



Diversity Species and Dominance of Gastropods on Lantebung Mangrove Ecosystem, City of Makassar

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Abstract

The Lantebung mangrove ecosystem in Makassar City is one the mangrove ecosystems in Makassar City, which has been used by the community as a mangrove tourism area. The purpose of this study was to determine the level of species diversity and the dominance of gastropod species in the Lantebung Mangrove ecosystem, Makassar City. This research is exploratory descriptive research. The determination of stations is done by purposive sampling with 3 research stations. Where at each station a 20-meter-long transect was made with 5 subplots measuring 1m x 1m. The results of this study indicated that the index of gastropod diversity in the Lantebung mangrove ecosystem, Makassar City is in the medium class with a value of 1.235. The Dominance Index found that the Dominance of Gastropod Species was in a low class with a value of 0.388.

Keywords: Mangroves; Gastropods; Diversity; Dominance

Introduction

Indonesia is a country that affluent in natural resources in mainland and ocean areas. One is the mangrove forest, which has various functions in human life. Mangroves can be a habitat or home for many types of biota, such as Gastropods that use mangroves as a place to attach, and no less important is their existence as a source of nutrition (Saragih, 2020).

The Coastal is a boundary between the ocean and the mainland with the lowest (neap tide) and the highest tide (spring tide). In Indonesia's coastal ecosystems,

there are various ecosystems: mangrove ecosystems, coral reefs, seagrass, and seaweed. Organisms that live on coastal have structural adaptations to attach to rigid substrates, cling to mangrove trees, or immerse themselves in muddy and sandy substrates (Nurmiati, Sirih, and Parakkasi 2016). *Mangrove* is an ecosystem that grows in brackish waters bordering sea water and rivers or estuary zone. That is what causes the mangrove ecosystem to have a reasonably high biodiversity. Various types of biota dominate the mangrove forest, including Mollusca and Gastropod groups.

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The ecological benefits of mangroves are that they can be a food supplier or a place to find food, a breeding ground for various aquatic biota, including the gastropod itself. Gastropoda is one type of aquatic biota that inhabits mangrove forests. Gastropods use mangroves for various activities, both as a place to live, shelter, and breed and as a food source. Gastropods from mangrove forests can be found in various parts of the mangrove itself, starting from the roots, stems, and leaves of mangroves (Hendri Budiawan, Fuad Ardiansyah 2020). Mangroves, as a place for food foraging, have a high role in the complexity of the habitat and the diversity of various fauna associated with this ecosystem, including Mollusca, namely gastropods and bivalves. Gastropods are a phylum of macro-zoobenthos that can be used as bioindicators in aquatic ecosystems (Sri Wahyuni, Arier Anthoius Purnama 2015).

Gastropods are often found in our daily lives. Gastropods can live in mangrove forests because mangrove forests have high humidity levels. Due to the high humidity level, gastropods become one of the relatively high biotas in the mangrove forest and dominate compared to other marine biotas. Mangrove forests, which have dual ecological and economic functions, make them an ecosystem often overused by the community for personal and industrial interests. This disruption of the mangrove ecosystem has a direct impact on the disruption of the various gastropod communities that are in it. (Salim et al, 2020).

These various types of gastropods have been overused in recent years—utilized for various sectors of life either as a source of food or decoration. In the last few decades,

shellfish have been used for various protein and commercial needs. It is a mixture of cement and lime, meat as a protein supplement for shrimp farming activities, and food for birds, and several types of shellfish have been used as a mixture. For cosmetics such as shellfish from the family Potamididae, the life cycle will be spent in the mangrove forest itself (Kristiana, 2019).

In the mangrove ecosystem, gastropods have a role in the litter decomposition process and mineralization of various organic materials. (Merly and Elviana, 2017) The hallmark of gastropods is a developmental process called torsion. As the embryo develops, the viscera rotate up to 180° causing the anus and mantle cavity to fold over the head. Organs previously bilateral will experience a size reduction, and other organs may be lost on one side of the body. Torque is not related to forming a coiled shell because shell formation is an independent developmental process (Kristiana, 2019).

Gastropods in mangrove forests are divided into two groups: foreign groups (immigrants) and groups of native inhabitants of the mangrove forest (Bengen, 2004). These two things explain that the difference between native gastropods and visitors can be seen in the gastropod's activities in their lives. Gastropod visitors only spend part of their life in mangrove forests, while native gastropods will spend their entire life in mangrove forests (Hendri Budiawan, Fuad Ardiansyah, 2020).

