

## Gastropod Diversity in the Lembung Beach Mangrove Ecosystem, Galis District, Pamekasan Regency, Madura

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**Abstract:** Indonesia is a biodiversity country seen from the amount of biodiversity, including the mangrove ecosystem. Mangrove ecosystems are essential in maintaining ecological balance in forming vegetation structures and becoming a place for marine biota such as gastropods. Gastropods are soft-bodied animals that use their stomachs to walk. In mangrove ecosystems, gastropods have a role in litter decomposition and maintaining nutrient dynamics, so the role of gastropods is essential for mangrove ecosystems. This research was conducted to determine the diversity of gastropods in the mangrove ecosystem of Lembung Beach. This is descriptive exploratory research with a qualitative approach. Sampling and station determination using a purposive sampling technique. Data were analyzed descriptively, tabulated and presented as tables and figures. Based on the research results, there are eight families, namely: Ellobidae Family, Littorinidae Family, Potamididae Family, Muricidae Family, Cerithiidae Family, Neritidae Family, Ampullariidae Family, and Strombidae Family.

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## INTRODUCTION

Geographically, Indonesia stretches from 6° LU to 11° LS and 92° to 142° BT, with 17,504 islands and a coastline of 95,161 km, the second longest after Canada (Arianto, 2020). These geographical conditions make Indonesia a mega biodiversity country seen from the high amount of biodiversity, so Indonesia occupies the second position after Brazil (Silalahi & Nisyawati, 2018). Biodiversity in Indonesia includes gene-level diversity, species-level diversity includes plant, animal, and so on, and ecosystem-level diversity includes terrestrial ecosystems and aquatic ecosystems (Sugandi, 2020). Land ecosystems and aquatic ecosystems also have a combination, namely mangrove ecosystems, so mangrove ecosystems are unique in terms of this combination and also have a lot of biological potential (Bonita, 2016). Similarly, the mangrove ecosystem is found on Lembung Beach, Galis district, Pamekasan Regency, Madura. Mangrove ecosystem, which has an area of 62.90 Ha. The mangrove ecosystem on the coast of Lembung Galis District is still in good condition and maintained because the mangrove ecosystem on the coast of the Lembung is managed and maintained by PT. Perhutani is a protected forest assisted by local communities (Prihantini et al., 2022).

Based on an ecological point of view, mangrove ecosystems have an important role in maintaining coastal ecological balance because of the formation of vegetation structures so that they become places for aquatic biota such as spawning ground, nursery ground and feeding ground (Salma et al., 2022). In general, mangrove ecosystems have sandy and muddy substrates, usually used as habitats by aquatic biota, such as gastropods (Laraswati et al., 2020). Gastropods are soft-bodied animals that use their stomachs to walk. The movement of gastropods is caused by wave-like muscle contractions, which start from the back towards the

front. When walking, gastropods produce scars because the front of the gastropod has glands (Bancin et al., 2020). Gastropods are found in sandy and muddy habitats, such as mangrove ecosystems attached to mangrove roots (Bahar et al., 2022). As well as in the Lembung Beach mangrove ecosystem, many gastropods are attached to the mangroves' roots, stems and leaves. In mangrove ecosystems, gastropods have a critical role in litter decomposition and also play a role in maintaining nutrient dynamics. Mangrove leaves that fall to the surface of the substrate will not directly experience weathering but are decomposed first by macrobenthos, one of which is gastropods (Rahman et al., 2021). This study aims to determine the diversity of gastropods in the Lembung Beach Mangrove Ecosystem, Galis District, Pamekasan Regency, Madura.

### RESEARCH METHOD

This type of research is exploratory, descriptive research with a qualitative approach. Exploratory research is a method of direct observation at the place of research (Swedberg, 2020). This study began by determining the station by Purposive Sampling method. Three observation stations include Station 1 = Lembung Beach, station 2 = mangrove ecosystem, and Station 3 = road to Lembung Beach (Figure 1). The gastropods found are morphologically identified up to the family level. Morphological features observed include colour, size, shape of the shell mouth (presence or absence of operculum), the shape of the shell tip, spire, whorl, and aperture. Identification was carried out by comparing samples of observations with the Recent Book & Fossil Indonesian Shells, Bunjamin Dharma and google lens (Dharma et al., 2005). Then the data found are analyzed descriptively, tabulated and presented as tables and figures (Sonnad, 2002).

