Evaluation of the Suitability of Mangrove Conservation Land to Mangrove Ecology and Aquatic Physical-Chemical Parameters in the Natural Tourism Area of the Paiton Power Plant Area

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Abstract: Mangrove is a plant that grows between the tidal lines. Mangrove forest plays important ecological and economical functions, but highly vulnerable to damage if less wise in maintaining, preserving and management. This study had been conducted in mangrove conservation land in the natural tourism area of the Paiton PLTU coastal area of East Java Province. The aims of this study were to find out the structure of the mangrove community and to know the condition of the waters in the mangrove conservation land in the coastal area of the Paiton power plant. The method used was the line transects method and sampling by determining the quadrant location of water conditions sampling. The data was processed with community structure analysis and analysis of pollution indices based on the physical-chemical parameters of the waters. There were 3 mangrove species being identified in mangrove conservation land in the coastal area of the Paiton power plant Is., those are : *Rhizophora mucronata, Rhizophora apiculata,* and *Rhizophora stylosa.* Result of the analysis showed mangrove ecosystem was in stable condition yet. It is based on the value of the diversity index in the low category (Tree level H '= 1.01, Stake level H' = 0.83, and Seedling level H '= 0.67). Whereas the important value index shows a high value at the habitus level (Tree = 300) and is classified as moderate at the habitus level (Shrubs = 0.66 and Stakes = 1.00). Environmental factors used based on the physical-chemical parameters of water show values such as temperature 30-32 temperature C, salinity 30-34 ppt, pH 7-8 ˚C, and dissolved oxygen 5-6 mg / L. This value is good enough for mangrove growth.

I. INTRODUCTION

Mangrove ecosystems (mangrove) provide many benefits, including those that are direct or indirect. One of the indirect benefits of mangroves is their role in carbon sequestration (Nasprianto et al., 2016). Another benefit of the mangrove ecosystem that can be utilized directly is as an object of natural tourism and ecotourism (Gunggung and Muhammad, 2016). Various functions and benefits of mangrove ecosystems make the target resources to be managed by coastal communities (Rudianto, 2018). Mangroves have important ecological and economic functions, but are very vulnerable to damage if they are not wise in maintaining, preserving and managing. The number of muddy coastal areas around the Paiton power plant as a habitat for mangroves has its own potential in developing mangrove conservation (Putra et al., 2018). Development of potential mangrove ecosystems can play a direct role in the state of coastal ecosystems (Saru, 2014). Mangrove ecosystems have potential attraction objects to support the development of natural tourism (Agussalim and Hartoni, 2014). Coastal and marine natural tourism not only sells destinations or objects, but also preserves nature so that it can increase the attractiveness in the sector of natural resource conservation, the economy, and tourism (Hartanti et al., 2018).

Utilization of mangrove ecosystems as natural tourism without integration of management principles will tend to damage the mangrove ecosystem itself (Magdalena, 2015). At present many mangrove ecosystems have been converted for human benefit. In general, the conversion of mangrove lands into areas of use that are considered to be more economically profitable (Hoberg, 2011; and Sreeja et al., 2010 in Zulkarnaini and Mariana, 2016), but have an impact on the declining ecological function of supplying nutrients and germplasm in coastal areas (Flavo et al., 2011). The mangrove ecosystem in the Pareho II mangrove conservation area, Paiton PLTU natural tourism area which is the utilization zone of PT PJB Paiton Generating Unit, is currently experiencing pressure as indicated by the lack of development since 2014, so that it can threaten the potential it has, both from mangrove ecosystems and the environment as the carrying capacity of their habitat. Mangrove conservation land in the Paiton power plant area interacts directly with industrial activities, as well as various human activities including CSR programs for empowering the surrounding community by utilizing them as natural tourism areas (Putra et al., 2018).

