




Gastropods Diversity in Mangrove Ecosystem of Kalanganyar River, Kalianyar Village, Bangil, Pasuruan, Indonesia.

Ghinahilmi Najalin Kautsar^{1*} , Reni Ambarwati¹ , Dwi Anggorowati Rahayu¹ 

¹ Department of Biology, Faculty of Mathematics and Natural Sciences, Universitas Negeri Surabaya. Jl. Ketintang Wiyata, Ketintang, Surabaya 60231, Indonesia

*Corresponding Author e-mail: ghinahilminajalin.22020@mhs.unesa.ac.id



Article History:

Submitted:
November 5th, 2025

Accepted:
March 20th, 2026

Available online:
March 20th, 2026

Published:
March 20th, 2026

Keywords:

diversity,
gastropods,
mangroves,

ABSTRACT

Mangrove ecosystems are very important habitats for various organisms, including gastropods, which function as primary decomposers in the ecological cycle. This study aims to identify the diversity of gastropod species in the mangrove area along the Kalanganyar River, Kalianyar Village, Bangil, Pasuruan. Samples were collected randomly around mangrove roots, followed by morphological identification and species classification. The results showed that there were five gastropod species from four families, namely *Pirenella cingulata*, *Telescopium telescopium*, *Sermyla riquetii*, *Neripteron violaceum*, and *Ellobium* sp. The Shannon-Wiener diversity index (H') of 1.165 indicates a moderate level of diversity, with *Pirenella cingulata* as the most dominant species. Water quality tests showed that copper (Cu) levels were still below the threshold, but lead (Pb) levels exceeded seawater quality standards. These results indicate that the mangrove ecosystem is fairly stable, although there are environmental pressures that need to be addressed, particularly those related to heavy metal pollution.

Copyright © 2026 to Authors



This article is an open access article distributed under the terms and conditions of [Creative Commons Attribution-NonCommercial-ShareAlike 4.0 International License](https://creativecommons.org/licenses/by-nc-sa/4.0/).

How to cite this article:

Kautsar, G.N., Ambarwati, R., & Rahayu, D.A. (2026). Gastropods Diversity in Mangrove Ecosystem of Kalanganyar River, Kalianyar Village, Bangil, Pasuruan, Indonesia. *Rumphius Pattimura Biological Journal*, 8(1), 071-078. <https://doi.org/10.30598/rumphiusv6i1p071-078>

Journal Homepage: <https://ojs3.unpatti.ac.id/index.php/rumphius>
Journal E-mail: rumphiusbiojournal@gmail.com ; rumphius.journal@mail.unpatti.ac.id
Research Article: [Open Access](#)

INTRODUCTION

Mangrove ecosystems represent transitional zones between terrestrial and marine environments, characterized by unique physicochemical conditions such as fluctuating salinity, tidal inundation, and fine sediment deposition. These conditions create a highly specialized habitat that supports a wide range of flora and fauna adapted to environmental stress. Mangroves play a crucial role in coastal protection by reducing wave energy, preventing shoreline erosion, and acting as natural barriers against storms and sea-level rise. In addition, they contribute significantly to global carbon sequestration, making them an essential component in mitigating climate change. From a biological perspective, mangrove ecosystems are among the most productive ecosystems on Earth. This high productivity is largely driven by the continuous input of organic matter in the form of leaf litter, woody debris, and other plant materials. These organic inputs serve as the foundation of complex detritus-based food webs, supporting a diverse community of microorganisms, invertebrates, and higher trophic organisms. The decomposition process carried out by various decomposers enhances nutrient cycling, thereby sustaining the ecological balance and productivity of the ecosystem.

