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Molluscs From Mangrove Ecosystem in West Lombok and East Lombok

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Abstract. Mangrove ecosystems are very important and valuable habitat for marine organisms, namely molluscs. Research in the Pelangan and Cemara mangrove forests (West Lombok), Ekas and Tanjung Luar (East Lombok) aims to determine the whereabouts of mollusks in the area. Research and sampling were carried out from February to July 2019 using roaming methods with free sample collections, namely capturing empty-handed. From this study it was found that there were 51 species of molluscs, 47 species from the gastropod class and 4 species from the bivalve class. It is known that the mangrove ecosystem in Ekas has the most species, namely 29 species, then in Tanjung Luar 20 species, 16 species of Mangrove Pelangan and Mangrove Cemara 15 species. The composition of the types of mollusks in each location is 36%, 24%, 21%, 19%. Based on the similarity index, Tanjung Luar and Ekas have the highest similarity value with 0.417, and both have similarity values with Cemara and Pelangan 0.343 and 0.285 respectively. It is hoped that this research can be used as a reference for related research.

Keywords: mangrove ecosystem, mollusca, Tanjung luar, Cemara, Pelangan, Ekas

INTRODUCTION

Indonesia has the largest mangrove forest in the world. In 1982 the area was around 4.25 million hectares, another source said that this year the area was around 3.24 million hectares and in 1993 there were only 3 million hectares left (Setyawan et al, 2002). Mangrove forests are one of the unique natural ecosystems and have high ecological and economic value. Ecological functions of mangrove forests include: protection of the coast from wind attacks, currents and waves from the sea, habitats (dwellings), places to look for food (feeding ground), a place of care and enlargement (nurse ground), and spawning ground (spawning ground) for aquatic biota (Printrakoon and Temkin, 2008). Mangroves as foraging places contribute to the complexity of habitat and diversity of macrofauna associated with this ecosystem, such as crabs and mollusks which are the most dominant macrofauna in this ecosystem (Dewiyanti and Sofyatuddin, 2012).

Mangroves are characteristic of the shape of coastal plants, estuaries or river mouths, and deltas in protected areas of the tropics and subtropics. Thus, mangroves are ecosystems that exist between land and sea and in appropriate conditions mangroves will form extensive and productive forests. The existence of mangrove forest ecosystems provides a good habitat for the survival of several biota such as fish, crustaceans, and molluscs.

Molluscs are invertebrate animals that can live in various places such as land, muddy soil, fresh water, brackish water, and sea water. Mollusks are soft bodied animals (from the Latin word molluscus, soft), but most create hard protective shells made of calcium carbonate (Campbell et al, 2008). Mollusks are selomata, and the body has three main parts: muscular legs, usually used for movement; visceral mass consisting of most internal organs; and the mantle, the fold of tissue that encloses the visceral mass and secretes the shell (if any). In many mollusks, the mantle extends beyond the visceral mass, producing a space filled with water, the mantle cavity that holds the gills, anus and excretion pores. Many mollusks capture food with a grater that resembles a belt, called a radula, to grind food (Campbell et al, 2008).

Mollusca is come from benthos groups that have very high commercial value. Animal makrozobentos has an important role in the nutrient cycle. Called Montagna et al. (1989) in Suartini et al. (2006), states that in ecosystems, macrobentos as one of the link chains in energy flow and cycles from planktonic algae to high-level consumers. This study aims to determine the types of mollusks in the mangrove area in Pelangan, Cemara (West Lombok) and Ekas, Tanjung Luar (East Lombok). This research is important in the effort to preserve biodiversity and conservation efforts of mangroves and their associated biota. It is hoped that this research can be used as information for related research.

MATERIALS AND METHOD

The tools used in this study include

Cameras for documentation, sample bottles and plastic (zip lock) to put crustacean and mollusca specimens obtained. The materials used in this study are, the types of crustacean and mollusca caught, sea water for temporary preservation and 70% alcohol for preservation of specimens.

Time and place of research

This research was conducted from February to July 2019 located at Pelangan and Cemara (West Lombok) and Ekas and Tanjung Luar (East Lombok) (FIGURE 1). The molluscs samples obtained were taken to the Biology Laboratory, Faculty of Mathematics and Natural Sciences, Mataram University for identification.