One form of threat to mangrove ecosystems arising from human activities will affect the carrying capacity of habitats. Evaluation of mangrove conservation land by knowing the structure of the mangrove community in the Paiton power plant area and testing the water conditions in the region are the main parameters that can be done. The parameters tested are used to determine the suitability of the mangrove conservation land to the mangrove ecosystem in the location. This research was conducted to determine the types, frequencies, densities, dominance and important value indices that show mangrove ecosystems in conservation lands, as well as to test the physical chemistry factors of waters by comparing existing quality standards, then can be used as scientific considerations in mangrove conservation land management in accordance with the principle of management.

II. METHODOLOGY

The study was conducted in March - December 2019 on mangrove conservation land in the natural tourism area of the Pareho 2 region in the utilization zone of PT PJB UP Paiton, kec. Paiton, Situbondo, East Java. The research location is in the area of PT PJB UP Paiton which is geographically located at 7 ° 42'0 "- 7 ° 45'0" LS and 113 ° 33'0 "- 113 ° 40'0" BT. Data collected includes primary data and secondary data. The type of primary data taken is physical data in the form of ecological aspects including the structure of the mangrove community and the physical chemistry parameters of the waters, while the secondary data collected includes the physical condition of the mangrove conservation area, the general condition of the area, management policies in the surrounding area within the mangrove conservation zone of PT. PJB Up paiton, and quality standards as a comparison to the results of research conducted at the site.

2.1 Mangrove Community Structure

The method used in this study is Transect Line Plots Method (plot line transect method). The direction of line transects is determined by a compass compass, with a minimum of 3 plots to represent species between transects. A 100 m rope was installed at the point of the sampling location. For tree habitus the plot size is 20 m x 20 m, the stake habitus size of the transect is 10 m x 10 m, the pole habitus of the transect size is 5 m x 5 m, and the seedling habitus for the transect size is 2 m x 2 m. On each plot, determined by each type of plant (stand), is counted by the number of individuals of each species. Next, measured the diameter of the stem (Girth at Reast Height) for trees at a height of 1.3 meters using a sewing meter for direct diameter measurement, where the measurement is used to determine the diameter at breast height (Diameter at Breast Height). For tree habitus, the diameter of the trunk is> 20cm, the saplings are 10-20cm, the diameter of the trunk is <10cm and the height is> 1.5m, and the seedlings are diameter <10cm and the height is <1.5m. Each plot was identified by species and then measured in diameter (Bengen, 2001).

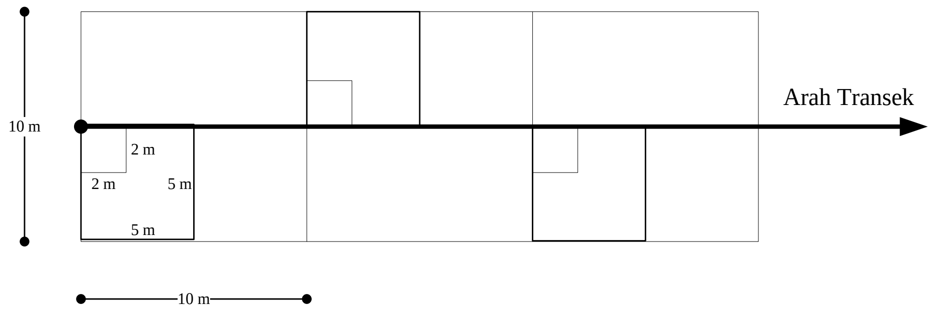

Figure 2.1 Plot of vegetation analysis data collection (Putra et al., 2018).

The observation plot placement method was carried out by purposive sampling based on the consideration of the presence of mangroves in Pareho II mangrove conservation area PT PJB UP Paiton, which includes:

a. The size of 10 m x 10 m is used for tree growth rates (t> 1.5 m; O ≥ 10 cm) with data collected in the form of species, number of individuals, and diameter.

b. The size of 5 m x 5 m was used for the growth rate of the stake (t> 1.5 m; O <10 cm), the data collected in the form of types and number of individuals.

c. The size of 2 m x 2 m is used to calculate the rate of seedling growth (t <1.5 m), the data collected in the form of types and number of individuals.

