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Community Structure of Mangrove Vegetation in Sapat Village, Kuala Indragiri District, Indragiri Hilir Regency, Riau Province

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ABSTRACT

Mangroves are very productive wetlands and can live in areas still influenced by tides. This research was conducted in November - December 2023 in the mangrove ecosystem of Sapat Village, Kuala Indragiri District, Indragiri Hilir Regency, Riau Province. This study aimed to determine the structure of mangrove vegetation communities in Sapat Village. This study used the survey method, and three stations were used. Mangrove species found include *Avicennia alba, Sonneratia alba, S.caseolaris, S.ovata, Nypa fruticans, Rhizophora apiculata, Bruguiera parviflora, B.gymnorhiza, B.sexangula,* and *Achantus ebracteatus*. Mangrove vegetation density at station I has very dense criteria, station II medium criteria, and III has sparse criteria. From the index aspect, the mangrove vegetation community has a diversity value (H'), which is classified as moderate, with sufficient productivity, which has a value ranging from 1.33-1.68. The uniformity value (E) of stations I and II is in the moderate category, which ranges from 0.57-0.58, and station III is classified as a high category with a value of 0.73. Moreover, the value of the dominance index (C) is classified as low, ranging from 0.21-0.3 based on the significant value. The type of *N.fruticans* dominates because they have a more excellent value than other species seen at each station in both categories of trees, saplings, and trees.

Keywords: Community structure, Density, Mangrove, Sapat Village.

1. INTRODUCTION

Mangroves are highly productive wetlands, and this is because mangroves grow in areas that are still influenced by the tides. Mangroves, as a coastal ecosystem, play a crucial role in maintaining the coastal environment's viability and providing diverse ecological benefits.

The existence of mangrove ecosystems in Indonesia is currently experiencing several serious problems. Some of the leading causes are human factors, climate change and natural resource management policies. Several human activities can cause damage to mangrove ecosystems, such as the exploitation of mangrove woo,d, which is often used for construction, firewood, and industry, which decreases mangrove populations. Mangrove forest vegetation in Indragiri Hilir Regency is spread across several sub-districts, including Kuala Indragiri District, which is precisely in Sapat Village. Based on data from the Coordinating Ministry for Maritime Affairs in collaboration with the Ministry of Environment and Forestry in 2018, the area of mangrove vegetation in Indragiri Hilir Regency is in good condition with an area of 32,851 ha, is in critical condition outside the area with an area of 68,850 ha and within the area 116,182 ha.

The mangrove forest area in Sapat Village is currently experiencing an increase in area caused by rehabilitation activities but also experiencing a reduction in area due to natural and human factors, which are undoubtedly related to its influence on changes in mangrove function (Renta et al., 2016).

Given these dynamics, this research is significant in understanding the structure of the mangrove vegetation community in Sapat Village so that it can be used as a reference in managing and preventing the threat of mangrove forest damage and provide valuable preliminary data for further research.

2. RESEARCH METHOD

Time and Place

The research was conducted from November to December 2023. Data was collected in Sapat Village, Kuala Indragiri District, Indragiri Hilir Regency, Riau Province

(Figure 1). The tools used for this research are GPS, roll meter, plastic rope, TDS meter, camera, stationery and mangrove identification book.

