

# study of the mangrove

*by* Sundari S

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# A Study of the Mangrove Community in the Coastal Area of Dodinga Bay, South Jailolo District, West Halmahera Regency, North Maluku Province

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**Abstract.** The coastal area of Dodinga Bay possesses a 125 ha mangrove forest. Mangroves have essential ecological roles besides being exploited for firewood, building construction, lift net construction and fish pond. This study was carried out to obtain the following information: (1) mangrove species composition, (2) structural formation of the vegetation and habitat conditions and (3) growth rate of mangrove community. Results showed mangrove vegetation in the study site consisted of 10 species belonging to six families, *Avicennia alba*, *Bruguiera gymnorrhiza*, *Bruguiera parviflora*, *Ceriops decandra*, *Lumnitzera littorea*, *Rhizophora apiculata*, *Rhizophora mucronata*, *Scyphiphora hydrophyllacea*, *Sonneratia alba* and *Xylocarpus granatum*. The dominant and subdominant plant compositions in the mangrove ecosystem of Dodinga Bay could be classified into six association types: (1) *A. alba/R. apiculata* association with closed forest formation and substrate salinity between 5-10‰, sandy sediment texture, muddy sand, mud and total biomass of 153.7 tons/ha; (2) *R. apiculata* association with closed low forest formation, substrate salinity of 10‰ and ashy sand sediment texture, mud and total biomass of 84.5 tons/ha; (3) *A. alba/C. decandra* association with open forest formation and open low forest, with substrate salinity between 5-10‰, muddy sand sediment texture, ashy sand and total biomass of 91.8 tons/ha; (4) *R. apiculata/C. decandra* association with closed forest formation, substrate salinity between 10-12‰, muddy sand sediment texture, mud and total biomass of 209.6 tons/ha; (5) *R. mucronata/R. apiculata* association with closed forest formation, substrate salinity between 9-12‰ and sandy clay mud sediment texture, muddy sand and total biomass of 266.8 tons/ha; and (6) *B. parviflora/R. mucronata* association with forest formation, salinity of 12‰ and muddy sand sediment texture, ashy mud and total biomass of 274.2 tons/ha.

**Keywords:** coastal area, Dodinga Bay, ecosystem, mangrove, vegetation.

## INTRODUCTION

The mangrove ecosystem in West Halmahera is a naturally grown ecosystem of 4,890 ha.<sup>1</sup> The coastal area of Dodinga Bay possesses a 125 ha mangrove forest. Mangroves, particularly in this bay, have very important ecological roles besides being exploited for firewood, building construction, lift net construction, and fish pond.<sup>2</sup> This mangrove ecosystem is directly affected by the tidal cycle because this location is connected to the sea.<sup>3,4</sup> Various survey results and research studies have shown that the ecological impacts resulting from reducing or damaging mangrove ecosystems are the loss of various species of flora and fauna associated with mangroves.<sup>4-7</sup> Based on these conditions, it is deemed necessary to have a model of sustainable management that can ensure the sustainability of mangrove ecological functions in the region. This study was carried out to obtain the following information: (1) mangrove species composition, (2) structural formation of the vegetation and habitat conditions and (3) growth rate of the mangrove community.

## EXPERIMENTAL DETAILS

This research was conducted in the coastal area of Dodinga Bay, South Jailolo District, West Halmahera Regency for eight months from January until August 2015. A descriptive exploration research method procedure was used for 1. Determination of species; 2. Classification of community types (2a. Vegetation profile; 2b. Density, height, and diameter of trees; 2c. Biomass; 2d. Density and composition of saplings); 3. Determination of sediment texture composition and salinity measurement.

## RESULTS AND DISCUSSION

Mangrove vegetation in the study site consisted of 10 species belonging to six families, *Avicennia alba*, *Bruguiera gymnorhiza*, *Bruguiera parviflora*, *Ceriops decandra*, *Lumnitzera littorea*, *Rhizophora apiculata*, *Rhizophora mucronata*, *Scyphiphora hydrophyllacea*, *Sonneratia alba* and *Xylocarpus granatum* (Fig. 1).