2.2 Physics - Aquatic Chemistry

Observation parameters in this study are physical and chemical parameters that affect the condition of mangrove conservation land, carried out through an ecological approach based on the principles of biological science, namely the prominent interrelations between the mangrove ecosystem and its environment. The purpose of this approach is to examine the suitability of mangrove conservation land conditions by taking into account the interaction of mangroves with their environment. Water quality data is carried out by taking seawater samples, which are taken as a water physics-chemical test at 3 retrieval stations with 2 repetitions and conducted at the Environmental Biotechnology Laboratory, ICBB, Bogor, West Java. The physical physics chemistry test parameters are presented in table 2.1.

Table 2.1 Measurement Parameters

No.	Environmental Factor	Unit	Method / Tool	Information
	Water Chemical - Physics			
1	Brightness	m	Sechidisk	Insitu, Laboratory
2	Turbidity	NTU	Turbidimeter	Insitu, Laboratory
3	Total Suspended Solid / TSS	mg/L	Gravimetri	Insitu, Laboratory
4	Temperature	^{0}C	Termometer	Insitu
5	Salinity	psu	Handrefraktometer	Insitu
6	Acidity / pH	^{0}C	Ph meter	Insitu
7	Disolved Oxygen / DO	mg/L	DO meter	Insitu
8	Nitrat NO_3-N	mg/L	Brucine acetat/ APHA 4500 NO3-B:2012	Insitu, Laboratory
9	Amonia Total NH_3-N	mg/L	SNI 19-6954.3:2003	Insitu, Laboratory

2.3 Data Analysis

The data obtained were analyzed descriptively and the results were interpreted through the table. In the analysis of mangrove ecosystem vegetation, the data taken are absolute frequency (Fa), relative frequency (Fr), absolute density (Ka), relative density (Cr), absolute dominance (Da) and relative dominance (Dr). From the above data we will know the Important Value Index of each species (Noor et al, 1999; Bengen 2000 in Agustini, 2016). Whereas in classifying the physical chemistry parameters of the waters the coastal water body index formula will be used where the results of the analysis are compared with the quality standards of Government Regulation Number 82 of 2001 concerning Management of Water Quality and Water Pollution Control in Indonesia and State Minister of Environment Decree Number 51 Year 2004 concerning Sea Water Quality Standards for Marine Biota (KEPMENLH. No.51 of 2004 in Baigo, 2018).

III. RESULT AND DISCUSSION

3.1 Mangrove Community Structure

Based on observations and identification of Table 3.1 and Table 3.2 that mangroves in the mangrove conservation area in the natural tourism area of Paiton Power Plant consist of 1 family with 3 types of mangroves, namely *Rhizophora apiculata*, *Rhizopora mucronata*, and *Rhizopora stylosa*. The measured mangrove community structure includes; diversity index (H '), relative density (Kr), relative frequency (Fr), relative dominance (Dr), and importance value index (INP) studied consisted of several levels of habitus, namely trees, saplings and seedlings. The measured mangrove community structure was used as a parameter of the evaluation of the suitability of mangrove conservation land in the Paiton PLTU natural tourism area.

3.1.1 Diversity Index (H ') Mangroves

Based on the results of research in the location of the mangrove diversity index in Table 4.1 shows the highest H 'value in the tree H' habitus data that is equal to H '= 1.01, while in the sapling data H' = 0.83 and diversity index based on nursery seedlings H '= 0.67 which shows the lowest H 'value. This can be seen from the number of species in an area, the more the number of species, the higher the value of diversity. The diversity of mangrove vegetation types is known by the Shannon-Wiener diversity index (Ludwig and Reynold, 1988 in Noor et al., 2012).