Furthermore, mangrove ecosystems provide essential ecological services as nursery grounds, feeding habitats, and shelter for many aquatic and terrestrial species. Various organisms, including fish, crustaceans, and mollusks, depend on mangroves for survival during critical stages of their life cycles. The structural complexity of mangrove roots and sediment characteristics offers protection from predators and harsh environmental conditions, thus increasing survival rates and biodiversity in coastal regions. Mangroves, commonly known as mangrove forests, are one of the ecosystems that support biodiversity in coastal areas. In addition to coastal areas, mangroves can be found surviving in brackish water areas and forming vegetation around them (Rosario et al., 2019). Based on ecological aspects, areas with mangroves can form ecosystems with high productivity (Ratna et al., 2016), have higher organic matter decomposition activity compared to other ecosystems (Uspar et al., 2021), and serve as habitats for various types of organisms (Rosario et al., 2019).

One of these is gastropoda from the phylum Mollusca. According to Uspar et al. (2021), gastropods can inhabit various substrate types, including rocky, sandy, and muddy environments. Consequently, they are well adapted to mangrove ecosystems, particularly in brackish riverine areas characterized by sandy and muddy substrates (Nugroho et al., 2019; Setiawan et al., 2024). Gastropods possess soft body structures and utilize their muscular foot for locomotion. Additionally, they are distinguished by the presence of shells with diverse shapes, sizes, and ornamentation patterns, which serve as important taxonomic characteristics for species identification (Safitri et al., 2024; Wardani, 2023; Sari et al., 2021). In mangrove ecosystems, gastropods are not only inhabitants but also play a vital ecological role as early decomposers in the breakdown of organic matter derived from mangrove litter. This function contributes significantly to nutrient recycling and the maintenance of ecological balance within mangrove environments (Ansuar et al., 2025; Ernawati et al., 2018; Hulopi et al., 2022; Merly et al., 2022). However, the presence and distribution of gastropods are closely linked to the environmental conditions of mangrove habitats. This is due to their relatively sessile lifestyle, often attaching to leaves, trunks, branches, and sediment surfaces within mangrove areas (Silaen et al., 2013; Hulopi et al., 2022).

Based on research conducted by Ernawati et al. (2019), it was found that the waters of Kalianyar Village, Bangil, Pasuruan, were contaminated with heavy metals such as Pb, Cu, Cd, Hg, and Fe, as identified through analyses of water, sediment, and mangrove fruit samples. The results indicated that the mangrove ecosystem in this area is categorized as slightly polluted. Environmental contamination, particularly by heavy metals, can influence the structure of biological communities, including gastropods, due to their sensitivity to habitat changes and pollutant accumulation. Therefore, it is necessary to provide updated and comprehensive information regarding the diversity and distribution of gastropods in this area, particularly within the Kalanganyar River flow. Such information is essential not only for understanding the ecological status of the mangrove ecosystem but also for supporting conservation and management efforts. This article aims to report the current status of gastropod species diversity and to analyze environmental conditions based on heavy metal parameters, specifically lead (Pb) and copper (Cu), in the Kalanganyar River, thereby providing scientific insights into the relationship between environmental quality and gastropod community structure.

MATERIALS AND METHOD

This research was conducted in April-May 2025 on the Kalanganyar River in the morning and afternoon. The Kalanganyar River is located in the Kalianyar Village area, Bangil, Pasuruan, East Java (**Figure 1**). Mangroves grow along the river, which has a fairly deep flow.

