The Perspective of Local Community's on Mangrove Resilience and Needs Conservation Along the Southern Coast of Lombok Island, Indonesia

Agil Al Idrus, Abdul Syukur and Lalu Zulkifli
Postgraduate Program and Department of Sciences Education, Faculty of Teacher Training and Education, Universitas Mataram, Jalan Majapahit No 56 Mataram Nusa Tenggra Barat, Indonesia

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Abstract: Mangroves are well known by local communities as plants. They are essential for coastal protection of marine organisms, habitats, resouches, and their livelihood. This study formulates the value of resilience and vulnerability of mangrove from the perceptive of local communities as the basis of conservation. The collected data through from direct observation, questionnaires, interviews and discussions were analyzed using descriptive statistical analyses. The results showed that the most important value of mangrove resilience is from the local people perspectives. The development of mangroves are straight forward and could grow on their own. Mangrove plants can restore environmental conditions for the habitat of marine organism. The local people can look for organisms that had economic value for a source of livelihood. Therefore, the consideration of conservation for magrove could become of great benefit for suronding communities on a grand scale.

1 INTRODUCTION

Resilience has provided a way for thinking about policies for the future, an important consideration in a world characterized by unprecedented environmental change (Chapin et al, 2009). The main elements of the resilience approach includes attention to drivers and change processes, treating social-ecological systems as complex adaptive systems characterized by cycles and uncertainty, and social systems and ecosystems as coupled and co-evolving (Berkes, 2010). The issues of resilience and vulnerability are likely to become more important in the framing of resource management questions in the future. Therefore it is possible to develop strong local support for sustainable management of mangrove forests in areas where a positive attitude towards mangrove conservation prevails (Badola et al., 2012). In addition, the ecological knowledge's understanding has huge potention for local communities and can be a component in the protection of coastal ecosystems for the sustainability of biodiversity (Syukur, 2013). However, the local community's ecological potential has not been formulated in conservation formulas, such as mangrove conservation. The local communities need the ecological knowledge in order to be able to identify the needs of mangrove conservation at local levels. Therefore, the objective of this research is to see the recovery of mangrove vegetation and biotas in the ecosystem playing a role as an indicator of resilience.

2 MATERIALS AND METHODS

The study was conducted from April to October 2017 on the southern coast of East Lombok. The study conducted and involved the people in Tanjung Luar, Ketapang Raya and Jerowaru (Figure 1) with geographic position 116 ° 27'0"- 116 ° 30'0 " LU and - 8 ° 48'0 "-8 ° 51'0). Research sample was determined proportionally to take into account the length of stay of minimum 20 residents. They factored in education level, livelihood and distance of residence in the mangrove location. In addition, snowball sampling technique is used to gain depth of information about the ecological knowledge structure of local communities (Aswani and Lauer 2006;). The research data was analyzed by a discrete statistic method that

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to get conceptual pictured about society, ecology, knowledge, structure, and description in a ecological perspective (Few 2009).

