonesia Aquaculture Society**
2. **Prof. Rhohei KADA, Ph.D. from Shijonawate-Gakuen University and and Research Institute for Humanities and Nature, JAPAN**
3. **DR. Takahiro SAYAMA from Kyoto University, JAPAN**
4. **DR. Normawaty Binti Mohammad Noor from IIS Universiti, Malaysia**
5. **Prof. Dr. Eng. Warsito, MSc. (Indonesian Education Representative in France – Ministry of Education of Indonesia)**
6. **Prof. DR. Mustofa Usman, MA. (Director of Graduate School – University of Lampung)**

I would also like to thank participants for joining us and sharing your valuable researches, experiences and ideas. It is essential to bring together experts and other stakeholders in the field of Marine and Coastal Engineering and Sciences here in Lampung.

Ladies and Gentlemen,
Indonesia is known to be the largest archipelago country with more than 17.000 islands with its long of coastal line reaching up to 99,093 km and 6.315.222 km^2 of total seawater areaand the third biggest population number in the world. Indonesia is also laid in the ring of fire of the world, making more complex and even high in biodiversity which is the 2nd mega biodiversity after Brazil. Therefore, it is necessary to wisely manage the marine and coastal resources which become one of our challenges to conserve the natures.

It is known that Indonesian coastal area is commonly inhabitant. More than 300 Indonesian' tribes are inhabitant in the coastal land. Therefore, empowering of the coastal people should be taken into account for coastal and marine management. Coastal line changes have been widely occurred, converting mangrove and seagrass ecosystem into maricultures such as shrimp and fish ponds, recreational area, ports and else, which effectively change among other coastal ecosystems, one of which is coral reefs. It has been known that those three coastal ecosystems are well contributing in declining the global warming by increasing their ability as part of blue carbon storage, which related to the Indonesian government decree, implementing *Sustainable Development Goals* No. 14 to reduce as much as 29% of its emission gas by year 2030. Therefore, it is necessary to elucidate any potential engineering on restoring of the coastal ecosystems to reduce the climate change effects.

On the other hand, natural disasters affected by the ring of fire facts should be taken for deeply consideration in order to lessen damage which are commonly occur across Indonesia. In year 2018, at least 3 major natural disasters occurred, Lombok, Palu and Sunda Strait. And recently, on August 2nd 2019 we had some earthquake along the Hindia ocean near to Banten. It is aware that policies to respond to natural disasters in Indonesiaare still in developing, need to develop

strategies to deal with each of these different types of disasters.

To response to that challenges, The University of Lampung within our *Dies Natalis* Agendas, present "**International Conference on Marine and Coastal Engineering and Sciences**" here in Bandar Lampung, Indonesia on August 23-24, 2019. There are 10 topics presented in this conference as follows:

1. Mariculture supporting blue economics
2. Coastal Social Empowering
3. Marine Biology
4. Marine and coastal Management and Services
5. Coast and small Islands Policies
6. Coastal and Marine Mitigation
7. Oceanography and Climate Changes
8. Coastal Engineering
9. Marine Biosystem and Informatics
10. Early warning system on marine disaster

With all of these topics in this International Conference on Marine and Coastal Sciences, therefore, I believe that we can gather all many aspects related to marine and coastal study, function and uses for their benefits to humankind. We are expecting the conference will produce not only papers but also some remarks which necessary help policy makers, especially those are Provincial Officers.

Finally, Thank You for your participation and looking forward to having productive discussion among participants.