Lantebung is one of the coastal areas in the Bira Urban Village Government, Makassar City. Currently, the Mangrove Area has become a coastal area protected area based on the Makassar City Long Term Development Plan (RPJPD) 2005-2025. It is

inseparable as a strategic step for the Makassar City government in protecting the mangrove ecosystem in Lantebung, Bira Village, Makassar City (Valentino Sarapang Batara, Agus Salim 2020).

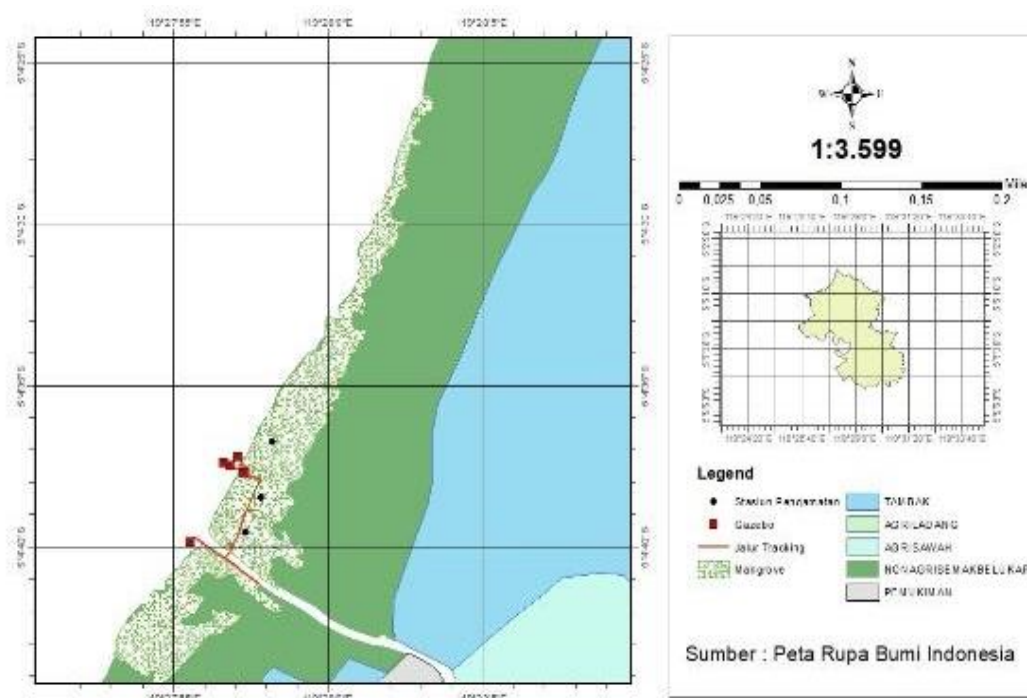
Research on gastropods has been carried out on various beaches and waters in Indonesia. The mangrove ecosystem itself is no exception to showing that Indonesia's mangrove ecosystem has a good role and function. The utilization of the Lantebung mangrove ecosystem as ecotourism in Makassar City certainly indirectly impacts the mangroves and gastropods themselves. So the purpose of this study was to determine the level of diversity of gastropod species and the dominance of gastropod species found in the Lantebung mangrove ecosystem.

This research was conducted in April 2021 on the Lantebung mangrove

ecosystem, Makassar City. The research method uses a qualitative descriptive method (Ahmad, 2018). The population and samples in this study were gastropods found in the Lantebung mangrove ecosystem, Makassar City as a population, and gastropods attached to mangrove roots and trunks or gastropods tree fauna as research samples (Nyco Hendrawan, 2015).

The observation stations in this study were determined by purposive sampling by setting three research stations that were considered to represent the ecosystem as a whole. Each station is made of a transect with a length of 50 m and a 10m x 10m plot. The observation points or observation stations can be seen in Figure 1.

Figure 1
Maps of research location



This study includes the index of species diversity and dominance index. Species diversity shows the balance in an ecosystem and can indicate a stable ecosystem condition. According to Brower et al. (1990), to calculate the species diversity index, we can use the Shannon-Wiener equation with the following formula:

$$H' = \sum Pi \ln Pi, \text{ where } Pi = \frac{ni}{N}$$

Where is,

H' = Species diversity index

Pi =Ratio Comparison between the number of individuals of type I (ni) and the total number of individuals N

ni = first total species individuals

N = total individuals

The criteria for assessing the Shannon-Wiener diversity index are grouped into 3 criteria, which are,

If the value of $H' > 3$, then the species diversity is high, if the value is $1 < H' < 3$, then the species diversity is moderate,

If the value $H' < 1$, then the species diversity is low.