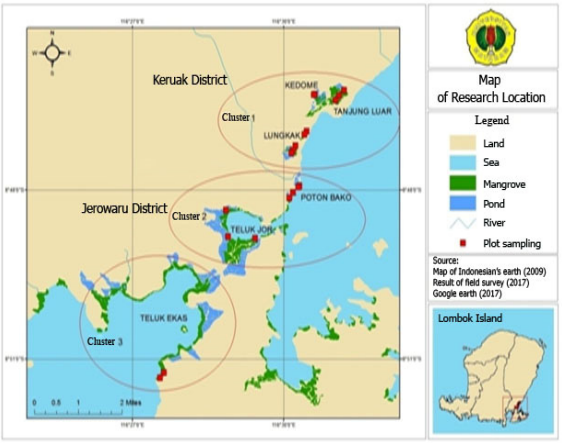

Figure 1. Research location

3 RESULTS AND DISCUSSION

3.1 Diversity of Mangrove Species and Diversity of Fauna Species

The vegetation of mangrove in the study area represents the potential of mangroves on the southern coast on Lombok Island (Table 1). The mangrove species found on all the location are *Avicennia marina*, *Rhizophora stylosa*, *Sonneratia alba* and *Xylocarpus moluccenis*. In addition, the species of mangrove found in two locations are *Avicennia lanata* dan *Bruguiera cylendrica*. The different number of mangrove species on each sampling area may reflect environmental conditions. Furthermore, the dominant mangrove species found in Tanjung Luar is *Rhizophora stylosa*, *Avicennia lanata* in Kedome, *Avicennia marina* and *Sonneratia alba* in Lungkak, *Sonneratia alba* in Teluk Jor and also *Sonneratia alba* in Teluk Ekas. The mangrove species are lower, compared to other locations such as in Gili Sulat where the number of species totaled eleven (Agil et al., 2015).

Table 1. The diversity of mangrove species in the study area.

Species	Tan jung Luar	Kedo me	Lung kak	Poton Bakau	Teluk Jor	Teluk Ekas
Avicennia marina	√	√	√	√	√	
Avicennia lanata		√	√			
Bruguiera cylendrica		√			√	
Ceriops decandra			√		√	
Lumnitzera rasemosa					√	
Rhizophora apiculata				√	√	
Rhizophora mucronata			√	√	√	
Rhizophora stylosa	√	√	√	√	√	
Sonneratia alba	√	√	√	√	√	
Xylocarpus moluccenis	√	√	√	√	√	
Total Number of Species	4	6	7	6	9	

The mangrove species in each sampling area have ecologically contributed to the sustainability of the biota diversity. In this study, we found a diversity of animals associated with mangroves (Table 2). The types of animals associated with mangroves are a form of mangrove ecological services. The diversity of fauna species that can be found within the areas such as crustacean, insects, fish, vertebrates (*Varanus* sp, *Chrysopelea* sp, *Cerberus* sp.), mamalia ((*Lutrogale* sp dan*Callosciurus* sp.), primate groups and birds (Agil et al., 2015), mangrove can be referred to the home for biodiversity (Ellison, 2008; Nagelkerken et al., 2008;). Furthermore, the environmental services from mangrove plays a role in the regulation of gas for the balance of CO_2 and O_2 in the atmosphere. As well as climate regulation, genetic resources, regulator of species and biophysical dynamics and increase biodiversity value (Larkum et al., 2006).

Table 2. The diversity of fauna in the study area.

Class	Species	Location					
		Tan jung Luar	Ke do me	Lung kak	Po ton Ba kau	Te luk Jor	Teluk Ekas
Gas tro poda	*Cerithidea cingulata*	+	+	+	+	+	+
	Cerithidea quadrata	+	+	+	+	+	+
	Chicoreus capucinus	-	-	-	+	-	-
	Chicoreus sp.	+	+	+	+	+	+
	Litoria scabra	+	+	+	+	+	+
	Littoraria melanosto	+	+	+	+	+	+

	ma						
	Murex sp.	-	-	-	+	-	-
	Nerita undata	+	+	+	+	+	+
	Oliva sp.	-	-	-	+	-	-
	Pomacea canaliculata	+	+	+	+	+	+
	Strombus sp.	+	+	+	-	-	-
	Sulcospira sp.	+	+	+	+	+	+
	Telescopium telescopium	-	-	+	-	-	-
	Terebralia sulcata						
	Volema myristica						
Crustacea	*Uca* sp.	+	+	+	+	+	+
	Scylla serrata	+	+	+	+	+	+
Reptilia	*Varanus salvator*	-	+	-	-	-	-
	Cryptophis boschmai						

3.2 Assessment of Local Communities on the Ecological Function of Mangrove

The diversity of mangrove services in the perspective of local communities is the value of environmental services obtained from the presence of mangroves. The communities interviewed as respondents can distinguish between species of mangroves based on morphological characteristics, such as; life spots and fruit types Furthermore, they stated that mangrove are important for many habitats, such as; fish holothuroidea, mollusca, birds and reptile. The local knowledge of mangroves represents its ability to describe it is many services ((Table 3).

Distribution of scores on the results of respondents assessment (Table 3), it shows that the number of respondents who choose the benefits from the mangrove in the category are useful and very useful, was prominent.