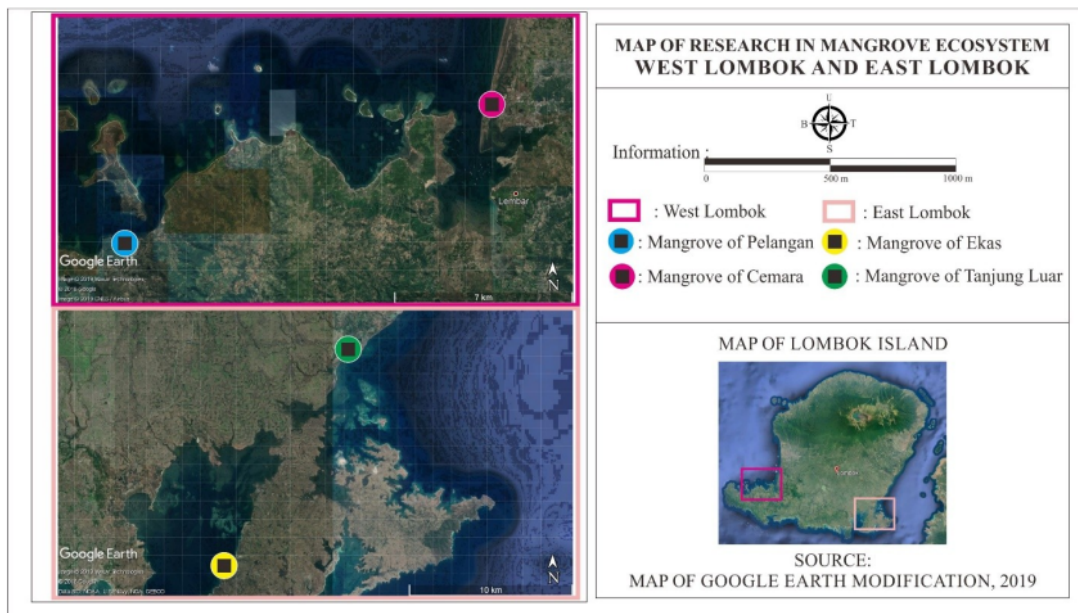


FIGURE 1. Map of Research Location

Method of Sampling

This type of research is descriptive exploratory research where the results of the research will be delivered in accordance with the conditions that occur during the field. The sampling technique is done by roaming methods



with a free collection using manual methods, namely capturing empty-handed. Specimens collected and preserved using 70% alcohol were then taken to the Biology Laboratory, Faculty of Mathematics and Natural Sciences, Mataram University to be identified. The book used as a reference in identifying the types of crustaceans and molluscs obtained was Crabs (PKLNg, 1998), Shrimps and Prawns (Chan, TY, 1998), Compendium of Seashells (R. Tucker Abbott and S. Peter Dance, 1998), and Private Lives Expose of Singapore's Shores (Peter KL NG, Shirley SL Lim, Wang Luan-Keng and Leo WH Tan., 2007).

RESULT AND DISCUSSION

Presence of Molluscs

Research on mangrove mollusks was carried out in four locations namely Pelangan and Cemara beaches in Sekotong District, West Lombok Regency and Ekas and Tanjung Luar beaches in East Lombok Regency. These locations have sandy and muddy contours, especially in mangrove-covered areas. Soil contour which is a factor that influences the gastropods and distribution. According to Riniatsih & Kusharto (2009) this substrate is a very good environment for the survival of the gastropod ecosystem. Suitable environmental conditions also support the growth of mangroves as well as animal species belonging to the mollusk phylum. The mangrove ecosystem is a habitat that supports the life of the fauna contained in it because the dense mangrove provides microhabitat for Gastropods. If the available microhabitat is more varied then the number of species found is greater (Priyambodo, 2003). A total of 51 species were found in all four locations, with a total of 26 families. The dominant species found in the East Lombok region are at the Ekas and Tanjung Luar beach locations with species composition of 36% and 24%, then 21% of species on the Pelangan beach and 19% of species on the Cemara beach.

From the 51 species, the most commonly found are from the Potamidinae family with 8 species. Potamidinae is a member of the Gastropods family, its shell has a common cone shape but varies in terms of length and width proportions. The lower edge of the winding shell opening, formed by a short siphon channel. Potamidinae has a pair of tentacles with a thick base. The habitat is the tidal area, the brackish estuary area, the mining area, and the mangrove forest. Distribution includes tropical regions and subtropics (Arbi, 2014).