Table 3.1 Diversity of Mangrove Species

No.	Jenis	Indeks Keanekaragaman (H’)
1	Pohon	1,01
2	Pancang	0,83
3	Semai	0,67

Based on the criteria stated by Bengen (2000) in Agustini (2016), in general the value of the diversity index of mangrove species found in mangrove conservation land in the Paiton PLTU natural tourism area is classified as low with a value of H 0 0 ≤ H ≤’1. A community that has a low complexity because the interaction between species that occur in the community is not good. In addition this can occur because in one community there is one type of the same family (Bengen, 2000 in Agustini 2016).

3.1.2 Relative Density (Cr) of Mangrove Species

The density of a species in a community is the number of individuals or species per sample area. Conversely, relative density is a way to determine the density of species against all types based on the percentage of a type (Amir, 2012). The high or low relative density of mangrove species in a research location is influenced by the number of species found in the study area. Based on observations made in the field, the relative density can be seen in Table 3.2.

Table 3.2 Mnagrove Community Structure Based on Habitus Level

No.	Species Name	Amount	K	KR	F	FR	D	DR	INP
Tree									
1	*Rhizophora mucronata* (Bakau hitam)	2	40	15.39	0.4	38.09	0.47	15.92	69.40

No.	Species Name	Amount	K	KR	F	FR	D	DR	INP
2	*Rhizophora stylosa* (Bakau)	6	120	46.15	0.4	38.09	1.21	40.92	125.17
3	*Rhizophora apiculata* (Bakau minyak)	5	100	38.46	0.25	23.81	1.27	43.16	105.43
	TOTAL	13	260	100	1.05	100	2.95	100	300
Stake									
1	*Rhizophora stylosa* (Bakau)	22	1760	44.90	0.6	27.27	-	-	72.17
2	*Rhizophora mucronata* (Bakau hitam)	2	160	4.08	0.8	36.36	-	-	40.44
3	*Rhizophora apiculata* (Bakau minyak)	25	2000	51.02	0.8	36.36	-	-	87.38
	TOTAL	49	3920	100	2.2	100	-	-	200
Seedling									
1	*Rhizophora apiculata* (Bakau minyak)	4	1000	40	0.4	33.33	-	-	73.33
2	*Rhizophora stylosa* (Bakau)	6	1500	60	0.8	66.67	-	-	126.67
	TOTAL	10	2500	100	1.2	100	-	-	200

The highest relative density value is the type of *R.stylosa* with Kr = 60 in seedling habitus, in sapling habitus kr = 51.02 R.apiculata and habitus seedling kr = 60 R.stylosa. Some experts such as Chapman (1977) & Bunt, Williams (1981) in Noor, (2012) state that it is closely related to soil type (mud, sand or peat), openness (against wave blows), salinity and tidal effects . Types such as *R.stylosa* grow well on sandy substrates, (Ding Hou, 1958 in Noor, 2012).

3.1.3 Relative Frequency (Fr) Mangrove Species

The relative frequencies obtained show mixed results, these results are presented in Table 3.2. In the habitus of the *R.mucronata* and *R. stylosa* trees showed the same relative frequency values ie Fr = 38.09 and *R.apiculata* showed lower values namely Fr = 23.81. Whereas in the habitus of *R.mucronata* and *R.apiculata*, the values were also the same, Fr = 36.36 and *R.stylosa* showed lower values Fr = 27.27. Relative frequency can describe the spread of a species that exists in one ecosystem. This is in accordance with the opinion of Pramudji (2001) in Usman (2013), that on mud and mushy soils are overgrown by *R.apiculata* and *R.mucronata* mangrove species with an even and wide distribution, whereas in sandy and choppy coastal areas the growth of vegetation is large mangrove is not optimal. From the results in the field for seedling habitus level showed different values of the 2 types found, namely Fr = 33.33 at lower *R.apiculata* and Fr = 66.67 at *R.stylosa*. This is in accordance with Pramudji's (2000) opinion in Usman (2013), that the high and low relative frequency values are caused by unequal competition between mangrove species that occupy the same habitat, so they are less competitive in obtaining nutrients.