Table 3. The distribution of respondents based on the results of an assessment of the ecological role and benefits of mangroves for the community's, n= 100.

Description	Results of respondents' assessment				
	no benefit	less	quite	Benefit	very benefit
Habitat and fish feeding ground	0	12	15	30	40
The small fish habitat	0	3	13	31	45
Habitat of marine life other fish	0	0	14	44	42
The sources of marine fertility	0	0	15	20	65
Provisioning services material outputs					
Foods	80	20	0	0	0
Wood	0	0	5	10	85
Cegulating and maintenance					
Purification of water	0	0	20	25	55
Flood control	0	0	15	20	65
Regulation of the climate via carbon sequestration	0	5	25	35	30
River flow	0	0	10	20	70
Cultural services (non-material)					
Cognitive development	0	15	15	25	45
Recreation	0	0	5	10	85
Aesthetic experiences	0	0	10	20	70

3.3 The Perspective of Local Community's on the Resilience of Mangrove

Resilience is a parameter for assessing ecosystem changes to recover after receiving a disturbance. Resilience is the observation of a disturbance to the system that can absorb and retain the same function, structure, and identity and it is the ability to self organize as well as its capacity in adapting toward environmental change and social-ecological systems as complex adaptive systems (Walker et al. 2008; Chapin et al, 2009; Berkes, 2010). Moreover, resilience is a property of a system, and in Social-Ecological Systems (SES), humans have the added capacity to anticipate change to some degree and influence future paths.

The local communities in the study area have adequate knowledge of mangrove services (Table 3). In this case, they can identify changes in mangrove conditions as an object of assessment of the mangrove resilience and associated biota. However, resilient objects are extensive and complex in mangrove ecosystems, so this study used mangrove resilience indicators of cover value and mangrove density, using example such as species of biota ;fish, shrimp, crab and molluscs. The assessment of mangrove resilience, respondents were given choice in several

categories namely (e.g., mangrove category has recovered between 75% - 100%, the mangrove category has recovered between 50% - 75%% and the mangrove category has recovered <50%. Here is the results of respondents' assessment of mangrove resilience in the study area (Figure 2).

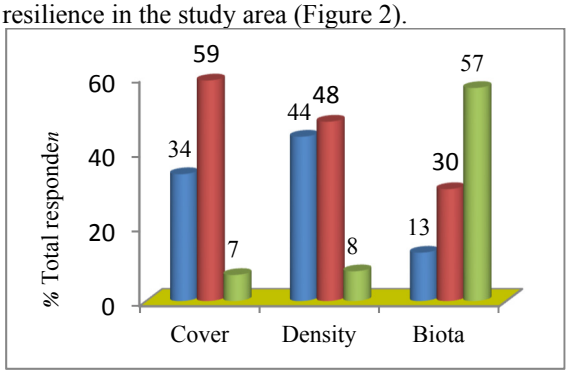

Figure 2. Respondent's assessment of mangrove resilience, n = 100.

The results of the respondents' assessment presented in Figure 2, are the mangrove condition has not recovered to 50% which is quite limited compared with those who have recovered above 50% -100%. However, the condition of biota (e.g., fish, shrimp, crabs and mollusks), more than 50% of respondents said, has not recovered to 50%. It explains the reason of mangrove has a faster recoverey compared to the biota associated with the location, or biota of economic value in the location. Those who are exploited have a slower recovery.. Nevertheless, the findings of this study were indicators of mangrove resilience from a community perspective in accordance with the concept of ecological resilience.

The respondents are able to identify mangrove resilience and formulate conservation efforts for its preservation. This in turn generates their social awareness and views regarding management options. It can be stated that they desire the mangrove area to be protected, especially from the effort to change the mangrove land into pond land, salt fields and new settlement. Furthermore, they are also expected the mangroves used in an environmentally friendly manner through the development of eco-friendly cultivation and tourism.

4 CONCLUSION

The local people's perspectives on the mangroves resilience are significant. The knowledge of local people on mangrove enviromental service is extremely relevant in the effort to maintain a balance ecosystem. The local people's knowledge about the natural system is a great value to scientific research and understanding leading to better conservation efforts by all who are involved.

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