The presence of species on Pelangan beach, Cemara beach, Ekas beach, and Tanjung Luar beach are 16 species, 15 species, 30 species, and 21 species respectively, respectively. The species *Nerita undata* and *Littorina scabra* are species that exist in every place. Species of *Nerita undata* which is a Gastropod visitor / more immigrants are found living attached to the stems or roots of mangrove species *Avicennia marina* and *Rhizophora mucronata*. While the type of *Littorina scabra* which is a facultative Gastropoda is found from roots to mangrove leaves. This is because this species has a relatively small size, has a strong attachment system and is drought resistant and is often found in *Avicennia marina* mangroves, some can even climb like the Littorinidae and Ellobiidae families.

TABLE 1. Presence of Molluscs on Pelangan, Cemara, Ekas and Tanjung Luar beaches

No	Family	Spesies	Location			
			Pel	Cem	Ekas	Tjg Lr
1	Neritidae	<i>Nerita undata</i>	+	+	+	+
		<i>Nerita planospira</i>	+	-	+	-
		<i>Nerita polita</i>	+	-	-	-
		<i>Nerita articulate</i>	-	+	-	+
		<i>Nerita sp</i>	+	-	-	+
2	Littorinidae	<i>Littorina scabra</i>	+	+	+	+
		<i>Littorina melanostoma</i>	-	-	+	+
3	Cymatiidae	<i>Cerithum sp</i>	+	+	-	-
		<i>Cymatium sp</i>	-	-	+	-
4	Ampullaridae	<i>Pomacea canaliculata</i>	-	-	+	-



5	Cerithiidae	<i>Rhinoclavis kochi</i>	+	-	-	-
		<i>Rhinoclavis longicauda</i>	-	-	-	+
		<i>Rhinoclavis aspera</i>	-	+	-	-
		<i>Clypeomorus moniliferus</i>	+	-	+	+
		<i>Clypeomorus coralium</i>	-	-	+	-
		<i>Clypeomorus bifasciata</i>	-	+	+	+
6	Potamidineae	<i>Terebralia sulcata</i>	+	-	+	+
		<i>Terebralia palustris</i>	+	-	-	-
		<i>Telescopium telescopium</i>	-	-	+	-
		<i>Cerithidea obtusa</i>	+	-	-	-
		<i>Cerithidea quoyii</i>	-	+	+	+
		<i>Cerithideopsilla alata</i>	-	+	-	+
		<i>Cerithidea cingulata</i>	-	-	+	+
		<i>Cerithidea quadrata</i>	-	-	+	+
7	Batillariidae	<i>Batillaria zonalis</i>	-	+	-	-
		<i>Batillaria sordid</i>	-	+	-	-
8	Ellobiidae	<i>Cassidula nucleus</i>	+	-	-	-
		<i>Cassidula sp</i>	-	+	-	+
		<i>Ellobium aurisjudae</i>	+	-	-	-
		<i>Cassidula aurisfelis</i>	-	-	-	-
9	Conidae	<i>Conus sp</i>	-	-	-	+
10	Muricidae	<i>Chicoreus capucinus</i>	-	+	-	+
		<i>Hexaplex sp</i>	-	-	+	-
		<i>Chicoreus sp</i>	-	-	+	-
11	Melongenidae	<i>Volema myristica</i>	-	-	+	-
12	Coenobitidae	<i>Coenobita cavipes</i>	-	-	-	+
13	Pachychilidae	<i>Sulcospira sp</i>	-	-	+	-
14	Coatellariidae	<i>Vexillum amandum</i>	-	+	-	-
15	Buccinidae	<i>Phos vandenberghi</i>	-	-	-	+
16	Cypraeidae	<i>Cypraea sp</i>	+	-	+	-
17	Veneridae	<i>Gafrium</i>	-	-	+	-
18	Nassariidae	<i>Nassarius olivaceus</i>	-	-	+	-
19	Strombidae	<i>Strombus sp</i>	-	-	+	+
20	Tegulidae	<i>Tectus fenestratus</i>	-	-	+	-
21	Trochidae	<i>Trochus sp</i>	-	-	+	-
22	Turbinellidae	<i>Vasum turbinellus</i>	-	-	+	-
23	Pteriidae	<i>Isognomon sp</i>	+	+	+	-
24	Arcidae	<i>Anadara sp</i>	+	+	+	-
25	Cyrenidae	<i>Polymesoda erosa</i>	-	-	+	+
26	Assimineidae	<i>Assiminea brevicula</i>	-	-	+	-



Note:

+ : found

- : not found

Molluscs are a class of invertebrate animals that are widely distributed in coastal areas, especially those associated with mangrove plants. Molluscs in the coastal areas of Pelangan, Ekas, Tanjung Luar and Cemara are found on substrates which tend to be muddy and sandy to support the supply of nutrients and water for their survival. They also use the roots of mangrove plants to breed. Molluscs that many found in the Pelangan, Ekas, Tanjung Luar and Cemara coastal areas, namely the Neritidae family type or often referred to by the surrounding community, namely Kaliomang. Mollusks that belong to the class Gastropoda can be found from the roots to the stems and leaves of mangrove vegetation.

