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Community of Mangrove Category Tree and Sapling in The Sekotong Bay, West Lombok

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Abstract: Community of mangrove in the Bay of Sekotong, West Lombok was studied to know the species composition, individual density of each species, and percentage covering of mangrove canopy. Total 28 plots of 10 m x 10 m were set in 9 transects in 5 stations. Photographs of canopy covering and mangrove community composition were analyzed by using software ImageJ and template spreadsheet 10x10, the new version of March 2018. The community of mangrove of Sekotong bay, West Lombok consists of 8 species, 5 genera, and 4 families. *Rhizophora apiculata* & *Rhizophora stylosa* were recorded in seven of nine transects (78% of transect). *Ceriops tagal* was a species that was also recorded to have the highest density (3700 trees/ha) in transect SKTM02B. The average density of the mangrove sapling category was higher than the mangrove tree category. The three highest covering percentages of canopi mangrove community took place in transects SKTM01A, SKTM01B, and SKTM04T.

Keywords: Density; Mangrove; Percentage covering; Sekotong bay; Species composition.

Introduction

Mangrove ecosystems mostly are laying down along the coastal lines of tropical and subtropical areas which are dominated by the community of mangrove. Community of mangrove adapted to grow well and normal development in habitats with high salt concentration. Naturally, the potential of Indonesia mangrove ecosystem is much higher than those of Australia and Brazil of mangrove areas (Backmann, 1994, and Giri *et al.*, 2011).

Some mangrove forests in many parts of Indonesia, however are now in uncertain condition, even in threatening condition. One example, mangrove forest of Bintan Island is very susceptible to tantrums and threatened (Saputra *et al.*, 2016). The areas of Sekotong Bay West Lombok has wide enough potency of mangrove forest. However, many forms of the local community activities including traditional gold mining can bring some negative effects for the mangrove community. Some activities including mangrove reclamation can threaten the condition

of mangrove forests (Saputra *et al.*, 2016). For this reason therefore, the mangrove ecosystem of Sekotong Bay West Lombok needs to be survey regularly for getting a value of healthy condition and development as some policies on management of coastal areas developed continuously rapidly. Therefore, the mangrove ecosystem with no exception, mangrove ecosystem of Sekotong Bay West Lombok should be managed very well for the existence and conservation objectives.

Results of a research can be used as based of good management for the mangrove community conservation. The results of this research can be used as the basis of materials policies in every decision in relation to management of mangrove ecosystem areas, basically in the areas of Sekotong Bay, West Lombok.

Materials and Methods

Time and Places

Data collection of mangrove community was conducted during one week period (2nd – 8th August 2019) at nine transects in five permanent station. All

stations were located in the area's two villages namely: Pelangan and Batu Putih, District of Sekotong, West Lombok. Name, coordinates, and

locality of station and transects of research are given in **Table 1**.

Table 1. List of name, coordinates, and locality of station and transects of sampling mangrove community in Sekotong Bay, West Lombok

Station	Transects	Coordinates		Locality
		BT	LS	
SKTM01	SKTM01A	115° 53' 671"	08° 45' 584"	Dusun Siung, Desa Batu Putih
	SKTM01B	115° 53' 623"	08° 45' 573"	Dusun Siung, Desa Batu Putih
SKTM02	SKTM02A	115° 54' 302"	08° 46' 291"	Dusun Pewaringan, Desa Batu Putih
	SKTM02B	115° 54' 289"	08° 46' 336"	Dusun Pewaringan, Desa Batu Putih
SKTM03	SKTM03A	115° 55' 692"	08° 46' 429"	Dusun Selindungan, Desa Pelangan
	SKTM03B	115° 55' 770"	08° 46' 353"	Dusun Selindungan, Desa Pelangan
SKTM04	SKTM04	115° 56' 114"	08° 46' 171"	Dusun Kayu Putih, Desa Pelangan
	SKTM04T	115° 56' 086"	08° 46' 213"	Dusun Kayu Putih, Desa Pelangan
SKTM05	SKTM05	115° 52' 148"	08° 44' 884"	Dusun Labuan Poh, Desa Batu Putih