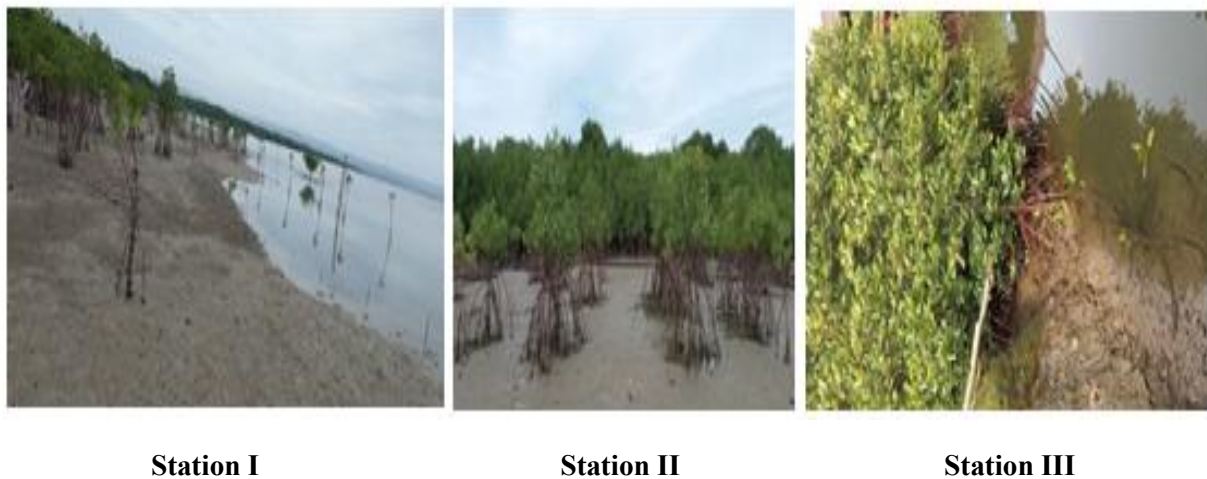











Figure 1. Sampling location




### RESULT AND DISCUSSION

Based on the results of the study, gastropods found in the Lembung coastal mangrove ecosystem there are eight families, namely: Family Ellobidae, Family Littorinidae, Family Potamididae, Family Muricidae, Family Cerithiidae, Family Neritidae, Family Ampullariidae, and Family Strombidae. which shows the varied structure of the shell. Here are, some types of gastropods based on the character of the gastropod shell can be seen in Table 1.

**Table 1.** Number of families and species of gastropods found

No.	Family Name	Name Species	Species figure
1.	Ellobidae	<i>Cassidula aurisfelis</i>	
2.	Ellobidae	<i>Cassidula nucleus</i>	
3.	Littorinidae	<i>Littotaria (palustorina) articulata</i>	
4.	Littorinidae	<i>Littotaria (palustorina) melanostoma</i>	
5.	Potamididae	<i>Cerithiadea cingulata</i>	

No.	Family Name	Name Species	Species figure
6.	Potamididae	<i>Cerithidea quadrata</i>	
7.	Muricidae	<i>Chicoreus capucinus</i>	
8.	Cerithiidae	<i>Rhinoclavis sinensis</i>	
9.	Neritidae	<i>Nerita (amphinerita) inscuplata</i>	

No.	Family Name	Name Species	Species figure
10.	Neritidae	<i>Neritidae (retina) signata</i>	
11.	Ampullariidae	<i>Pila polita</i>	
12.	Strombidae	<i>Strombus (laevistrombus) canarium</i>	

There are two types of Ellobidae in the Lembung coastal mangrove ecosystem: *Cassidula aurisfelis* and *Cassidula nucleus*. Both types have oval-shaped shells, medium size, thick and have dextral shell rotation (turning towards the right). The difference between the two types is that the colour of the outer surface of the shell of *Cassidula aurisfelis* is brown. In contrast, the colour of the outer surface of the *Cassidula nucleus* shell is golden brown with white patterns. The ellobidae family is mainly found on muddy substrates on the beach and substrates in mangrove forest ecosystems on the leaves and roots (Ernawati et al., 2019). The Littorinidae family found in the Lembung coastal mangrove ecosystem is represented by *Littotaria (palustorina) articulata* and *Littotaria (palustorina) melanostoma*. In general, the shell of the family littorinidae is pyramidal. *Littotaria (palustorina) articulate* has a circle and a relatively low spire scattered on its body. The type of *Littotaria (palustorina) melanostoma* slightly modifies the typical Littorinidae. In this type, it is pointed at the apex and has a

dextral round (turning towards the right). Yellow on the surface of the shell with a pattern of brown stripes (Rahmasari et al., 2015; Supratman et al., 2018).