Wassalammualaikum Wr. Wb.
Bandar Lampung, August 23rd 2019

LIST PARTICIPANTS ICMACES 2019

No. id	Paper Title	Author	Category
01	Isolation and Characterization of Cellulase Producing *Bacillus* sp. From Hanura Mangrove Forests	**SumardiSumardi**, Christina NugrohoEkowati, Salman Farisi and CahyaIntanListiyorini	Paper
02	Selection and Characterization of Mannanolytic*Bacillus*sp. From Hanura Mangrove Forests	**DwiEkaRahmawati**, Christina NugrohoEkowati, Salman Farisi and SumardiSumardi	Paper
03	Lipid Contain of Three Microalgae on Culture With Different Salinity And pH	**InasFadhilah**, Tia Annisa, Endang L. Widiastuti and Henni W. Maharani	Poster
04	Taurine Content Of Three Different Macroalgae: *Halimedaopuntia*L., *Sargassum*sp. and*Eucheumacottonii*L.	**UlfaAzzizah**, EndangLinirinWidiastuti and HenniWijayanti Maharani	Poster
05	Preeliminary Study: Coral Fish And Plankton Abundance on The Coral Transplation Site of Mahitam Island Lampung Bay	**M KhairulAnam**,Endang L. Widiastuti and Henni W. Maharani	Poster
06	Artificial Light Colours Could Increase Growth and Valuable Fatty Acid of *Nitzschia*sp. (Bacillariophyceae)	**DiahNoerdjito** and DiahNoerdjito	Paper
07	Analysis of Fishermen Attitude Response on Fisheries Insurance In Bandar Lampung City, Lampung Province	**Mutiara Rona**, IndraGumayFebryano, Abdullah AmanDamai, Hartoyo and Erna Rochana	Paper
08	Community-Based Water Management in Coastal Area of Dente Teladas Village, TulangBawang District, Lampung Province	**Vina Olivia Indraswati**,EndangLinirinWidyastuti, IndraGumayFebryano, Hartoyoand Supono	Paper
09	The Quality And Mineral Content of The Public Salt Conventional in Kupang City and Kupang District East Nusa Tenggara Province	**Umbu P. L. Dawa**, Dewi S. Gadi and Yunialdi H Teffu	Paper
10	Analysis of Suitability of The Mangrove Ecotourism Area Pandan Alas Sriminosari Village LabuhanMaringgai East Lampung	**Ahmad Herison**, AriefDarmawan and Citra Puspitaningrum	Paper
11	Tidal Current Pattern in The Surrounding Bintan Island	**Ahmad Bayhaqi**, AnnisaKusumaFajari,	Paper

15.15 16.00 **Moderator** Dr. MelyaRiniarti	Bintan Island Waters Based on Model Simulation	AnnisaKusumaFajari, DewiSurinati and NurinHidayati
	Study of Generalized Pareto Distribution to Flood Disaster Mitigation in Bandar Lampung	**AchmadRafliePahlevi,**Khoirinnisa, Warsono and Mustofa Usman
	Analysis of Fishermen Attitude Response on Fisheries Insurance In Bandar Lampung City, Lampung Province	**Mutiara Rona,** IndraGumayFebryano, Abdullah AmanDamai, Hartoyo and Erna Rochana
	Groundwater Management for Small Islands and Spatial Patterns	**JakaSuryanta**
	Perceptions of Fishermen and The Government on The Implementation of The Cantrang Fishing Ban in Teluk Lampung, Lampung.	**Debi Hardian,**Supono, IndraGumayFebryano, Abdullah AmanDamai and EndangLinirinWidiastuti
	The Quality And Mineral Content of The Public Salt Conventional in Kupang City and Kupang District East Nusa Tenggara Province	**Umbu P. L. Dawa**, Dewi S. Gadi and Yunialdi H Teffu
	Bioconcentration of Cadmium Heavy Metal (Cd) on *Perna viridis* (Linnaeus, 1758) Cultivated in Pasaran Island Waters, Lampung, Indonesia	**Henni Wijayanti Maharani,** Nurulita, Herman Yulianto, Eko Efendi, Putu Cinthia Delis
16.30 17.00 Moderator RaraDiantari, S.Pi., M.Sc.	Community-Based Water Management in Coastal Area of Dente Teladas Village, TulangBawang District, Lampung Province	**Vina Olivia Indraswati,** Endang Linirin Widyastuti, Indra Gumay Febryano, Hartoyo and Supono
	Analysis of Suitability of The Mangrove Ecotourism Area Pandan Alas Sriminosari Village LabuhanMaringgai East Lampung	**Ahmad Herison**, Arief Darmawan and Citra Puspitaningrum
	Analysis of Urban Fabric: An Integrated Coastal Zone Management (ICZM) Approach for Sustainable Tourism Development in The Coastal Area of Bandarlampung	**Citra Persada**, Yunita Kesuma and Fadhilah Rusmiati
	Empowerment and Qualify Women's Home-Based Workers In The Lens of The Home Industry in Coastal Communities	**Novita Tresiana** and Noverman Duadji
	Territorial Fulfillment of Children's Rights	**NovermanDuadji** and Novita Tresiana
	The Tourism Concept of Emergency Shelter: A Strategies for Community Resilience in The Costal Area of South Lampung	**FadhilahRusmiati,** Citra Persada and Dini Hardilla