Data Collection and Analyzed

Data of mangrove vegetation were obtained by using some important tools, such as: camera, GPS, tailor meter, protractor, and waterproof paper, in plot atau quadrat transect (Syafei, 1990). Total of twenty eight plots (quadrates) of 10m x 10m were laid down at nine transects in five stations. Photography hemispherical photography method was applied for data collection of Percentage covering of mangrove canopy (Dharmawan & Pramudji, 2014, 2017). Total of 164 photographs were analyzed for the health condition of the mangrove community. Diameter of the mangrove stem was measured at the position of breast high, except some trees of mangrove *Ceriops tagal* were measured just below the branching system (at knee high). Stems diameter of mangrove at breast high of 16 cm and above were recorded as tree category. Mangrove with diameter of stem less than 16 cm and minimal height of 1.5 m were recorded as sapling category. Data of canopy height were also determined by measuring the elevation angle from the highest shoot to the distance of 10 m from the base canopy stem using a protractor. Data of mangrove communities in both tree and sapling categories were collected and analyzed based on the method provided by Dharmawan and Pramudji, 2014, 2017). Data for canopy covering percentage and diameter of mangrove stem were analyzed as the main parameter, reversed to Dharmawan & Pramudji

(2014, 2017) using *software ImageJ* and a newly *template spreadsheet*. Furthermore, the health of the mangrove community was interpret based on the National Standard of Keputusan Menteri Lingkungan Hidup Nomor 201 tahun 2004 (Anonymous, 2004).

Results and Discussion

Total eight species from five genera, and four families of the mangrove community were fully identified (**Table 2**). Distribution of mangrove species on each station and transect is given in **Table 3**. The important values index of each mangrove species for tree, sapling, and all categories can be seen in **Figure 1**. For all categories, the dominance species in each transect were *Ceriops tagal* in SKTM02B, *Rhizophora stylosa* in SKTM03B, *Rhizophora mucronata* in SKTM04, and *Rhizophora apiculata* in SKTM04T.

Species composition of the mangrove community for the tree category in the Sekotong bay was less and/or more than mangrove communities in other areas of Indonesia. Number of mangrove species in Sekotong bay was less than what been reported by: Onrijal & Kusmana, (2010); Lestari (2013); Eti *et al.* (2014); Handono *et al.* (2014); Akbar *et al.* (2015); Samsumarlin *et al.* (2015). The species number of mangrove in Sekotong bay however, much more compared to have been reported by: De Jesus (2012); Al Idrus *et al.* (2014);

Table 2. List of Family, Genera, and Species Name of Mangrove Community in Sekotong Bay West Lombok

Families	Genera	Species
Avicenniaceae	<i>Avicennia</i>	<i>Avicennia marina</i> <i>A. officinelis</i>
Combretaceae	<i>Lumnitzera</i>	<i>Lumnitzera ceramosa</i>
Rhizophoraceae	<i>Ceriops</i>	<i>Ceriops tagal</i>
	<i>Rhizophora</i>	<i>Rhizophora apiculata</i> <i>R. mucronata</i> <i>R. stylosa</i>
Sonneratiaceae	<i>Sonneratia</i>	<i>Sonneratia alba</i>



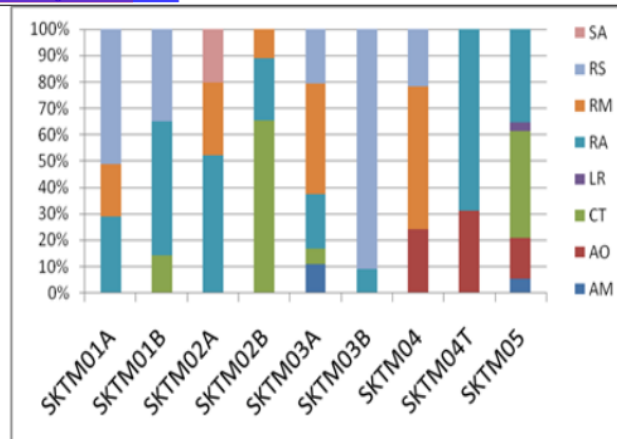


Figure 1. Proportion of the Impotence Values Index of Mangrove Species (A: Tree, B: Sapling, and C: All)

The highest and lowest density for mangrove tree category was recorded in transect SKTM02B and SKTM01B, 4467 ind./ha and 2400 ind./ha, respectively. Mangrove for sapling category, the highest density (9933 ind./ha) was recorded in transect SKTM03A, and the lowest density (1050 ind./ha) occurred in transect SKTM01B. Density comparison of mangrove tree and sapling category

are provided in **Figure 2**. The average density of the mangrove sapling category is much higher than the density of the mangrove tree category. Density of sapling was much higher than the tree in transects SKTM03A, SKTM03B, and SKTM05. However, in transects SKTM01A, SKTM01B, SKTM04, density of sapling was lower than tree, and similar in transect SKTM04T.