The species of the Potamidinae family most commonly found are *Cerithidea cingulata*. This is because the *Cerithidea cingulata* species has a very wide distribution area in the mangrove forest. Besides that the sandy soil condition is very suitable for the life of *Cerithidea cingulata* where according to Roberts *et al.* (1982) *Cerithidea cingulata* is one of the original group Gastropods who like sand or mud-habitable habitat and is generally very abundant in mangrove forests.

In this study conducted in four locations namely Tanjung Luar, Cemara, Ekas, and Pelangan found 51 species of mollusks which belong to the bivalvia and gastropod class consisting of 26 types of families. Common species found from these four locations are the family of potamidinae from gastropods namely *terebralia sulcata*, *terebralia palustris*, *telescopium telescopium*, *cerithidea obtusa*, *cerithidea quoyii*, *cerithideopsilla alata*, *cerithidea cingulata*, *cerithidea quadrata* that live on muddy terrain. While in 2015 Research conducted in different locations but still in the Lombok region has identified 11 families and 31 species of mangrove gastropods on Lombok Island, consisting of 19 species of native mangrove groups, 5 facultative species, and 7 visiting species. Diversity ranges from 5 to 13 species and the physical characteristics of the mangrove forest environment determine the composition of gastropod species. From this article, it can be seen that the types of species that exist in the Lombok island mangrove habitat are increasing every year because their habitats are still maintained today.

Composition of Molluscs Species

In general, sampling locations in Pelangan, Cemara, Ekas and Tanjung Luar beaches have fairly uniform substrates, i.e. Which are dominated by muddy sand and Mangroves which are predominantly of *Rhizophora* sp. The number of species or species of mollusks obtained during the study were 51 species (47 species from the Gastro-poda class and 4 species from the Bivalvia class) that belonged to 26 families. The most common types include the Pottamidinae family, namely *Terebralia sulcata*, *Terebralia palustris*, *Telescopium telescopium*, *Cerithidea obtusa*, *Cerithidea quoyii*, *Cerithideopsilla alata*, *Cerithidea cingulata*, *Cerithidea quadrata*. Mollusks that are found are mostly species that are commonly found in all four locations.

The composition of dominant mollusk species was found in the location of Ekas Beach (East Lombok), 36% with 20 families. Then in Tanjung Luar beach the mollusk composition found was 24% with 11 families. In Pelangan and Cemara Beach, molluscs compositions were found at 21% and 19% with 9 and 11 families found. According to Candri *et al* (2018), Mollusks associated with mangrove ecosystems are 47 species. However, the number of different sampling locations causes the number of species that are different from the results of this study.