No. Id : 10

ANALYSIS OF SUITABILITY OF THE MANGROVE ECOTOURISM AREA PANDAN ALAS SRIMINOSARI VILLAGE LABUHAN MARINGGAI EAST LAMPUNG

Ahmad Herison, Arief Darmawan and Citra Puspitaningrum

ABSTRAK

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*

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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.

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INTRODUCTION

Mangrove forests in Indonesia have almost 25% of the world's mangrove forests of 15.24 million ha (Spalding et al., 2010). 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 (the Ministry of forestry, 2010).

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 (Bengen, 2002).

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.

RESEARCH METHODS

Time and Location of Research

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 November-January 2019.

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 station. 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 conformity of tourism.

The Data Source

The data used in the analysis are the primary data and secondary data. Primary data is the thickness of the mangrove, mangrove, mangrove type density, and the types of biota. While secondary data is the tidal data, reports, studies of librarianship, publications and maps supporters While secondary data are tidal data, publication reports, literature studies, and supporting maps.

Data analysis

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 criteria. Determination of Tourism Suitability Index (IKW)is done by using the following formula (Yulianda, 2007):

$$IKW = \sum \left(\frac{Ni}{Nmax} \right) x\ 100\ \%$$

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 isdivided into four areas, namely:

S1 = Very Suitable, with a value of 75 – 100%

S2 = Accordingly, with a value of50 - < 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	Parameters	weight	Category S1	Scor	Category S2	Scor	Category S3	Scor	Category N	Scor
1	Mangrove thickness (m)	5	>500	3	>200-500	2	500 - 200	1	<50	0
2	Mangrove density (100 m2)	3	>15-20	3	> 10-15 >20	2	50 - 10	1	<5	0
3	Mangrove type	3	>5	3	3 – 5	2	1 - 2	1	0	0
4	Tidal (m)	1	0 - 1	3	>1 – 2	2	> 2 - 5	1	>5	0
5	Biota object	1	Fish, shrimp, crabs, mollusca, reptiles, birds	3	Fish, shrimp, crabs, mollusca,	2	Fish, mollusca	1	One of the aquatic biota	0

Source: Yulianda (2007)

RESULTS AND DISCUSSION

Mangrove Ecotourism Suitability Analysis

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 *Drones 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)

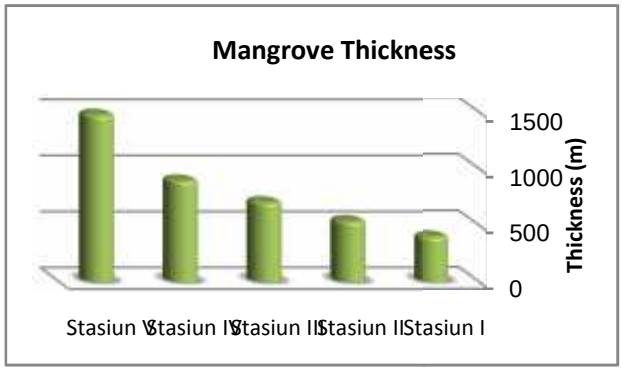

Figure 2. Mangrove Thickness

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.

The mangrove ecosystem at Station IV has a thickness of up to 905 m which is located close to the river water flow and is closer to the mainland and the location of mangrove ecotourism so that the influence of seawater or salinity is less. While at Station V the mangrove thickness value was 1492 m. The mangrove ecosystem at Station V is far from the activities of residents and tourist sites and is directly facing the sea so that the condition of the mangrove ecosystem at this station is always inundated by water at normal tides, so the influence of seawater in it becomes higher.

