

# THE ANALYSIS OF ECOLOGY AND THE IMPACT OF COAST COMMUNITY BEHAVIORS TOWARDS MANGROVE ECOSYSTEM IN MORU COAST, IN ALOR REGENCY EAST OF NUSA TENGGARA

**Sari Hauliah Ahmad Koda\***

Muhammadiyah University of Kupang, KH. Ahmad Dahlan st., No. 17, Kupang,  
85111, Telp. 082339129717,  
e-mail: [shauliah@yahoo.co.id](mailto:shauliah@yahoo.co.id)/[sallyaslaven@gmail.com](mailto:sallyaslaven@gmail.com)

**Charly Mutiara**

Flores University, Samratulangi st., Ende regency, Flores, Telp.085239117667,  
e-mail: [mutiaracharly@ymail.com](mailto:mutiaracharly@ymail.com)

## ABSTRACT

*The aim of this research is to analyze ecologically of the mangrove ecosystem in Moru coast in Alor Regency. We use transect quadrant method to get the data of density, frequency, dominance, important value index, and diversity index of mangrove. The coast community behavior that bring positive and negative impacts to the mangrove ecosystem was known by using interview and observing method. The result shows that there are 4 kinds of mangrove in the place. The average of diversity index in each location is less than 3.2, shows that the mangrove forest was in the condition of depressed, that caused by negative behaviors of coast community, i.e., illicit timber, waste disposal in coast area, the manufacturing of irrigation channels, and the conversion from mangrove forest area to cultivation and salt ponds area. Even though, some people also participate in the governmental or non-governmental organization program for planting and conserving mangrove.*

**Keywords:** *Mangrove Ecosystem, Ecological Analysis, Coast Community Behavior*

## 1. INTRODUCTION

Some important functions of mangrove in coast area are connecting land and sea areas, muffling some natural sign that indicating for the abrasion, wave, and hurricane, and also supporting marine biotas as a food source for human. Besides that, the ecological functions of mangrove forest are as a nursery ground, feeding group, Nowadays, the decreasing of mangrove forest area become a serious problem for the growth countries, included Indonesia. This problems can affect to the environment and economy sector. The decreasing of mangrove forest are caused by exploitation and conversion for settlement, industry, embankment, etc. These factors can disturb the balancing of waters dynamic.

Alor regency, in East of Nusa Tenggara province is one of the tourism object in Indonesia. Alor has various kinds of biological resources and beautiful beaches. Nevertheless, the area of mangrove forest in Alor regency was only 9.16 km<sup>2</sup> or just 0.13% of used land (RT RW Kab. Alor, 2014), that too short for an island with 287.10 km of sea line length. Some efforts for mangrove conservation has been done by WWF-Indonesia, together with the local fisherman. Some tourism areas in Alor, like Sebanjar, Kokar, and Moru coasts have mangrove ecosystem, but from the previous survey and interview, this ecosystem become narrower from year to year. Because of the importance of mangrove ecosystem for the water sustainability, especially in Alor regency, we need to

study about the ecological analysis of mangrove and the impact of coast community behaviors towards mangrove ecosystem in Moru coast in Alor regency. and spawning ground for various kinds of marine biotas (ex. fish, shrimps, mollusks), both for that lived in the sea or off-shore.

## 2. MATERIAL AND METHODS

### a. Observation

In this research technique (passive participation), researchers has observed coast community behaviors in these three research locations that bring positive or negative impacts to the mangrove ecosystem.

### b. Interview

After observation, researchers had interviewed some village apparatus i.e. headman, secretary, neighborhood head, and local society, both for whom had stayed for long time or not.

### c. Quadrant Transect

Researchers obtained data about mangrove ecosystem through transect and quadrant method. There are 3 transects in each location, stretch along from seashore to the forest land for 100 m, and the distance between each transect was also 100 m. In each transect we made 5 quadrants (size 10 × 10 m), and the distance between quadrants was 10 m. So, there are 15 quadrants in each village. We had observed the

vegetation and record the data in each quadrant (threes number, saplings, seedlings) for each kind of mangrove, then measured trees diameter (trees diameter >10 cm; saplings diameter 2-10 cm; and seedlings diameter <2cm), and mangrove height. These data was needed for calculate the relative density, relative frequency, dominance, important value index, and diversity index in each studied coast.

### d. Data Analysis

To get the data of level damaged of mangrove forest in all three research locations, the obtained data was analyzed through the calculation of important value index (IVI) of three stand of mangrove at three growth phases, i.e. tree stage, sapling stage and seedling stage according to Cox guide (1967). Data analysis in this research consist of absolute and relative density (*ADi* and *RDi*), absolute and relative dominance (*ADo* and *RDo*), absolute and relative frequency (*AFi* and *RFi*), large of basal area (LBA), important value index (IVI) and diversity index (DI).