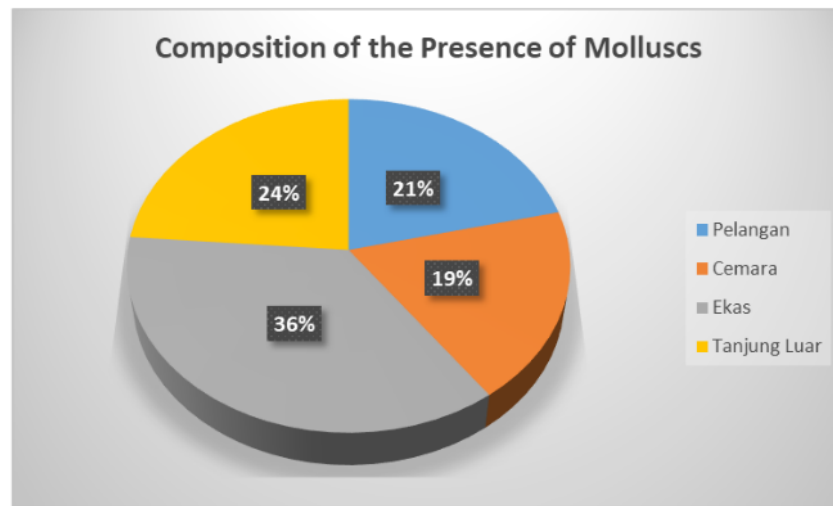


FIGURE 2. Composition of mollusk species in West Lombok and East Lombok

Location Similarity

The types of mollusks found in Tanjung Luar Beach and Ekas Beach have many similarities. Recorded similarity index of mollusc species between Tanjung Luar and Ekas Beach is 0.417. This can be seen from the type of sand in both locations, muddy sand which is the habitat of the mollusk in search of food and survival. Factors that influence it are the level of salinity, substrate (where to survive) and tides. The level of salinity in the mangrove ecosystem is fairly high because of its location adjacent to the beach. Coastal and mangrove ecosystems are tidal areas so it is easy to obtain food.

In this study, 26 mollusk families were found, namely Netritidae, Littorinidae, Cymatiidae, Ampullaridae, Cerithiidae, Potamidinae, Batillariidae, Ellobiidae, Conidae, Muricidae, Melongenidae, Coenobitidae, Pachychilidae, Potamidinae, Batillariidae, Ellidiidae, Ellobiidae, Conidae, Muricidae, Melongenidae, Coenobitidae, Pachychilidae, Potamideidae, Bucloeidae, Bucidaeidae, Bucidaeidae, Bucidaeidae, Bucidae, Bucidae, Turbinellidae, Pteriidae, Arcidae, Cyrenidae, and Assimineidae. Mollusks that have the highest composition are in Ekas Beach with 7 families and 15 species. The dominant species are from the Potamidinae family, where most species live on muddy plains, but some also climb mangrove trees. Potamidinae species distribution is limited to mangroves and brackish water is very dependent on the presence of mangroves and brackish water as a habitat and food source. Only *Terebralia palustris* only consumes true mangrove litter, and the rest eat microalgae and eat organic detritus mangrove and brackish water, and even open swamp dwellers make use of high primary productivity in mangrove forests and brackish water (Wilson, 1993).

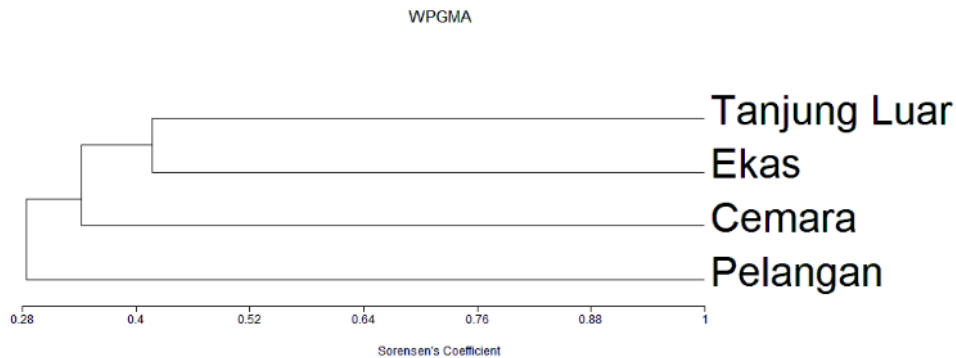


FIGURE 3. Dendrogram level of similarity of mollusk species between four locations in West Lombok and East Lombok.

The results of research and data analysis show that the Tanjung Luar and Ekas beaches have a higher level of similarity than the Cemara beach and then Pelangan beach. These results are seen from the number of types of mollusks that exist in both locations. The availability of food, shelter and level of salinity are several factors that influence the type of mollusk in the mangrove ecosystem.

CONCLUSION

From research conducted on the coast of Tanjung Luar, Cemara mangrove, Ekas, Mangrove Pelangan found 51 species of mollusks which belong to the bivalvia and gastropod class consisting of 26 types of families. Common species found from these four locations are the family of potamidinae from gastropods namely *Terebralia sulcata*, *Terebralia palustris*, *Telescopium telescopium*, *Cerithidea obtusa*, *Cerithidea quoyii*, *Cerithideopsis alata*, *Cerithidea cingulata*, *Cerithidea quadrata* that live on muddy terrain. The composition of the types of mollusks in each location is 36%, 24%, 21%, 19%. Based on the similarity index, Tanjung Luar and Ekas have the highest similarity value with 0.417, and both have similarity values with Cemara and Pelangan 0.343 and 0.285 respectively.

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