JURNAL PERIKANAN DAN KELAUTAN
Volume 30 No. 2, June 2025: 227-232

e-issn : 2721-8902
p-issn : 0853-7607

Population Structure of *Polymesoda expansa* Shellfish in Mangrove Forest in Banglas Village, Meranti Islands

Struktur Populasi Lokan (Polymesoda expansa) pada Hutan Mangrove di Desa Banglas, Kabupaten Kepulauan Meranti

Hafidah Novi Anggraini[1*], Syafruddin Nasution[1], Afrizal Tanjung[1]
[1]Department of Marine Science, Faculty of Fisheries and Marine,
Universitas Riau, Pekanbaru 28293 Indonesia
**email: hafidah.novi0089@student.unri.ac.id*

Received
25 April 2025

Accepted
23 May 2025

Abstract

Lokan (*Polymesoda expansa*) is a bivalve in mangrove forest areas with important ecological and economic values. The lokan population plays a role in maintaining water quality and is a source of livelihood for coastal communities. This study aims to analyze the abundance, distribution patterns, and frequency distribution of individual sizes of *P. expansa* in the mangrove forest of Banglas Village, Meranti Islands Regency. The research was conducted in December 2024 using a survey method to determine station locations by purposive sampling. Sampling was conducted at three stations, each consisting of three transects with plots measuring 1 × 1 m². The results showed that the highest abundance was found at Station III (±16.33 ± 5,508 ind/m²) and the lowest at Station II (8.33 ± 2,082 ind/m²). The distribution pattern of lokan at all stations is clustered (Morisita index value> 1). The frequency distribution of individual sizes showed the dominance of sizes 3.40-3.89 cm with 21 individuals. Abundance and distribution patterns of lokan are influenced by habitat conditions, human activities, and food availability. ANOVA test results showed no significant differences in abundance between stations, but there were significant differences between subzones. Knowledge of the population structure of *P. expansa* is vital for sustainable resource management in mangrove ecosystems.

Keywords: *Polymesoda expansa*, Mangrove forest, Abundance

Abstrak

Lokan (*Polymesoda expansa*) merupakan salah satu bivalvia yang hidup di kawasan hutan mangrove dan memiliki nilai ekologis serta ekonomis penting. Populasi lokan berperan dalam menjaga kualitas perairan serta menjadi sumber mata pencaharian masyarakat pesisir. Penelitian ini bertujuan untuk menganalisis kelimpahan, pola sebaran, dan distribusi frekuensi ukuran individu *P. expansa* di hutan mangrove Desa Banglas, Kabupaten Kepulauan Meranti. Penelitian dilaksanakan pada Desember 2024 menggunakan metode survei dengan penentuan lokasi stasiun secara purposive sampling. Pengambilan sampel dilakukan pada tiga stasiun, masing-masing terdiri dari tiga transek dengan plot berukuran 1×1 m². Hasil penelitian menunjukkan bahwa kelimpahan tertinggi ditemukan di Stasiun III (±16,33 ± 5,508 ind/m²) dan terendah di Stasiun II (8,33 ± 2,082 ind/m²). Pola sebaran lokan di seluruh stasiun bersifat mengelompok (nilai indeks Morisita >1). Distribusi frekuensi ukuran individu menunjukkan dominasi ukuran 3,40–3,89 cm dengan jumlah 21 individu. Kelimpahan dan pola distribusi lokan dipengaruhi oleh kondisi habitat, aktivitas manusia, dan ketersediaan pakan. Hasil uji ANOVA menunjukkan tidak terdapat perbedaan signifikan kelimpahan antar stasiun,

namun terdapat perbedaan signifikan antar subzona. Pengetahuan mengenai struktur populasi *P. expansa* penting dalam pengelolaan sumber daya berkelanjutan di ekosistem mangrove.

Kata kunci: *Polymesoda expansa*, Hutan mangrove, Kelimpahan

1. Introduction

Banglas Village is in Tebing Tinggi Sub-district, Meranti Islands Regency, Riau Province. Banglas Village, as part of this region, shares similar geographical characteristics, where mangrove forests play a central role in the lives of local people. In general, the main livelihoods of Banglas villagers depend heavily on coastal and marine natural resources. Some common livelihoods include the collection of mangrove forest products. The community also utilizes forest products, mangroves such as wood for household use, and shellfish, including *Polymesoda expansa* and other biota for consumption or sale.

A population is a collection of individuals of the same species living in a particular place and time (Andriyanto, 2019). Population studies, especially population structure, are critical to determining a population's status or state in Lokan mussels. Lokan mussels are one type of mollusk commonly found in coastal and coastal areas. It plays a vital role in the food chain and bioindicator of Forest health. Various Studies show that Lokan mussels play an important role in maintaining water quality by filtering out particles and nutrients. They are also a food source for various aquatic organisms, thus playing an important role in the food chain.

Understanding their population structure can provide insights into ecological dynamics in mangroves and interactions between species. However, lokan mussels and mangrove habitats face various threats, such as overfishing, land conversion for agriculture and development, and pollution. These threats can affect the population structure of the shellfish, which in turn impacts the balance of the mangrove forest.