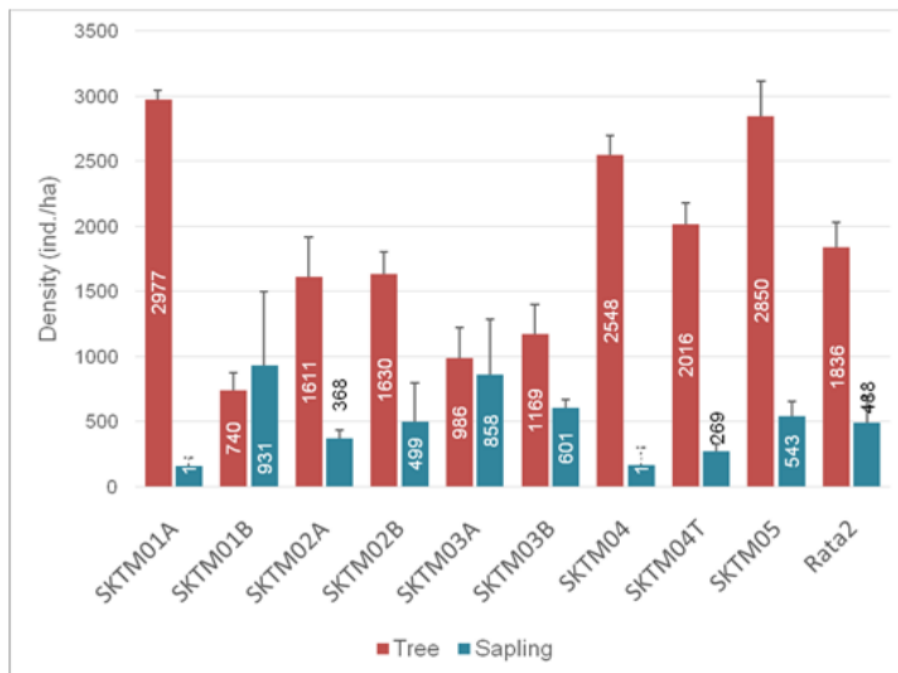


Figure 2. Density proportion of Mangrove Tree and Sapling Categories

Distribution and authority of transects numbers for each species of eight species of mangrove identified were various enough, in the range of one to seven (11-78%) (**Figure 3**). *Rhizophora apiculata* was the only one species

which has the highest percentage of area authority (78%). The other seven species have the percentage of area authority less than 60%, and two species with the lowest percentage of area authority (11%) were *Lumnitzera racemosa* and *Sonneratia alba*.

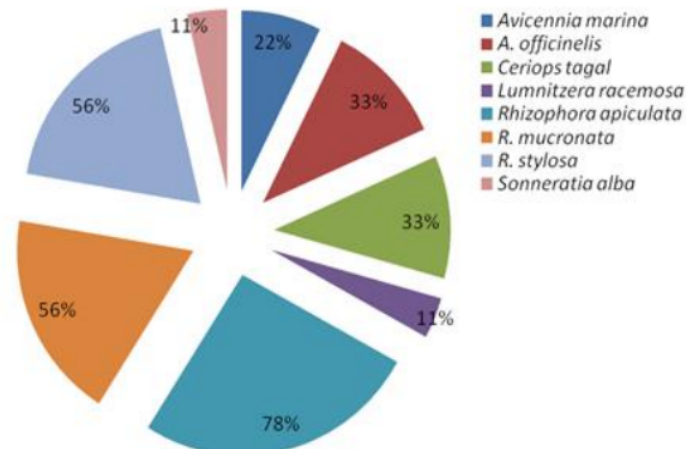


Figure 3. Percentage authority Domination of each species of mangrove tree category to the number of transects

Table 3. Distribution of mangrove species at station and transects of sampling in the Sekotong Bay West Lombok in the year of 2019