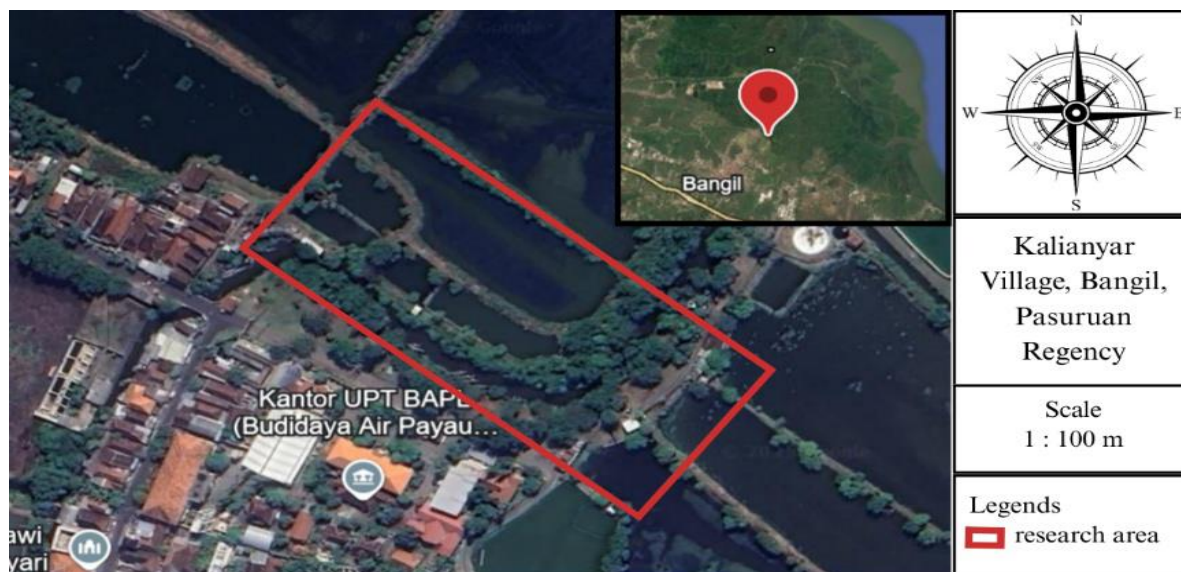


Figure 1. Research location map

The research process began with specimen collection (*sampling*) on April 26, 2025, and May 3, 2025, in the area around mangrove trees along the banks of the Kalanganyar River using the free sampling method. The tools and materials used in sampling included a camera, sample bottles, writing instruments, 70% alcohol, seawater, millimeter paper, and gastropods. The specimen samples obtained were preserved and stored in 70% alcohol after being cleaned to identify visible morphological characteristics and then classified using the MolluscaBase, n.d., WoRMS Editorial Board, and Dharma (2005) websites. The results of the identification were then calculated using the species diversity index. Species diversity is the variation found in an environment. The amount of diversity in the environment can be determined using the Shannon-Wiener Diversity Index (Odum, 1993) as follows:

$$H' = \sum_{i=1}^s \left(\frac{n_i}{N} \times \ln \frac{n_i}{N} \right)$$

Explanation:

H' = Species diversity index

S = Number of species

n_i = Number of individuals- i

N = Total number of individuals of all species

The criteria for values that can be used as reference after calculating the Diversity Index are as follows:

H' ≤ 1 = Low diversity

1 < H' < 3 = Medium diversity

H' ≥ 3 = High diversity

In addition to the diversity index formula (H'), diversity can be determined using the relative abundance formula by Ludwig and Reynolds (1981) as follows:

$$D = \frac{\text{number of species}}{\text{total number of all the species}} \times 100 \%$$

Explanation:

D = relative abundance index

In addition, during the *sampling* process, as supporting data referring to research by Ernawati et al., (2019) related to pollution at the research site, water samples were taken from the research site and tested for copper

(Cu) and lead (Pb) content. The testing was carried out at the Pasuruan Fish and Environmental Health Laboratory (UPT LKIL).

RESULTS AND DISCUSSION

From the sampling results conducted in the Kalanganyar river mangrove area, several types of gastropods from 4 families were found, namely Potamididae, Thiariidae, Neritidae, and Ellobiidae. In the Potamididae family, two gastropod species were found, namely *Pirenella cingulata* and *Telescopium telescopium*. In the other families, only one gastropod species was found, listed in order as *Sermyla riquetii*, *Neripteron violaceum*, and *Ellobium* sp.