3.1.4 Relative Dominance (Dr) Mangrove Species

The value of relative dominance obtained is *R.mucronata* with Dr = 15.92 which shows the lowest value at the tree habitus level, *R.stylosa* Dr = 40.92 and the highest relative dominance value at the tree level is *R. apiculata* Dr = 43 , 16. Whereas at the level of habitus stumps and seedlings the relative dominance and dominance index values were not obtained from observations in the field. The dominant type has a large productivity where in determining a type of dominant vegetation that needs to be known is the diameter of the stem, this study index of dominance and relative dominance is shown at the level of tree habitus that has the largest diameter (Odum, 1994 in Agustini, 2016).

3.1.5 Importance Value Index (INP)

Based on the research results of tree habitus level presented in Table 3.2 shows the highest INP value of the *R.stylosa* species is 125.17%, while in the *R.appiculata* type is 105.43% and the lowest is 69.40% *R.mucronata*. If a type of mangrove has an important role and influence in the mangrove community, then that type will have the highest importance value index in its habitus level (Bengen, 2004) in Yostan (2015). At the habitus level the *R.stylosa* tree showed the highest INP so it had an important influence on the level of habitus. Raymond et al. (2010) add that species that obtain a high INP mean they have a larger dominant cumulative value and more control over their habitat. This type will be superior in utilizing resources or more able to adjust to the local environment.

At the level of habitus, the type of *R.appiculata* had the highest INP, 87.38%, while the type of *R.stylosa* showed INP 72.17% and the lowest was 40.44% *R.mucronata*. This illustrates that the influence of a type in the mangrove community is different from each level. For tree level, it has a higher INP value when compared to sapling and seedling levels, this is influenced by the greater closure value of the species resulting in a higher INP (Agustini, 2016). At the highest level of INP seedlings, the *R.stylosa* species showed a value of 126.67%, which indicated that this value was the highest value compared to other types of habitus. According to Romadhon (2008), if the INP ranges from 106-204 then it is classified as moderate, and ≤ 204 -300 is high. Whereas at the level of habitus the seedlings of *R.appiculata* had an INP of 73.33%. This is consistent with the opinion of Odum (1993) in Raymond et al. (2010) important value index that exists in a mangrove ecosystem will describe the influence and role of a type in a community.

3.2 Water Quality

Changes in environmental quality found in the coastal environment affect water quality which can directly affect the growth of mangrove vegetation (Tyagita, 2016). According to Wantasen (2013), water quality needs to be examined because it is very important for sustainability ecological processes (nutrient cycles, environmental stability, and life support systems). Physical and chemical analyzes conducted at the study site were tested directly (in situ) and laboratory tests were conducted for several parameters with the aim of knowing the physical and chemical content. The physical chemistry parameters of water are divided into 10 main measurement factors which are presented in Table 3.3.

Table 3.3 Data from Water Analysis Results

No	Environmental Factor	Unit	Quality Standards	Station		
				S1	S2	S3
1	Brightness	m	0 - 25	5,0	3,5	4
2	Turbidity	NTU	0 - 50	0,7	0,2	0,8
3	Total Suspended Solid / TSS	mg/L	0 - 80	<4	<3	3
4	Temperature	˚C	28 - 32	32,5	31,2	30,7
5	Salinity	psu	0 - 34	34	34	30,8
6	Acidity / pH	˚C	7,5 – 8,5	7,78	7,84	7,10
7	Disolved Oxygen / DO	mg/L	5 - 10	5,0	6,7	5,8
8	Nitrat NO_3-N	mg/L	0 – 75	0,4	0,3	0,2
9	Amonia Total NH_3-N	mg/L	0 – 0,3	0,03	0,03	0,02
10	Fosfat PO_4-P	mg/L	0 – 0,1	<0,003	0,004	0,003

(Minister of Environment Decree No.51 of 2004 in Juwita, 2015 and Baigo, 2018)