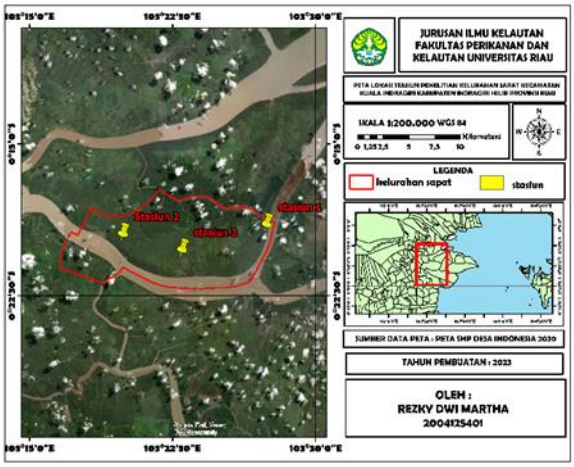

Figure 1. Research Location Map

Method

In this study, a survey method was used: observation and field data collection (ground check). The research station was determined through the purposive sampling method, namely by intentionally determining the research location by considering and paying attention to the condition of the surrounding research area. Station I is on the border of Perigi Raja near the village forest, Station II is in Sapat outside near residential areas, and Station III is in Parit 18 near a damaged plantation.

Procedures

Mangrove Vegetation Type and Density

Mangrove species were identified based on the Jurgenne primavera mangrove identification book. As many as three stations determine the research station point. Each station consists of 3 transects, and each transect consists of 3 sample plots (Transect Line Plot). In each plot for the tree category, 10 m x 10 m plots were used, 5 m x 5 m saplings, 2 m x 2 m seedlings, and a total of 27 plots. Transects and plots are spanned with a certain distance on the transect line across from the outermost mangrove boundary inland to the outermost mangrove boundary towards the sea, according to Kusmana (2017). Each plot was identified, and the number of mangrove stands was found for each category of trees, saplings, and seedlings at each station.

Research on mangrove vegetation in Sapat Village was conducted by comparing each station based on its community structure. The standard criteria for mangrove damage to determine the status of mangrove conditions set by the Decree of the Minister of Environment No. 201 of 2004 can be seen in Table 1.

Table 1. Mangrove Degradation Criteria

No.	Criteria	Tree Density/Ha
1	Very Dense	> 1500 Tree/Ha
2	Medium	≥ 1000 Tree/Ha
3	Damaged	< 1000 Tree/Ha

Mangrove Community Index

Importance Value Index

One can use the analysis method to find the Index of Important Value (INP) to find information or to know the condition of mangrove vegetation. According to (Kusmana, 2017), The parameters that are analyzed are as follows:

$$K = \frac{\sum \text{individuals of species}}{\text{Sample plot area}}$$

$$KR = \frac{\text{Density of species}}{\text{The density of all species}} \times 100\%$$

$$F = \frac{\Sigma \text{ plot occupied by a types}}{\text{total number of plots}}$$

$$FR = \frac{\text{Frequency of a species}}{\text{Frequency of all species}} \times 100\ \%$$

$$D = \frac{\text{Total basal area of species}}{\text{sample area}}$$

$$DR = \frac{\text{Dominance of a species}}{\text{Dominance of all species}}$$

$$INP = KR + FR + DR$$

Description:

K = Density
KR = Relative Density
F = Frequency
FR = Relative Frequency
D = Dominance
DR = Relative Dominance
INP = Importance Indeks

Species Diversity Index

The species diversity index can be determined using the diversity formula according to Shannon-Wiener *in* Bengen (2000) as follows:

$$H' = -\left(\sum \frac{ni}{N} Ln \frac{ni}{N}\right)$$

Description:

H' = Index of species diversity/diversity
ni = Number of individuals of each type
N = Total number of individuals of all species

The criteria for the diversity index (H')

are as follows: H' < 1= Low diversity; 1 ≤ H' ≥ 3 = Medium diversity, and H' > 3 = High diversity.

Uniformity Index

The species uniformity index can be calculated using the uniformity formula according to (Brower & Zar *in* Dewiyanti 2004) as follows:

$$E = \frac{H'}{\ln(S)}$$

Description:
E = Species Diversity Index
H' = Diversity index
Ln = Natural logarithm

The criteria for the uniformity index are as follows: 0 < E ≤ 0.4 = small uniformity; 0.4 < E ≤ 0.6 = medium uniformity; and 0.6<E≤1 = high uniformity.