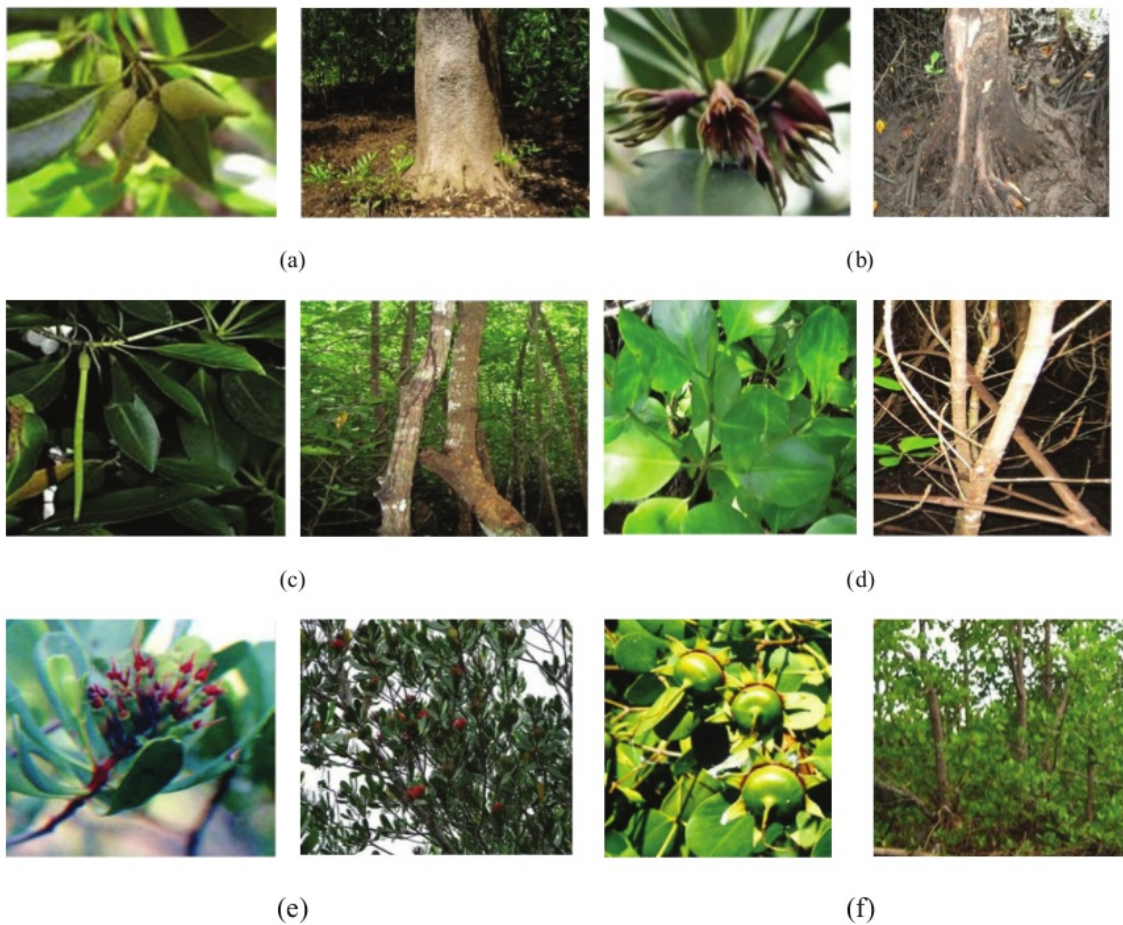


FIGURE 1. Mangrove Vegetation. (a) *Avicennia alba* (b) *Bruguiera* sp (c) *Bruguiera* sp (d) *Ceriops* sp, (e) *Lumnitzera littoria* (f) *Sonneratia alba*.