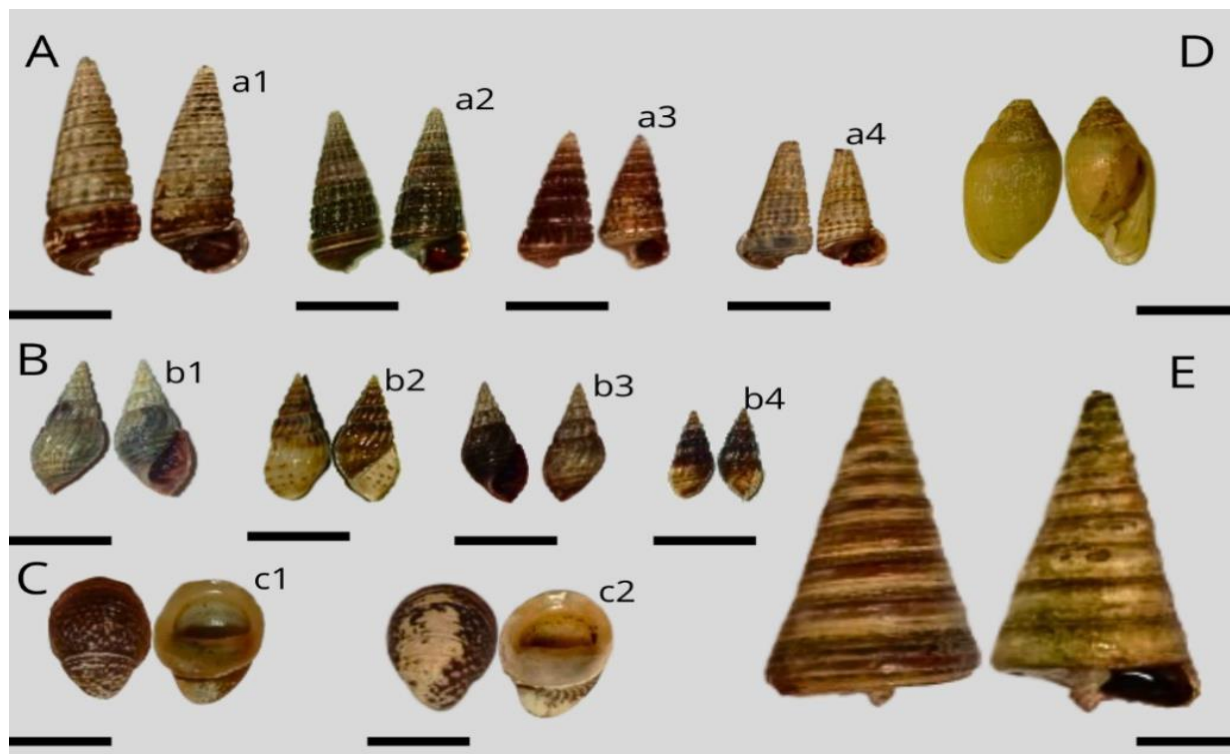


Figure 2. (Personal documentation) A (a1,a2,a3,a4). *Pirenella cingulata*; B (b1,b2,b3,b4). *Sermyla riquetii*; C (c1, c2). *Neripteron violaceum*; D. *Ellobium* sp; E. *Telescopium telescopium*; scale bar 10 mm

In the Potamididae family, the species *Pirenella cingulata* (Gmelin, 1791) was found. It has a dark brown to black shell with brown or white lines, an eroded apex, body whorls filled with spiral ribs with granules arranged around the shell, and a slightly thickened, widened, and curved outer lip. It is found in large numbers at the research site, especially in areas with muddy substrates. *Pirenella cingulata* that found had an average length of 2.1 cm. According to the description by Safitri *et al* (2024), the *Pirenella cingulata* species can be easily found in estuaries, mangrove forests, and marine waters. The species *Telescopium telescopium*, which also belongs to the Potamididae family, has an elongated shell, a rough surface, a dark brown and white color with vertical stripes, a slightly tapered apex, and a slightly wide siphon groove. It was found in small numbers at the research site, with a tendency to be small in size, 4 cm long and 2.6 cm wide. According to Sibua *et al.* (2021), differences in size can occur due to the influence of the living environment and habitat providers in supporting the life of *Telescopium telescopium*. It generally lives in habitats with muddy substrates and mangrove vegetation in brackish waters (Wahyuni *et al.*, 2016) and is also influenced by tidal activity (Husein *et al.*, 2017).