## 3. RESULT AND DISCUSSION

### A. Importance Value Index

Important Value Index (IVI) was used for determining the dominance of one species to another species, or in other definition, IVI describes ecological position

Table 1  
Mangrove Species, Density, Dominance,  
Frequency and IVI (%) in Moru Coast

No	Species	Family	D	RDi	RFi	RDo	IVI
<b>I Tree stage</b>							
1	Aegialitis annulate	Plumbaginaceae	-	-	-	-	-
2	Avicennia alba	Avecenniaceae	0.11	18.97	19.27	16.48	54.71
3	Bruguiera gymnorrhiza	Rhizophoraceae	0.17	29.31	34.68	46.37	110.36
4	Bruguiera sexangula	Rhizophoraceae	0.09	15.52	23.12	15.17	53.81
<b>II Sapling stage</b>							
1	Aegialitis annulata	Plumbaginaceae	31	12.09	20.59	-	54.66
2	Avicennia alba	Avecenniaceae	23	25.27	23.54	-	48.8 i
3	Bruquiera gymnorrhiza	Rhizophoraceae	32	35.16	29.42	-	64.59
4	Bruguiera sexangula	Rhizophoraceae	25	27.47	26.48	-	53.95
<b>II Seedling stage</b>							
1	Aegialitis annulate	Plumbaginaceae	19	20.21	13.64	-	33.86
2	Avicennia alba	Avecenniaceae	14	14.89	22.74	-	37.63
3	Bruguiera gymnorrhiza	Rhizophoraceae	27	28.72	27.29	-	56.01
4	Bruguiera sexangula	Rhizophoraceae	34	36.17	36.38	-	72.55

of one species in one community. Data of mangrove species, density, frequency, dominance, and important value index in the research locations are shown in Table 1.

There are 4 mangrove species 1 from 3 different families in Moru coast. *Bruguiera gymnorrhiza* is the most found mangrove species with the highest of IVI both in tree stage or sapling stage. This species is one of mangrove species that had cultivated by government together with Moru coast society recently. *Avicennia alba* dan *Bruguiera sexangula* has the lowest IVI, that caused by illicit timber. These two species have so strong stem that become favorite for coast society to use them as building materials, firewood and charcoal.



Figure of Mangrove Types in Moru, Kokar and Sebanjar Coasts in Alor Regency

## B. Diversity Index of Mangrove

The diversity index of Shannonwiener of mangrove species in Moru coast is shown in Table 2.

Table 2  
Diversity Index of Mangrove Species in Moru Coast

Location	Mangrove Species	Diversity Index (H')
Moru	Aegialitis annulata	0.520
	Avicennia alba	0.558
	Bruguiera gymnorrhiza	0.632
	Bruguiera sexangula	0.631

The diversity index of mangrove ecosystem in this coast is belong to small population diversity category, with diversity index value was less than 3.2, which is indicating that mangrove forest in all these research locations is in depressed condition.

## C. The Behaviors of Coasts Society towards Mangrove Ecosystem

### 1. Negative Impact Behaviors

Almost coast society have already know the importance of mangrove ecosystem in coast area. But, they are still doing the activities that can disturb the balancing of mangrove ecosystem. This happens because of economic pressure, development expansion, and seek of income source in daily life. As it happened in Moru coast, there is illicit timbers that often occurs at night by surrounding community. They thought that mangrove was like usual tree forest, so anyone can cut or use it. sThe community of surroundings coast also throw rubbish there, so it will affected to the mangrove ecosystem directly. Besides that, the activity of turning fresh water for human consumption was also affecting to the mangrove ecosystem indirectly. Most people thought that mangrove only need salt water (sea) for growth. By turning fresh water for human consumption or irrigation, it will decrease water supply for mangrove.

### 2) Positive Impact Behaviors

People who live near to the coast also have awareness to mangrove ecosystem. Some socialization program about the importance of mangrove ecosystem had been held by governmental or non-governmental organization. By involving coast community, they held mangrove planting or cultivation program. Coast community also can participate in keeping and controlling mangrove growth. Community in Moru coast also have responsibility to keep it from illegal fell.

## 4. CONCLUSION

There are 4 kinds of mangrove species in Moru coasts. IVI and H' values in this research location was low, which means that mangrove ecosystem was in depressed condition. This depressed condition is caused by some negative behaviors of surrounding coast community, i.e. illicit timber, garbage or waste disposal in coast areas, turning activity of freshwater for irrigation, and conversion of mangrove forest to salt or fishponds. Nevertheless, there are some positive behaviors which must be appreciated from governmental or nongovernmental organization with

the participation of coast community in planting, cultivating, and keeping mangrove.

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