Data Analysis

The data obtained will be presented in the form of tables. Figures are analyzed using the Microsoft Excel program by accumulating species density (K), relative density (KR), frequency (F), relative frequency (FR), dominance (D), and relative dominance (DR) to determine the important value index (INP). Furthermore, the results of the analysis will be discussed descriptively.

3. RESULT AND DISCUSSION

General Condition of the Research Location

Sapat Village is one of the villages located in Kuala Indragiri District, Indragiri Hilir Regency. This village is the centre of government of Kuala Indragiri District, with a land area of 111.21 km^2 and a population of 2,845 people. Sapat is located on an island named Pulau Mas. The coastal area in Sapat Village is overgrown by mangrove ecosystems, with a mangrove area of 5,421 Ha. Kuala Indragiri sub-district is one of the oldest sub-districts in Indragiri Hilir Regency.

Geographically, Sapat Village is bordered to the north by Sungai Piyay Village, to the east by Concong Dalam, to the south by Tekulai, and the west by Teluk Dalam Village. In the research area, various activities carried out by coastal communities were found, including local coconut farmers, mangrove crab fishermen, illegal mangrove logging, and poisoning of crab habitats. This causes degradation of the area, and the habitat of animals that live around mangroves will be disturbed, which will also cause problems in the future.

Mangrove Species Composition

Based on observation, in the Sapat Village area, ten types of mangroves were found, namely *Avicennia alba, Sonneratia alba, S.caseolaris, S.ovata, Nypa fruticans, Rhizophora apiculata, Bruguiera parviflora, B.gymnorhiza, B.sexangula,* and *Achantus ebracteatus*. The mangroves are included in 5 families, namely *Rhizophoraceae, Sonneratiaceae, Avicenniaceae, Achantaceae,* and *Areaceae*. Mangrove species found can be seen in Table 2.

Table 2. Mangrove species found in Sapat Village

No.	Species	Code
1.	*Rhizophora apiculata*	*R.a*
2.	*Bruguiera parviflora*	*B.p*
3.	*Bruguiera gymnorhiza*	*B.g*
4.	*Bruguiera sexangula*	*B.s*
5.	*Sonneratia caseolaris*	*S.c*
6.	*Sonneratia alba*	*S.a*
7.	*Sonneratia ovata*	*S.o*
8.	*Avicennia alba*	*A.a*
9.	*Achantus ebracteatus*	*A.e*
10.	*Nypa fruticans*	*N.f*

Table 3. Composition of Mangrove Vegetation Found in Sapat Village

Station	Mangrove Species									
	R. a	*B. p*	*B. g*	*B. s*	*S. c*	*S. a*	*S. o*	*A. a*	*A. e*	*N. f*
I	+	+	+	-	-	-	-	+	-	+
II	+	-	-	+	+	-	-	-	-	+
III	+	-	-	-	+	+	+	+	+	+

Description: (+) = found (-) = not found

The composition of mangrove vegetation is essential when describing the distribution of the abundance of mangrove species found at a research site. The mangrove and vegetation identification results based on the table above have different compositions at each station. However, the species *N.fruticans* and *R.apiculata* can be found at all stations.

This species is tolerant to the surrounding environment, such as salinity, tides, and substrate. According to Rahim & Baderan (2019), the distribution of mangrove species is not always the same because mangroves can grow in low to high-salinity environments with different adaptability.

Mangrove Density

The analysis of mangrove vegetation density based on community structure at each station I, II, and III categories of trees, saplings, and seedlings ranged from 988.88 ind/ha to 8266.65 ind/ha. Based on the density of mangrove vegetation at each station, the lowest density was found at station III in the tree category. In comparison, the highest density is found in the station III seedling category. The Station III area is a former damaged plantation in the initiation stage. Table 4, station I includes very dense criteria with a value of 1993.33 trees/ha, station II includes medium criteria with 1455.56 trees/ha, and station III includes 988.88 trees/ha. This is by the Decree of the Ministry of Environment No. 201 of 2004 concerning Standard Criteria and Guidelines for Determining Mangrove Damage (Table 4).