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	*Avicennia marina*	+	+	+	+	+
2	*Rhizophoram ucronata*	+	+	-	+	+
3	*Avicenniaoffi cinalis*	-	-	+	+	+
4	*Rhizophoraa piculata*	+	+	+	+	+

Source: Data processed (2019)

At Station 1, Avicennia marina and Rhizophora mucronata species are

the dominant mangrove vegetation types with a total mangrove density of 4,100 trees/ha. Station II is dominated by Rhizophora mucronata species with a total density of 5,433 trees/ha. Station III is dominated by Avicennia marina vegetation with a total mangrove density of 5700 trees/ha. Station IV is dominated by Avicennia officinalis vegetation with a total mangrove density of 5850 trees/ha.

While on station V is dominated by *Avicennia marina* species with a total mangrove density of 6280 trees/ha.Based on the decision of the Minister of the Environment No. 201 of 2004 concerning the standard criteria and guidelines for determining mangrove damage, that the potential of the mangrove ecosystem at all stations for the category of trees is included in the good criteria of <1500 trees/ha.

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.

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).

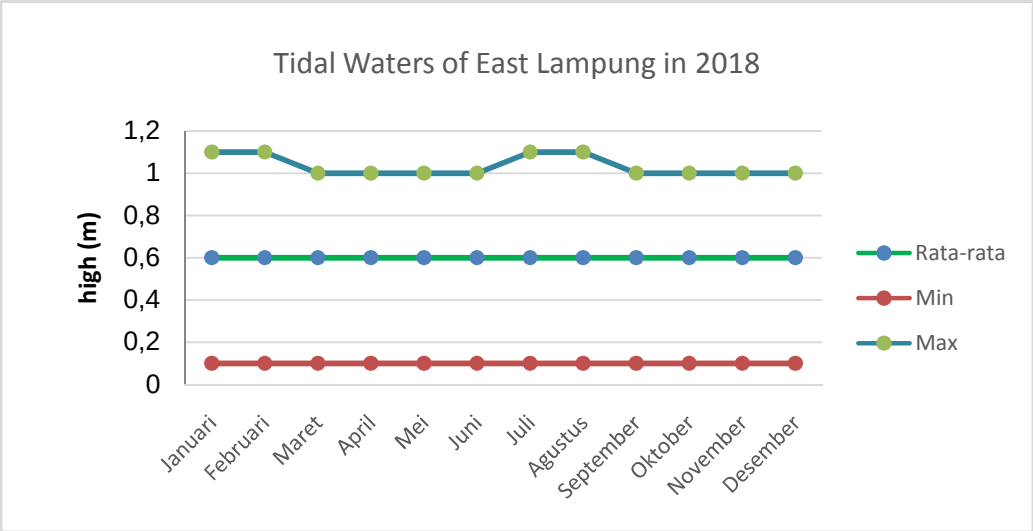

Figure 3. Graphic of Tidal Waters of East Lampung Regency in 2018
(Source: Lampung Maritime Meteorological Station processed, 2019)

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 5).

Mangrove Ecotourism Suitability 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%.

Table 4. Biota Objects found in Pandan Alas Mangrove Ecotourism

No	Object of Biota	Scientific name	Station				
			I	II	III	IV	V
1	IkanGlodok	*Cerithidaecinglelata*	+	+	+	+	+
2	Ularbakau	*Myron richarsonii*	-	-	-	+	+
3	Kepitingbakau	*Scylla sp*	+	+	+	+	+
4	Kupu-kupu	*Rhopalocera*	-	-	+	-	+
5	Tupai	*Tupaiasp*	+	-	-	+	-
6	BurungBlekoksawah	*Ardeolaspeciosa*	-	-	+	+	+
7	BurungKuntul	*Ardea alba*	-	+	+	-	+
8	Molusca		+	+	-	-	+

Source: Data processed (2019)

The results of calculating the tourism suitability index for each station (See table 6)

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)

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).

According to Agussalim and Hartoni (2014), 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.

CONCLUCION

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.

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