Name of Species	Station and Transects								
	SKTM 01		SKTM 02		SKTM 03		SKTM 04	SKTM 04T	SKTM 05
	A	B	A	B	A	B			
<i>Avicennia marina</i>					+				+
<i>A. officinellis</i>							+	+	+
<i>Ceriops tagal</i>		+		+					+
<i>Lumnitzera racemosa</i>									+
<i>Rhizophora apiculata</i>	+	+	+	+	+			+	+
<i>R. mucronata</i>	+		+	+	+		+		
<i>R. stylosa</i>	+	+			+	+	+		
<i>Sonneratia alba</i>				+					
Number of species in transect	3	3	3	3	4	1	3	2	5
Number of species in station	4		4		4		4		5

The highest average high of mangrove tree category ($8,20 \pm 0,11$ m) occurred in transect SKTM04, and the lowest average high ($3,43 \pm 0,17$ m) was recorded in transect SKTM02B. The dominant of *Ceriops tagal* in SKTM02B can be the main reason for the lowest average high of mangrove tree category in this transect. The biggest stem diameter of mangrove tree category was 10,57 cm recorded at transect

SKTM04, and the smallest tree diameter (6,10 cm) recorded at transect k SKTM03A. The biggest diameter (10,57 cm) of mangrove tree in the Sekotong Bay is much smaller compared the diameter of naturally mangrove tree of the District of Wondama-Papua (Dharmawan & Widyastuti, 2017). The high and diameter comparison of mangrove tree among transects are given in **Figure 4**.

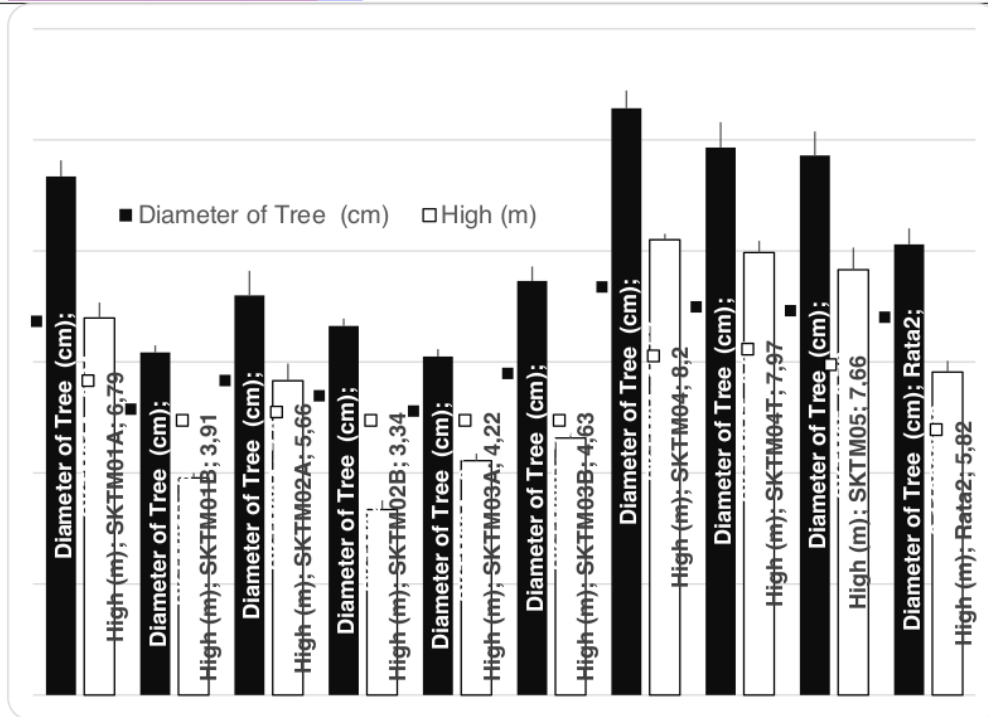


Figure 4. Portion of comparison of high and diameter of mangrove tree in among transects in the Sekotong Bay West Lombok

Conclusion

Community of mangrove forest in Sekotong Bay, West Lombok consists of eight species from five genera and four families. Based on the average density and percentage coverage of mangrove canopy, the community of mangrove was in good to very good categories. *Rhizophora apiculata* and *Rhizophora stylosa* were the two species of mangrove with the highest distribution reached 78% station and transects of research. Density of mangrove tree category almost always higher than sapling in all transects, except in transect SKTM01B. Three station with highest species diversity index were SKTM02, SKTM04, & SKTM05.

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