Table 4. Mangrove Vegetation Density at Each Station

Species	Station I			Station II			Station III		
	Tree/ha	Sapling/ ha	Seedling/ha	Tree/ha	Sapling/ ha	Seedling/ha	Tree/ha	Sapling/ ha	Seedling/ha
R.a	200	1022,2	1155,56	166,67	888,89	888,89	0	0	444,44
B.p	300	2888,9	2577,78	0	0	0	0	0	0
B.g	77,78	800	444,44	0	0	0	0	0	0
B.s	0	0	0	411,11	182,22	2888,89	0	0	0
S.c	0	0	0	322,22	1377,8	1466,67	322,22	2844,4	2044,44
S.a	0	0	0	0	0	0	33,33	933,33	844,44
S.o	0	0	0	0	0	0	11,11	400	666,67
A.a	122,22	266,67	400	0	0	0	133,33	1644,4	1244,44
A.e	0	0	0	0	0	0	66,67	311,11	844,44
N.f	1233,3	2533,3	1822,22	555,56	1466,7	2444,44	422,22	1733,3	2177,78
Total	1933,3	7511,1	6400	1455,6	3915,6	7688,89	988,88	7866,7	8266,65

One of the drivers of high mangrove density in an area is suitable sediments and the adaptability of each mangrove species. Mangrove species that become dominant will be superior in utilizing resources or more adaptable to the surrounding environment, thus supporting high INP values. Based on observations from Table 4, the type of *B. parviflora* at the sapling level has a high-density value of 2888.89 saplings/ha. This is because the substrate conditions that support its growth are soft, muddy substrates, sandy loam textures with calm waters and little wave action.

Mangrove Diversity, Uniformity, and Dominance Index

The value of the Diversity Index (H') of mangrove vegetation in Sapat Village ranges from 1.33 - 1.68 so that it can be analyzed that all stations are categorized as moderate species diversity, with sufficient productivity ability, balanced vegetation conditions and moderate ecological pressure. For uniformity, index values range from 0.57 - 0.73 Table 5).

Table 5. Mangrove Diversity and Uniformity Index

Station	Index diversity (H')	Index uniformity (E)
I	1,34	0,58
II	1,33	0,57
III	1,68	0,73

The uniformity value at stations I and II can be categorized as medium uniformity criteria, which is 0.58 for station I and 0.57 for station II. Station III is categorized as having high uniformity with a value of 0.73. The Dominance value is categorized as low at each station, with a value between 0.21-0.3.

Importance Value Index

Based on the diversity index (H') calculation of mangrove vegetation in Sapat Village, Kuala Indragiri District, Indragiri Hilir Regency, the diversity index's value ranges

from 1.34 - 1.68. The highest diversity index of mangrove vegetation types is found at station III, with a value of 1.68, followed by Station I, with a value of 1.34. The lowest. On the value of mangrove vegetation type uniformity, it can be seen that the value of type uniformity ranges from 0.58-0.73. The highest mangrove vegetation type uniformity index is found at station III with a value of 0.73, followed by station I with a value of 0.58, and the lowest at station II with a value of 0.57. Mangrove community observations at the tree level can be seen in Tables 6, 7, and 8.

Table 6. Mangrove Community Structure Tree Category Station I

Species	Total Ind	K (ind/ha)	KR	F	FR	BA	D	DR	NP (%)
B.p	27	300,00	15,52	0,67	26,09	2716,03	3,02	20,87	62,48
R. a	18	200,00	10,34	0,56	21,74	5558,05	6,18	42,72	74,80
A. a	11	122,22	6,32	0,22	8,70	4480,36	4,98	34,43	49,45
B. g	7	77,78	4,02	0,33	13,04	257,25	0,29	1,98	19,04
N. f	111	1233,33	63,79	0,78	30,43		0,00	0,00	94,23
Total	167	1933,33	100,00	2,56	100,00	13001,7	14,46	100,00	300,00