To be able to show the presence of biota that dominates in a community, a Dominance Index is calculated. According to Odum (1997), certain dominance can be recognized through the Simpson dominance index, which is using the following:

$$C = \sum (Pi)^2$$

Where Pi is $\frac{ni}{N}$

For,

C = dominance index

ni = Total species individuals

N = sum of total species individuals

The assessment criteria for the Simpson's Dominance Index range from 1 – 0 and are grouped into 3 criteria value ranges, which are as follows:

If $0 < C < 0,5$, then it is low in dominance,

If $0,5 < C < 0,75$, then it is moderate in dominance,

If $0,75 < C < 1$, then it is high in dominance.

Research Result and Discussion

Administratively, the Lantebung mangrove ecosystem is included in the administrative area of Bira Village, Tamalanrea District, Makassar City. Bira Village itself is a coastal area of 0-20 meters above sea level which is still influenced by tides. The Lantebung mangrove ecosystem itself is located at the coordinate point $5^{\circ} 4' 42.848''$ LS dan $199^{\circ} 27' 58.285''$ LE Based on research conducted on the Lantebung mangrove ecosystem in Makassar City, 238 individuals were found, including 139 species of *Nerita* sp, 29 species.

Based on table 1, *Nerita* sp is the species with the highest number found in the Lantebung mangrove ecosystem, with a total of 139, while the *Ceonobita* sp species is the least found in the Lantebung mangrove ecosystem, with a total of 16. However, it can also be seen that *Nerita* sp and *Nerita undata* were only found at station I and Station II. *Terebelia sulcata* was only found at station I and II, and *Cassidula auristlis* was only found at station II and II. Meanwhile, only *Ceonobita* sp was found at all existing stations. The percentage of the results can be seen in Figure 2.

Table 1

Observation Result of Gastropods

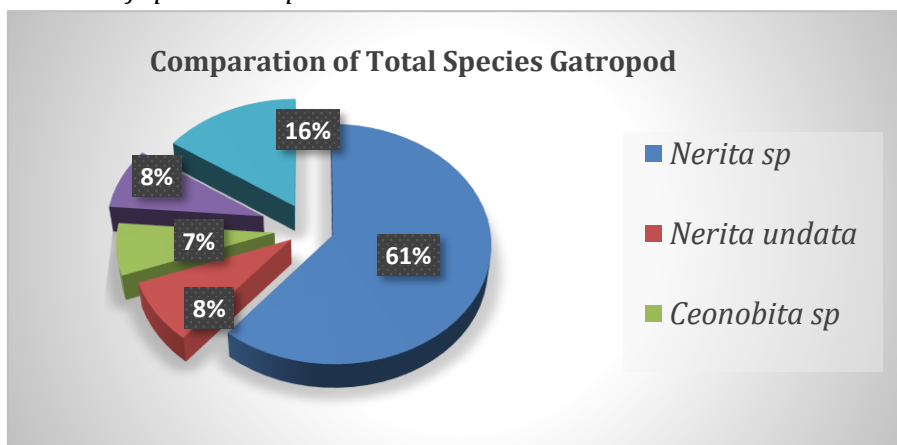
No	Species Name	Stations			Total
		I	II	III	
1	<i>Nerita sp</i>	75	0	64	139
2	<i>Nerita undata</i>	15	0	14	29
3	<i>Ceonobita sp</i>	3	2	11	16
4	<i>Terebalia sulcata</i>	6	13	0	19
5	<i>Cassidula auristlis</i>	0	32	3	35
Total					238

Nerita sp and *Nerita undata* are visitor gastropods that accidentally enter the mangrove ecosystem. These groups are generally found in narrow areas around the borders of other ecosystems, namely in the front of the forest bordering the sea and the back of the forest bordering the land.

Meanwhile, *Terbraliasulcata* and *Cassidula aurisfelis* are included in the original group of mangroves, namely gastropods species that spend their entire lives in the mangrove ecosystem. Gastropods are mostly litter eaters and are often found in the middle and back of mangrove forests.