The family Potamididae has a distinctive shell shape, which is elongated pyramidal. Two types of Potamididae families are found in the Lembung coastal mangrove ecosystem, namely *Cerithiadea cingulata* and *Cerithidea quadrata*. The character of the shell of *Cerithiadea cingulatea* is rather thick; the shape is pointed with a slightly tapered level thread and is black with an orange shell surface line. *Cerithidea quadrata* has a thick, dense, tapered shell, and its height is pursed. Periostrakum brownish, operculum rounded, head and pair of tentacles narrowed in the distal region, front legs rounded and hind legs blunt. This type is mostly found in muddy soil around mangroves (Slamet et al., 2021). The family Muricidae generally has a characteristic siphon-channelled shell shape that is very prominent and long in size. The structure is added as a spine or spines to form an axis towards the apex. In the Lembung coastal mangrove ecosystem, there is a muricidae family type *Chicoreus capucinus* which has a slightly larger shell size shape, jagged spire, slippery whorl surface and an oval-shaped dextral aperture shell rotation direction, an elongated siphonal canal. *Chicoreus capucinus* has an upper brown to black shell, a slightly light whitish brown underside, a light brown aperture and a brownish-yellow columella. Its habitat is found in muddy substrates around mangrove plants and attached to the roots and stems of mangrove plants (Ardiyansyah, 2018; Ernawati et al., 2019; Rupmana et al., 2021).

The Cerithiidae family has several interesting things, namely the apex shape and shell shape (shell shape) and apertura, which are common characteristics of Cerithiidae that can facilitate identification. The family of cerithiidae in the lembung coastal mangrove ecosystem is a type of *Rhinoclavis sinensis*, which has blackish-brown characteristics on the anterior part and bright brown on the part that locks, namely the posterior part on the surface of the shell filled with small blunt spines. This type lives in low-tide sea areas and sticks to coastal reefs (Supusepa, 2018). The family Neritidae is better known through its shell shape with a very large Body Whorl and a clumped and short whori unit. In the mangrove ecosystem, this family lembung beach is found on the coast attached to coral rocks with *Nerita (Amphinerita) insculpta* and the type of *Nerita (Retina) signata*. Type of *Nerita (Amphinerita) insculpta* on the surface of the shell, there are spiral lines, the top of the shell is slightly paled, and has serrations on the outer shell lip (Alita et al., 2021). The type of *Nerita (Retina) signata* has concave spiral lines on the entire surface of the operculum and nodules and has a large and jagged outer lip (Mujiono, 2016).

The family Ampullaridae is also found in the coastal mangrove ecosystem of the *Pila Polita* species. This type is found in muddy substrates. In general, this type has a rounded shell shape of yellow and yellow-green with brown ring belts that are more clearly visible inside the mouth of the shell (Aperture) (Marwoto et al., 2012; Marwoto, 2017). The Strombidae family is the last family found by researchers in the Lembung coastal mangrove ecosystem with the type of *Strombus (Laevistrombus) canarium*. *Strombus (Laevistrombus) canarium* has a beautiful shell that is wide and smooth shell. This type has various colours: blackish, golden yellow, white and cream. Ecologically, the shell has the potential to be an indicator of seagrass fertility (Lestari, 2020; Yanti et al., 2022).

## CONCLUSION

Eight types of gastropods are found in the Lembung Beach Mangrove Ecosystem (1) two types of Ellobidae family, *Cassidula aurisfelis* and *Cassidula nucleus*, (2) two types of Littorinidae family: *Littotaria (palustorina) articulate* and *Littotaria (palustorina)*

*melanostoma*, (3) two types of Potamididae family, *Cerithiadea cingulate* and *cerithiidea quadrata*, (4). one type of Muricidae family, *Chicoreus capucinus*, (5) one type of Cerithiidae family, *Rhinoclavis sinensis*, (6) two types of Neritidae family, *Nerita (Amphinerita) inscuplata* and *Nerita (Retina) signata*, (7) one type of Ampullariidae family, *Pila polita*, and (8) one type of Strombidae family, *Strombus (Laevistrombus) canarium*.

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