Table 7. Mangrove Community Structure Tree Category Station II

Species	Total Ind	K (ind/ha)	KR	F	FR	BA	D	DR	NP (%)
B. s	40	444,44	23,95	0,89	30,77	3870,55	4,30	45,99	100,71
R. a	14	155,56	8,38	0,67	23,08	2225,34	2,47	26,44	57,90
S. c	24	266,67	14,37	0,67	23,08	2320,62	2,58	27,57	65,02
N. f	89	988,89	53,29	0,67	23,08		0,00	0,00	76,37
Total	167	1855,56	100,00	2,89	100,00	8416,51	9,35	100,00	300,00

Table 8. Mangrove Community Structure Tree Category Station III

Species	Total Ind	K (ind/ha)	KR	F	FR	BA	D	DR	NP (%)
S. c	29	322,22	32,58	0,89	40,00	4073,64	4,53	51,44	124,03
A. a	12	133,33	13,48	0,33	15,00	3625,57	4,03	45,78	74,27
A. e	6	66,67	6,74	0,11	5,00		0,00	0,00	11,74
S. o	1	11,11	1,12	0,11	5,00	45,82	0,05	0,58	6,70
S. a	3	33,33	3,37	0,11	5,00	173,69	0,19	2,19	10,56
N. f	38	422,22	42,70	0,67	30,00		0,00	0,00	72,70
Total	89	988,89	100,00	2,22	100,00	7918,72	8,80	100,00	300,00

The results of observations on the structure of the mangrove community at the tree level at the research site show different results at each station. This can be seen in Tables 6, 7, and 8. The results of the analysis of the number of individuals, the relative density of species (KR), relative frequency of species (FR) and relative dominance (DR) obtained significant values (INP) of a mangrove species found in Sapat Village.

Based on the calculation of the relative density of mangroves at the level of trees, saplings, and seedlings, the relative density of mangroves ranged from 1.12-63.79%. The highest mangrove relative density value is found at the tree level at station I species *N.fruticans* with a value of 64.79%, and the lowest mangrove relative density value is found at station III species *S.ovata* with a value of 1.12%. At the sapling level, the highest relative density of mangroves is found at Station I, species *B.parviflora*, with a value of 38.46% and the lowest relative density value at Station I, species *A. alba*, with a value of 3.55%. At the seedling level, the highest relative density of mangroves is found at the station I species *B.parviflora* with a value of 40.28% and the lowest relative density of mangroves at station I species *B. gymnorhiza* and *A.alba* with the same value of 6.25%.

The highest Index of Important Value (INP) at each station was *N. fruticans* at 94.23 (station I), *B.sexangula* at 100.71 (Station II), and *S. caseolaris* at 124.03 (Station III). The

lowest INP at each station is *B. gymnorhiza* by 19.04 (Station I), *R.apiculata* by 57.90 (Station II), and *S.ovata* by 6.70 (Station III). Overall, it was found that the dominating species in the tree category was *S. caseolaris* at station III. While overall, the sapling category with the lowest level of dominance is *S.ovata*, with a value of 6.70%. *S.caseolaris* has the highest frequency value because the substrate conditions are very suitable for its growth. The results of observations of mangrove communities at the sapling level can be seen in Tables 9, 10, and 11.