The Thiariidae family includes one species from the genus *Sermyla*, namely *Sermyla riquetii*. This species can be found in freshwater to brackish water with sandy- muddy substrates. It has a compact, oval-shaped shell, usually brown to dark brown in color (sometimes cream with darker spots), with a grooved surface corresponding to the number of shell whorls, and a prominently axial apex. Additionally, *Sermyla riquetii* has

opisthocyrt ribs; at the basal part of the body circle, there are elevated spiral protrusions and deep spiral grooves (Lentge-Maaß et al., 2020). The average height of the individuals found ranges from 20 to 1.6 cm. In the Neritidae family, one species, *Neripteron violaceum* (Gmelin, 1791), was found living in both freshwater and brackish water habitats, particularly on muddy and rocky substrates and in mangrove areas (Mustapha et al., 2021). The morphological characteristics of the shell are oval in shape with a smooth surface, brown and dark brown to black in color, forming an alternating pattern similar to a gradient (**Figure 2** part C; c1 & c2). The edges of the shell are not too wide, the *aperture* is wide, forming a horseshoe shape, and the *apex* meets the anterior parietal edge. The individuals found were on average 1.45 cm in size and in moderate numbers. The species *Ellobium* sp., which belongs to the family Ellobiidae, was found in small numbers in the root and litter areas near the mangroves. It has a slightly cloudy brownish-yellow color with a smooth shell surface.

Table 1. Relative Abundance and Species Diversity Index of Gastropods

No	Family	Species	Total	Relative abundance (%)
1.	Potamididae	<i>Pirenella cingulata</i>	17	54,84
2.		<i>Telescopium telescopium</i>	1	3,23
3.	Thiaridae	<i>Sermyla riquetii</i>	8	25,80
4.	Neritidae	<i>Neripteron violaceum</i>	4	12,90
5.	Ellobidae	<i>Ellobium</i> sp.	1	3,23
Total			31	100
Species Diversity Index (H')				1,165

Based on the results in Table 1, it is known that of the 5 types of gastropods with a total of 31 individuals found, the highest relative abundance value was found in the *Pirenella cingulata* species at 54.84%, followed by the *Sermyla riquetii* species at 25.80%, then the species *Neripteron violaceum* at 12.90% with the lowest abundance of 3.23% in 2 species, namely *Telescopium telescopium* and *Ellobium* sp. This shows that the two species with the highest relative abundance reached a total of 75% of the overall relative abundance value of the species found. According to Laily et al. (2022), the high or low composition of gastropod species in an area can be interpreted as an indication of whether the marine biota are native species that inhabit the mangrove area throughout their life cycle or only inhabit the area around the mangroves facultatively. There are also gastropods that are categorized as visitor gastropods, which are marine species carried by water currents or waves to mangrove areas (Rangan, 2010; World Register of Marine Species, 2020).

Then, in the species diversity index calculated using the Shannon-Wiener calculation, the result obtained was 1.165. This value indicates that the species diversity in the Kalanganyar river mangrove is moderate. Moderate diversity, according to Purwanti et al. (2015), indicates fairly good organism productivity, supportive pH levels, stable ecosystem conditions, and moderate ecological pressure. According to Arbi (2008) and Hulopi et al. (2022), differences in species diversity index values are influenced by several factors, including the number of species obtained, substrate conditions in the study habitat, the presence or absence of dominant species, and environmental conditions as a habitat for gastropods. Diversity is influenced by habitat conditions and environmental quality that support the life of various organisms within it. According to Pratiwi et al. (2023) mollusks and mangroves have a relationship or connection in a good environmental cycle by providing a supply of nutrients that are needed by the macrozoobenthic organisms that live in them. After observation, the mangrove area along the Kalanganyar river has uneven density and other plants also grow lushly along the river. The river flow, which is affected by tidal activity, is another factor influencing the diversity of organisms living in the mangroves of the Kalanganyar river.