3.2.1 Brightness

Brightness at S1 = 5m with the highest value approaching the water quality standard as mangrove conservation land, S2 with a value of 3.5 m and S3 with a brightness value of 4m below the water surface. In general, the level of brightness of sea waters of mangrove conservation land in the natural tourism area of Paiton power plant is still relatively good in accordance with quality standards, with the level of brightness of sea water ranging from 0 - 25 meters (Juwita, 2015). The level of water transparency that can be observed at the location in Table 3.3 shows the value in accordance with the quality standard, but the low value indicates the level of brightness in the waters in the coastal area of mangrove conservation in the Paiton PLTU natural tourism area can be caused by the substrate content dominated by sand so that it is more easily carried by the flow of water and organic matter that accumulates in the water, as well as entering material from the mainland (Joshian, 2018).

3.2.2 Temperature

Temperature measurements show the results of S1 = 32.5 ˚C, S2 shows a value of 31.2 ˚C and at S3 = 30.7 ˚C. Good temperature for mangroves not less than 20 ˚C (Wishnu and Gunardi., 2017). Temperature is one of the easiest external factors to study and determine. Metabolic activity and the spread of aquatic organisms are greatly influenced by water temperature. In general, surface water temperature in mangrove ecosystems is in the range of 280C-31 -C (Nontji, 2005). Based on the results of the analysis at the 3 extraction stations presented in Table 3.3 the temperature in the sea waters of the mangrove conservation land in the Paiton PLTU natural tourism area shows an average of 30 - 32 32C, this shows that the temperature is still within normal limits with the 28 32 ˚C in waters with mangrove ecosystems. Mangroves can grow well in tropical regions with temperatures above 20 ˚C (Joshian, 2018).

3.2.3 Salinity

The condition of the waters in the mangrove conservation land in the Paiton PLTU natural tourism area at station 1 and station 2 has a maximum value of the salinity standard quality standard for mangroves, which is 34% psu and station 3 shows a value of 30.8% psu. Differences in water salinity can occur due to differences in evaporation and precipitation (Joshian, 2018). This value is in the range of 30 psu - 40 psu which shows the standard of sea waters with mangrove ecosystems (Effendy, 2003 on Wisnu and Gunardi, 2017). This is also consistent with the opinion of Bengen (2004) which states that one of the characteristics of mangrove habitat is brackish water (2-22 psu) to salty (~ 38 psu). Rhizophora sp. can tolerate a range of 32-36 psu salinity during low tide (Arif, 2003 in Juwita, 2015).

3.2.4 Degree of Acidity / Ph

Degree of acidity in Table 3.3 the pH at the S1 research location shows a value of 7.780C, at S2 = 7.840C and 7.100C at station 3. From these results it shows that the condition of the waters in the mangrove conservation land in natural tourism areas has a level of conformity to the pH value of mangrove growth. Mangroves will grow and develop well in the pH range of 6.2 - 8 (Arksornkoae, 1993 in Joshian, 2018). From the results of research at the location of the acidity (pH) in the waters of the mangrove conservation area in the natural tourism area of Paiton PLTU, it shows that the pH value is still in accordance with the quality standard that is in the range of 7 - 0 0C, where the standard quality standard degree of acidity is in accordance with the growth mangrove ie 7 - 8.50 C (Juwita, 2015). Menurtu (Dojlido and Best, 1993 in Baigo, 2018) that the pH of sea water is relatively more stable and usually in the range of 7.5 and 8.4, except near the coast. The ideal pH value for waters is 7 - 8.5.

Water conditions that are very basic or very acidic will endanger the survival of the organism because it will interfere with the metabolic process and respiration. In addition, according to (Odum, 1971 in Baigo, 2018) that the pH value is between 6.5 - 8.0 as a safe limit for the pH of waters for the life of the associated biota. The acidity of sea water affects the deposition of metals in sediments, the higher the pH value of the meal the easier it will be to accumulate metals (Wahab, 2005 in Wisnu and Gunardi, 2017). Variation in the pH value of waters greatly affects the biota in a waters. According to (Kordi and Andi, 2009 in Supriyantini, 2017), a slightly alkaline water pH can encourage the process of dismantling organic matter in water into minerals (ammonia salts and nitrates) that can be assimilated by plants.