Table 9. Mangrove Community Structure Sapling Category Station I

Species	Total Ind	K (ind/ha)	KR	F	FR	BA	D	DR	NP (%)
Bp	65	2888,89	38,46	1,00	37,97	58,30	0,06	45,14	121,57
R.a	23	1022,22	13,61	0,33	12,66	18,61	0,02	14,41	40,68
Aa	6	266,67	3,55	0,11	4,22	3,89	0,00	3,02	10,79
Bg	18	800,00	10,65	0,30	11,39	14,55	0,02	11,27	33,31
Nf	57	2533,33	33,73	0,89	33,76	33,80	0,04	26,17	93,65
Total	169	7511,11	100,00	2,63	100,00	129,1842	0,14	100,00	300,00

Table 10. Mangrove Community Structure Sapling Category Station II

Species	Total Ind	K (ind/ha)	KR	F	FR	BA	D	DR	NP (%)
Ra	20	888,89	16,00	0,78	35,00	51,54	0,06	43,06	94,06
Bs	41	1822,22	32,80	0,44	20,00	31,18	0,03	26,05	78,85
Sc	31	1377,78	24,80	0,33	15,00	22,11	0,02	18,47	58,27
Nf	33	1466,67	26,40	0,67	30,00	14,87	0,02	12,43	68,83
Total	125	5555,56	100,00	2,22	100,00	119,71	0,13	100,00	300,00

Table 11. Mangrove Community Structure Sapling Category Station III

Species	Total ind	K (ind/ha)	KR	F	FR	BA	D	DR	NP (%)
Sc	64	2844,44	36,16	0,89	38,10	62,36	0,07	51,68	125,93
Sa	21	933,33	11,86	0,22	9,52	6,76	0,01	5,60	26,99
Aa	37	1644,44	20,90	0,33	14,29	11,53	0,01	9,56	44,75
Ae	7	311,11	3,95	0,11	4,76	7,71	0,01	6,39	15,11
So	9	400,00	5,08	0,11	4,76	8,98	0,01	7,45	17,30
Nf	39	1733,33	22,03	0,67	28,57	23,30	0,03	19,31	69,92
Total	177	7866,67	100,00	2,33	100,00	120,67	0,13	100,00	300,00

Based on the analysis of the Important Value Index at the sapling level carried out at the research site, each station has different values. The highest Important Value Index in the sapling category is *B.parviflora* at 121.57 (Station I), *R.apiculata* at 94.06 (Station II), and *S.caseolaris* at 125.93 (Station III). The lowest value in the sapling category is *A. alba* at 10.79 (station I), *S.caseolaris* at 58.27 (Station II), and *A.ebracteatus* at 15.11 (Station III). Overall, it can be found that the dominating species in the sapling category is *S. caseolaris*. The high importance index of *S. caseolaris* is due to the condition of the sandy mud substrate at the research site. This substrate quality is suitable for mangrove development, especially *S.caseolaris*. The species of *N. Fruticans* and *S.caseolaris* have a high-frequency value of 0.89 at stations II and III. Observations of the seedling-level mangrove community at the research site can be seen in Tables 12, 13, and 14.

Based on the results of the importance value index analysis at the seedling level shown in Tables 14, 15, and 16, it can be seen that there are differences in values at each station. The highest Important Value Index at the seedling level is the type of *B. parviflora* at station I 68.62%, *N. fruticans* at 70.92% (station II), and *S. caseolaris* at 52.73 (station III). The lowest importance value in the seedling category is *B. gymnorhiza* at 17.88 (station I), *R. apiculata* at 33.30% (station II) and 13.38% (station III).

Table 12. Mangrove Community Structure of Seedling Category Station I

Kind	Amount	K (ind/ha)	KR	F	FR	BA	NP (%)
Bp	58	2577,78	40,28	0,78	28,34	113,116	68,62
R.a	26	1155,56	18,06	0,56	20,24	55,4444	38,30
Aa	9	400,00	6,25	0,33	12,15	6,12511	18,40
Bg	10	444,44	6,94	0,30	10,93	7,87514	17,88
Nf	41	1822,22	28,47	0,78	28,34	52,2623	56,81
Amount	144	6400,00	100,00	2,74	100,00	234,8227	200,00