Table 2. Metal content parameters in the Kalanganyar river flow

Parameter	Value (mg/L)	Standard Quality (mg/L)
Copper (Cu)	0.06	0.008*
Lead (Pb)	0.66	0.008*

*(Government Regulation No. 22 of 2021) Appendix VII on Marine Biota Designation

When viewed from one environmental factor, pollution is certainly a possibility. Previously, Ernawati et al. (2019) found that the waters of the Kalanganyar River mangrove forest had high heavy metal values, indicating

pollution, as they exceeded the permitted threshold. Table 2 shows the test results for copper and lead metal parameters and the maximum permissible quality standards for seawater or brackish water. The copper metal value in the Kalanganyar river flow is 0.06 mg/L, which is still below the maximum standard value set. This indicates a decrease in the level of copper (Cu) in the mangrove waters of the Kalanganyar River compared to previous studies. Copper (Cu) at low concentrations plays a role in the body's metabolic processes as a coenzyme, but it is toxic at high concentrations (Draszawka & Cyraniak, 2014). According to Azhar et al. (2012), the source of copper found in water is the result or residue of agricultural activities. In addition, other sources of copper can come from industrial waste, shipyards, and industrial product processing residues (Rompas, 2010).

Meanwhile, lead has a level of 0.66, which exceeds the permissible threshold for lead levels in brackish water or the sea. Lead found in water can come from household activities and ship oil that commonly passes through (Mustafa et al., 2021). According to This is in line with the activities that occur in the Kalanganyar River, where every day many people use it as a means of transportation to catch fish and crabs or to reach the river mouth

CONCLUSION

Five gastropod species (*Pirenella cingulata*, *Telescopium telescopium*, *Sermyla riquetii*, *Neripteron violaceum*, and *Ellobium* sp) from four families, namely Potamididae, Thiaridae, Neritidae, and Ellobiidae, were found. The results of the of gastropod species diversity was in the moderate category with a value of 1.165. This indicates that the environmental conditions in the Kalanganyar River mangrove forest in Bangil are stable, despite several other factors affecting the existence and life of gastropods within it, and that attention needs to be paid to the relatively high levels of lead (Pb) pollution.

AUTHORS CONTRIBUTION

G.N.Kautsar designed and conducted the study, analyzed and interpreted the data, wrote a draft of the manuscript, analyzed and interpreted the data. R. Ambarwati & D.A. Rahayu reviewed the draft manuscript, and supervised the entire process.

ACKNOWLEDGMENTS

Financial support for this research and development provided by the first authors self funding.

CONFLICT OF INTEREST

The authors declare no conflicts of interest, and will take full responsibility for the content of the article, including implications of AI-generated art.

REFERENCES

- Ansyar, L., Junianto, Arief, M. C. W., & Sahidin, A. (2025). Diversity of snails (Mollusca: Gastropoda) in the mangrove area of Karangsang, Indramayu Regency, West Java Province, Indonesia. *Journal of Tropical Biodiversity and Biotechnology*, 10(3). <https://doi.org/10.22146/jtbb.16927>.
- Azhar, H., Widowati, I., & Suprijanto, J. (2012). Study of heavy metal Content Pb, Cu, Cd, Cr in simping shellfish (*Amusium pleuronectes*), water and sediment in Wedung waters, Demak and analysis of maximum tolerable intake in humans. *Journal of Marine Research*, 1(2), 35–44. <https://ejournal3.undip.ac.id/index.php/jmr/article/view/2017>.
- Draszawka, B., & Cyraniak, E. (2014). Heavy metals in circulation biogeochemical. *World Scientific News*, 3, 26–34. <https://worldscientificnews.com/heavy-metals-in-circulation-biogeochemical/>
- Ernawati, Anwari, M. S., & Dirhamsyah, M. (2019). Gastropod species diversity in the mangrove forest ecosystem of Sebus Village, Paloh District, Sambas Regency. *Hutan Lestari Journal*, 7(2), 923–934. <https://doi.org/10.26418/jhl.v7i2.34561>.
- Ernawati, Suprayitno, E., Hardoko, & Yanuhar, U. (2018). A study of pollution in the *Rhizophora mucronata* mangrove ecosystem in the waters of Kalianyar Village, Bangil, Pasuruan, East Java. *Journal of*