3.2.5 Dissolved Oxygen / DO

DO values can be seen in Table 3.3, the results of the study show DO values at S1 are 5.0 mg / L, station 2 6.7 mg / L, and station 3 5.8 mg / L. Dissolved oxygen levels fluctuate daily and seasonally depending on mixing and turbulence of water masses, photosynthetic activity, respiration, and waste entering water bodies (Effendi 2003). Oxygen levels dissolved water decreases with increasing organic waste in the waters (Megawati et al., 2014). The lower DO value indicates the higher level of pollution because more oxygen is needed by microorganisms to decompose organic matter (Poppo et al., 2008 in Wisnu and Gunardi, 2017). Based on the results of the analysis presented in Table 3.3 the value of dissolved oxygen has an average of 5-7 mg / L, this value indicates an appropriate value of dissolved oxygen levels in mangrove ecosystem waters with a standard quality standard of 5-10 mg / L. The level of dissolved oxygen decreases with increasing organic waste in the waters (Megawati et al., 2014).

3.2.6 Nitrate (NO3-N)

Nitrate concentration at station 1 measurements ranged from 0.4 mg / L, at station 2 0.3 mg / L and 0.2 mg / L at station 3. Waters containing mangrove vegetation support the fertility of abundant waters. Mangrove litter that falls in the waters is further described by decomposers as the main source of detritus and degraded by decomposers into nutrients such as phosphates, nitrates, sulfur (Effendi, 2003 in Supriyantini, 2017). Based on nitrate content, the waters of the Paiton power plant mangrove conservation are included in oligotrophic waters with nitrate levels between 0 - 1 mg / l (Effendi, 2003 in Joshian, 2018). Based on the quality standard of nitrate content in the waters of the Paiton power plant mangrove conservation area is classified as low, it is shown in Table 3.3 which shows the nitrate values at stations 1,2 and 3 showing an average of 0.2 - 0.4 mg / L where the quality standard for waters with mangrove ecosystem nitrate content reaches 0 - 75 mg / L.

Nitrate (NO3) in marine waters is a primary productivity-controlling micronutrient compound in the surface layer of euphotic regions. Nitrate levels in the euphotic region are strongly influenced by nitrate transport, ammonia oxidation by microorganisms and nitrate uptake for primary productivity processes. Nitrate is the main form of nitrogen in natural waters and is the main nutrient for plant growth and algae. Nitrate Nitrates are very soluble in water and are stable. This compound is produced from the complete oxidation process of nitrogen compounds in the waters. Nitrification which is the oxidation process of ammonia to nitrite and nitrate is an important process in the nitrogen cycle and takes place under aerobic conditions. The oxidation of ammonia to nitrite is carried out by the bacterium Nitrosomonas, while the oxidation of nitrite to nitrate is carried out by the bacterium Nitrobacter (Schaduw et al., 2013).

IV. CONCLUSION

Based on the results of the study there are 3 types of mangroves identified in the mangrove conservation area of the Paiton power plant coastal area, including: *Rhizophora mucronata,* *Rhizophora apiculata,* and *Rhizophora stylosa*. The results of the analysis of mangrove vegetation indicate that the ecosystem is not yet stable. This is based on the diversity index value included in the low category (Tree level H '= 1.01, sapling level H' = 0.83, and seedling level H '= 0.67). While the important value index shows a high value at the habitus level (Tree = 300) and is classified as moderate at the habitus level (Semai = 0.66 and Stump = 1.00). Environmental factors that are used based on the physical-chemical parameters of the waters show values such as temperature 30-32˚C, salinity 30-34 ppt, pH 7-8 ˚C, and dissolved oxygen 5-6 mg / L. This value is quite good for mangrove growth.

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