Table 13. Mangrove Community Structure of Seedling Category Station II

Kind	Amount	K (ind/ha)	KR	F	FR	BA	NP (%)
Bs	65	2888,89	37,57	0,56	21,74	44,7054	59,31
Ra	20	888,89	11,56	0,56	21,74	22,6709	33,30
Sc	33	1466,67	19,08	0,44	17,39	29,2733	36,47
Nf	55	2444,44	31,79	1,00	39,13	77,5582	70,92
Amount	173	7688,89	100,00	2,56	100,00	174,208	200,00

Table 14. Mangrove Community Structure of Seedling Category Station III

Kind	Amount	K (ind/ha)	KR	F	FR	BA	NP (%)
Sc	46	2044,44	24,73	0,78	28,00	33,302	52,73
Aa	28	1244,44	15,05	0,33	12,00	13,2048	27,05
Sa	19	844,44	10,22	0,33	12,00	7,23877	22,22
Ae	19	844,44	10,22	0,22	8,00	9,78427	18,22
So	15	666,67	8,06	0,22	8,00	5,72738	16,06
Ra	10	444,44	5,38	0,22	8,00	3,97735	13,38
Nf	49	2177,78	26,34	0,67	24,00	34,8415	50,34
Amount	186	8266,67	100,00	2,78	100,00	108,0761	200,00

The high importance value index of *N. fruticans* in this study was influenced by the environment at the research site, where at the research location, the type of substrate in the Trench 18 area is sandy mud and is currently in the condition of the mangrove rehabilitation stage. Based on the calculation results of the frequency of tree-level mangroves, saplings, and seedlings, it can be seen that the frequency of mangroves at the tree level ranged from 2.22 to 2.9. The highest frequency value is found at Station II, with a value of 2.9, followed by Station I, with a value of 2.56 and Station III, with a value of 2.22. At the sapling level, the highest mangrove frequency is found at Station I, with a value of 2.66, followed by Station III, with a value of 2.33 and Station II, with a value of 2.22. At the seedling level, the highest mangrove frequency is at station I, with a value of 2.78, followed by station III, 2.77, and station II, with 2.56.

The best mangrove dominance value is found at station I, with a value of 14.47, followed by station II, with a value of 9.35 and station III, with a value of 8.8. The highest mangrove dominance value at the sapling level is found at station II, with a value of 0.11, followed by stations I and III, which have the same value of 0.1.

Mangrove Water Quality Condition in Sapat Village

Measurement of water parameters was carried out at each station. In this study, the water quality parameters measured were temperature, acidity (pH), and salinity. The results of salinity measurements ranged from 9-11, the pH of the water ranged from 6.5-7, and the water temperature ranged from 27-27.5, for the type of substrate at all stations is muddy. This shows that the water quality condition in each station of Sapat Village can still support mangrove growth. Water quality data around mangroves at each station can be seen in Table 15.

Table 15. Measurement Results of Environmental Parameters in the Mangrove Area of Sapat Village

Parameters	Station I	Station II	Station III
Temperature (℃)	27	27,4	27,5
Salinity (‰)	11	11	9
pH	7	7	6.5
Substrate	muddy	muddy	muddy

4. CONCLUSION

Based on the research that mangrove vegetation found in Sapat Village, as many as ten types of mangroves from 5 observation stations are *A.alba, S.alba, S.caseolaris, S.ovata, N.fruticans, R.apiculata, B. parviflora, B.gymnorhiza, B.sexangula,* and *A.ebracteatus*. The highest INP value is mangrove Sonneratia caseolaris species of 124,03% found at station III, and the lowest INP value is found at station III, mangrove *S.ovata* species of 6,70%. Overall, the species diversity index ranged from 1.33 - 1.68 with moderate criteria, and the species uniformity index ranged from 0.57 - 0.73 with different categories for each station.

Based on the results of research on mangrove vegetation structure analysis in Sapat Village, the Monmang 2 application by BRIN is expected to facilitate mangrove data collection and further research by increasing the number of stations to find more mangrove vegetation and structure.

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