- Agricultural Sciences "AGRIKA,"* 12(1), 61–72. <https://doi.org/10.31328/ja.v12i1.545>.
- Hulopi, M., De Queljoe, K. M., & Uneputty, P. A. (2022). Gastropod diversity in the mangrove ecosystem of Negeri Passo beach, Baguala district, Ambon city. *TRITON: Journal of Water Resources Management*, 18(2), 121–132. <https://doi.org/10.30598/TRITONvoll8issue2page121-132>.
- Husein, S., Bahtiar, & Oetama, D. (2017). Study of the density and distribution of *Telescopium telescopium* in the mangrove waters of Kaledupa District, Wakatobi Regency. *Journal of Aquatic Resource Management*, 2(3), 235–242. <https://ojs.uho.ac.id/index.php/JMSP/article/view/2661>.
- Laily, N., Isnaningsih, N. R., & Ambarwati, R. (2022). Gastropod community structure in the Suramadu coastal mangrove area, Surabaya. *Oceanology and Limnology in Indonesia*, 7(1), 33–41. <https://ejournal.brin.go.id/oldi/article/view/15272>
- Lentge-Maaß, N., Neiber, M. T., Gimmich, F., & Glaubrecht, M. (2020). Evolutionary systematics of the viviparous gastropod *Sermyla* (Gastropoda: Cerithioidea: Thiaridae), with the description of a new species. *Zoological Journal of the Linnean Society*, 191 (1), 1–27. <https://doi.org/10.1093/zoolinnea/zlaa120>.
- Merly, S. L., Sianturi, R., & Nini, A. L. (2022). Study of correlation and diversity of gastropods at mangrove ecosystem in Payum Beach, Merauke. *Indonesian Journal of Mollusk*, 6(1), 12–20. <https://doi.org/10.54115/jmi.v6i1.56>.
- Mustafa, A., Asaf, R., Kamariah, & Radiarta, I. N. (2021). Concentration and quality status of heavy metals in water and sediments in the coastal area of Sangihe Islands Regency. *Journal of Tropical Marine Science and Technology*, 13(1), 185–200. <https://doi.org/10.29244/jitkt.v13i1.35290>.
- Mustapha, N., Baharuddin, N., Tan, S. K., & Marshall, D. J. (2021). The neritid snails of Brunei Darussalam: their geographical, ecological and conservation significance. *Ecologica Montenegrina*, 42, 45–61. <https://doi.org/10.37828/em.2021.42.2>.
- Nugroho, B. A., Soendjoto, M. A., & Zaini, M. (2019). Gastropod density and diversity in the mangrove forest of Pagatan Besar village, Tanah Laut regency, Indonesia. *Indonesian Journal of Marine Sciences*, 24(4), 179–185. <https://doi.org/10.14710/ik.ijms.24.4.179-185>.
- Pratiwi, W. O., Suartini, N. M., & Ginantra, I. K. (2023). Mollusk species diversity in the mangrove forests of the Kampoeng Kepiting ecotourism area, Tuban village, Bali. *SIMBIOSIS*, XI(1), 118–126. <https://doi.org/10.24843/JSIMBIOSIS.2023.v11.i01.p10>.
- Purwanti, T., Yolanda, R., & Purnama, A. A. (2015). Gastropod community structure in the Sangkir River, a tributary of the Rokan Kiri River, Rokan Hulu Regency. *UPP Biology Student Journal*, 1(1), 5–6. <https://media.neliti.com/media/publications/110869-ID-struktur-komunitas-gastrpoda-di-sungai-s.pdf>