Figure 2

Number of species comparison chart



Various types of gastropods found in this study are gastropods that live in areas affected by tides, which have various ways of dealing with changes in environmental factors. Among them are storing water in their shells, moving to more humid areas, and modifying or adding breathing apparatus

other than gills so generally that they can take oxygen directly from the air, having a way of reproduction influenced by tides. This adaptability is possessed by native mangrove gastropods and fluctuating gastropods (Nyco Hendrawan, 2015).

Species Diversity Index and Gastropod Species Dominance

The results of data analysis carried out on the Species Diversity Index and

Gastropod Dominance Index in the Lantebung mangrove ecosystem of Makassar City can be seen in Table 2

Table 2

Diversity Index and Gastropod Dominance Index

NO	Indeks	Value	Categori
1	Diversity Index (H')	1,236	Moderate diversity
2	Dominance Index (C)	0,388	Low dominance

Species diversity itself is a parameter to determine the existence of a community related to the level of diversity. Hendri Budiawan and Fuad Ardiansyah (2020) explained that counting the number of species or species from a community is the simplest way to see the species diversity level of a species or community.

The results of the data analysis in Table 2 show that the level of diversity of gastropod species in the Lantebung mangrove ecosystem of Makassar City is in the medium category, which means that productivity is sufficient. The ecosystem is balanced or stable because the diversity index value is in the second category where the value is $1 < H' < 3$, then the species diversity is moderate.

The level of diversity of gastropod species is a bioindicator in seeing or determining the level of damage to the mangrove ecosystem by humans. So at the research location, in the Lantebung mangrove forest, we can see the damage to mangroves based on this bioindicator.

The high and low levels of species diversity can be caused by various factors,

including the number of species or individuals and the presence of several species that are found in more abundant quantities than the number of other species. The activities of the community around the mangrove forest are classified as not a factor that significantly influences the Gastropod biota. Because based on observations on the Lantebung mangrove ecosystem, no activities of the surrounding community exploit or damage the forest itself. It is in line with the statement of Tri Kurnia et al. (2013), which state that community activities can be classified as not having a high effect on the Gastropod and Bivalves biota. Diversity will be low if community activities have a strong influence (Elya Febrita, Darmawati, and Astuti 2015).

Meanwhile, the Gastropod dominance index based on the results of this study is categorized as low. It is because the numbers/values obtained are in the range of $0 < D < 0.5$. These results indicate that no gastropod exists in the Lantebung Mangrove ecosystem, Makassar City, which dominates to the extreme between one species and another. The low index of Gastropod dominance in the Lantebung Mangrove

ecosystem is due to environmental conditions that support and are still tolerant of various types of Gastropods. In this study, it was found that the gastropods of the *Nerita* Sp species had a large number of species compared to other types. However, the type of *Nerita* sp does not specifically dominate the other gastropod species. A species can be said to be low in a community or ecosystem if the dominance index of a community is low and shows a stable community structure. On another side, Macintosh et al. 1. (2020) in (Hendri Budiawan, Fuad Ardiansyah 2020) explains that an ecosystem or environment experiencing stress can be seen from the high level of dominance of one species, while a stable ecosystem shows high uniformity.

The role of ecology in the mangrove ecosystem is very high and has economic potential that can be appropriately utilized. The role of gastropods as decomposers has an essential ecological role in the food chain. At the same time, it can also be used economically for various needs, such as food ingredients that are rich in nutrients, so they have a reasonably high selling value (Sari, Aritonang, and Helena 2020).

Based on this research, the use of Lantebung mangroves by the Lantebung community, both ecologically and economically, does not directly impact the existence and diversity of Gastropods themselves. It is a fact that the Lantebung community has consciously managed and taken care of the mangrove as a gastropod habitat. It is also that the Lantebung community has not used gastropods economically, so there is no exploitation of the gastropod community.

However, for the use of gastropods to be sustainable in the future, the utilization must be accompanied by protective measures by

not over-exploiting both gastropods and the mangrove ecosystem itself. To be able to continue to be used, the mangrove ecosystem as a natural habitat for gastropods must be maintained and used wisely.

Conclusion

The conclusion of this study is the index of gastropod diversity in the Lantebung mangrove ecosystem; Makassar City is in the medium category with a value of 1.235, where this category shows a stable community condition with moderate productivity. While the Dominance Index found that the Dominance of Gastropod Species was in the low category with a value of 0.388. It shows that no gastropod in the Lantebung mangrove ecosystem dominates in an extreme way between one species and another.

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