The dominant and subdominant plant compositions in the mangrove ecosystem of Dodinga Bay could be classified into six association types: (1) *A. alba*/*R. apiculata* association with closed forest formation and substrate

salinity between 5-10‰, sandy sediment texture, muddy sand, mud and total biomass of 153.7 tons/ha; (2) *R. apiculata* association with closed low forest formation, substrate salinity of 10‰ and ashy sand sediment texture, mud and total biomass of 84.5 tons/ha; (3) *A. alba/C. decandra* association with open forest formation and open low forest, with substrate salinity between 5-10‰, muddy sand sediment texture, ashy sand and total biomass of 91.8 tons/ha; (4) *R. apiculata/C. decandra* association with closed forest formation, substrate salinity between 10-12‰, muddy sand sediment texture, mud and total biomass of 209.6 tons/ha; (5) *R. mucronata/R. apiculata* association with closed forest formation, substrate salinity between 9-12‰ and sandy clay mud sediment texture, muddy sand and total biomass of 266.8 tons/ha; (6) *B. parviflora/R. mucronata* association with forest formation, the salinity of 12‰ and muddy sand sediment texture, ashy mud and total biomass of 274.2 tons/ha.

The vegetation profile at the station *S. hydrophyllacea* dominated I in the ocean front zone with an average standing canopy height of 11 m. A shorter stature of *S. hydrophyllacea* (2 m) was found in the front zone at a distance of 0-20 m. *A. alba* dominated the center zone of the canopy stand with an average canopy height of 15 m. The stand of *A. alba* was also found at a distance of 20-80 m along with *B. gymnorhiza*, *B. parviflora*, and *R. apiculata*. In the back zone (near the mainland), the canopy stands are dominated by *S. alba* with an average canopy height of 8 m and are present with *X. granatum* stands at a distance of 85-100 m (Table 1).

TABLE 1. Profile of vegetation at Station I.

Species	Canopy Height (m)		Diameter of stem		Amount Species
	mean	$\sigma$	mean	$\sigma$	
<i>R. apicuata</i>	8,30769	5,87388	12,4077	4,62029	29
<i>B. parviflora</i>	7,87500	1,88679	11,7875	4,24181	8
<i>B. gimnorisa</i>	8,72222	3,76245	15,4189	4,97506	9
<i>Avicenia alba</i>	13,23530	2,63491	16,0118	4,45812	17
<i>S.hidrophyllase</i>	8,87805	3,22805	10,8415	2,50471	41
<i>S. alba</i>	13,66670	3,22805	18,6533	10,90730	3
<i>X. granatum</i>	10,50000	4,32084	11,6750	5,20018	4
Total Species					111

The results of sediment analyses grouped the fraction of sediment into three groups namely: sand, dust, and clay (Table 2). Comparison of each sediment fraction collected from the front, middle and back zones.

TABLE 2. Data analysis of soil texture percentage

No. Lab	No. yield	Percentage			Texture
		sand	dust	clay	
T98	Stasiun I.1	89.53	6.99	3.48	Sand
T99	Stasiun I.2	72.85	17.83	9.32	sand clay
T100	Stasiun I.3	36.94	40.50	22.56	clay
T101	Stasiun II.1	78.26	11.30	10.44	sand clay
T102	Stasiun II.2	20.47	59.25	19.28	sand dust
T103	Stasiun II.3	29.92	44.64	25.44	sand clay
T104	Stasiun III.1	76.75	15.33	7.92	clay
T105	Stasiun III.2	34.67	47.41	17.92	clay sand
T106	Stasiun III.3	52.96	33.00	14.04	clay sand
T106	Stasiun IV.1	59.92	12.26	27.82	sand clay
T107	Stasiun IV.2	43.66	38.02	18.32	sand clay
T108	Stasiun IV.3	79.08	17.00	3.92	sand clay
T109	Stasiun V.1	80.13	16.23	3.64	sand clay
T110	Stasiun V.2	79.57	14.27	6.16	sand clay
T112	Stasiun V.3	29.62	51.02	19.36	Clay dust

## SUMMARY

The mangrove community in Dodinga Bay, based on species composition analysis, structural formation of the vegetation and habitat conditions and growth rate of the mangrove community, is categorized under proper regeneration and productivity conditions. It is recommended that programs be implemented to provide the community counseling and counseling activities to strengthen knowledge about the ecological role of mangrove resources in Dodinga Bay. This could increase local wisdom about forms of environmental responsibility for long-term interests in the utilization of mangrove resources in Dodinga Bay.

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