- Rangan, J. K. (2010). Inventory of gastropods in the mangrove forest floor of Rap-Rap Village, Minahasa Regency, North Sulawesi. *Journal of Fisheries and Marine Sciences*, 4(1), 63–66. <https://doi.org/10.35800/jpkt.6.1.2010.163>.
- Ratna, Sirih, H. M., & Munir, A. (2016). Abundance of gastropods in the mangrove ecosystem at Latawe beach, Napano Kusambi subdistrict, West Muna regency. *Journal of Biology Education Alumni*, 1(2), 13–16. <https://ojs.uho.ac.id/index.php/ampibi/article/view/5031>.
- Rompas, R. M. (2010). *Marine toxicology*. Sam Ratulangi University Press.
- Rosario, E. L., Anwari, M. S., Rifanjani, S., & Darwati, H. (2019). Gastropod species diversity in the Sungai Kakap mangrove forest, Kubu Raya regency. *Hutan Lestari Journal*, 7(2), 645–654. <https://doi.org/10.26418/jhl.v7i2.32995>.
- Safitri, I., Sofiana, M. S. J., & Maulana, A. (2024). Checklist of mangrove snails (mollusca: Gastropoda) in the coastal of Sungai Nyirih Village West Kalimantan. *Platax Scientific Journal*, 12(1), 215–228. <https://doi.org/10.35800/jip.v12i1.53944>.
- Sari, N. R., Kartikasari, D., & Purwanto, N. (2021). Structure of gastropod communities in the coastal area of Peh Pulo Beach, Blitar Regency. *Proceedings of the V National Biology Seminar*, 74–81.
- Setiawan, R., Wimbaningrum, R., Sulistiyowati, H., Siddiq, A. M., Rani, C., & Baraas, A. (2024). Species diversity of gastropods in the mangrove forest of Pangpang Bay Ijen Geopark, Banyuwangi Indonesia. *Tropical Marine Journal*, 27(2), 277–286. <https://doi.org/10.14710/jkt.v27i2.22471>.
- Sibua, J., Nurafni, Wahab, I., & Koroy, K. (2021). Morphometric characteristics of the mangrove snail (*Telescopium telescopium*) in the mangrove ecosystem of Daruba village, Morotai Island regency. *La'ot Journal of Marine Science*, III (2), 90–98. <https://doi.org/10.35308/jlaot.v3i2.3761>
- Silaen, I. F., Hendarto, B., & Supardjo, M. N. (2013). Distribution and abundance of gastropods in the

- mangrove forest of Awur Bay, Jepara. *Journal of Management of Aquatic Resources*, 2(3), 93–103.
- Uspar, Mapparimeng, & Akbar. (2021). Analysis of gastropod diversity in the mangrove ecosystem of Larea-rea harbor, Lappa village, North Sinjai subdistrict, Sinjai regency. *Tarjih : Fisheris and Aquatic Studies*, 1(2), 066–072.
- Wahyuni, S., Purnama, A. A., & Afifah, N. (2016). Types of mollusks (Gastropoda and Bivalvia) in the mangrove ecosystem in Dedap Village, Tasikputripuyu District, Meranti Islands Regency, Riau. *Scientific Journal of FKIP Biology Study Program, Pasir Pengaraian University*.
- Wardani, S. A. R. (2023). Gastropod diversity at Tambakrejo beach, Blitar regency. *Journal of Science and Mathematics*, 8(1), 9–12. <https://doi.org/10.26740/sainsmat.v8n1.p9-12>.