Polymesoda expanse is a type of bivalve that belongs to the *Polymesoda* family. It is often found in brackish waters and estuaries in tropical and subtropical regions. *P. expansa* plays a vital role in estuarine forests by filtering nutrients and contributing to the biodiversity of benthic communities. The shell is oval and large, with a rough surface and often covered by an organic layer. They have significant economic value in some countries, as they are often consumed as food, both locally and for export.

2. Material and Method

2.1. Time and Place

This research was conducted in December 2024. Sampling was carried out in the mangrove forest area of Banglas Village, Meranti Islands Regency. Sample analysis was conducted at the Marine Biology Laboratory and the Marine Chemistry Laboratory of the Department of Marine Science, Faculty of Fisheries and Marine Sciences, Universitas Riau. The research location map can be seen in Figure 1.

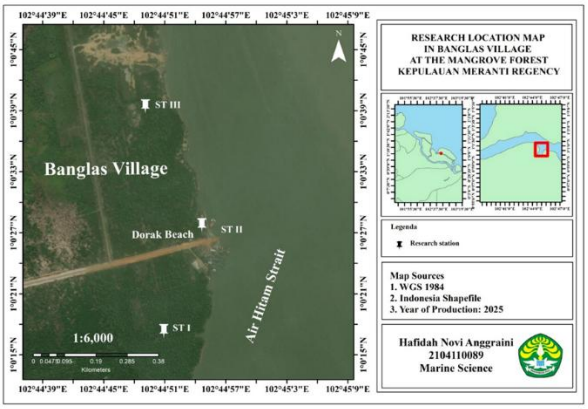

Figure 1. Map of the research location

2.2. Methods

The survey method was used in this research. The data collected are data obtained directly from the research site through observation sampling and measurement of water quality parameters at the research site. Samples of Lokan mussels and water quality parameters observed were population structure parameters measured, including population abundance, distribution patterns, and frequency distribution of individual sizes conducted by the Marine Biology Laboratory, Department of Marine Science, Faculty of Fisheries and Marine Sciences, Universitas Riau.

2.3. Procedures

Determination of station locations is carried out using purposive sampling, a method used by the conditions of the aquatic environment of the location. The location for sampling is divided into three stations; each station is divided into subzones with a distance of 50 m. At each station, there are three transects. In one transect, there are three plots, with each measuring 1x1m^2.

The determination of stations is based on the condition of the research area related to the geographical conditions in the research area at each station, namely, Station I, which is in the mangrove forest area. I rarely found human activity at the station, but some residents are looking for shellfish there. Station II is in the mangrove forest area close to Dorak Beach. Station II has several houses on the beach and household activities. Station III is in the mangrove forest area close to the fishing port. Station III is a fishing port used as a place for fishermen's activities, such as looking for shellfish. This place also has many fishing boats anchored.

Data collection of water quality parameters in mangrove forests in Banglas Village, Meranti Islands Regency, was carried out at high tide in the intertidal subzone, which was divided into three subzones, each 50 m apart.

2.4. Data Analysis

2.4.1. Abundance

The abundance data obtained based on the number of individuals per unit area was calculated using the formula according to Odum (1993) as follows:

$$K = \frac{N}{A}$$

Description:

K = abundance (ind/m^2)
N = Number of individuals of a species
A = Plot area (m^2)

2.4.2. Bivalve Distribution Pattern

To determine the distribution pattern of *P. expansa* lokan mussels, it was analyzed using the Morista dispersal index (Brower et al., 1989), namely:

$$Id = N \frac{(\sum X^2) - Ni}{Ni(Ni-1)}$$

Description:

Id = Morista distribution index
Ni = Total number of individuals per subzone
N = Number of plots
Σx^2 = total sum of squares of individuals per subzone with testing criteria: Id= 1, The spread of shells is random; Id< 1, The distribution of shells is uniform; and Id> 1, The distribution of shellfish is in groups

3. Result and Discussion

3.1. Abundance of P. expansa

The calculation of abundance between stations in mangrove forests in Banglas village can be seen in Figure 2.

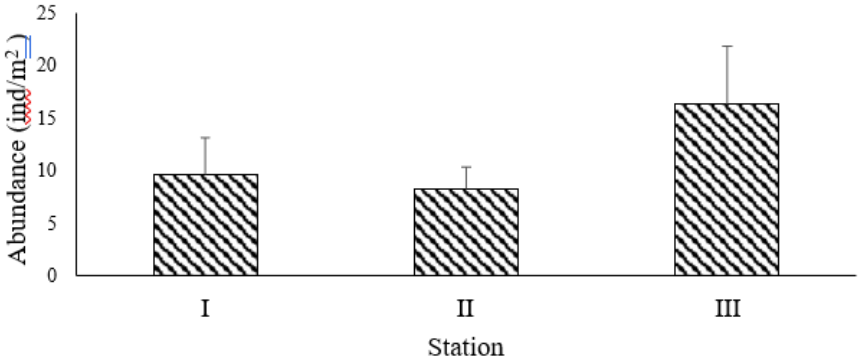

Figure 2. The abundance of lokan clams *P. expansa* at stations in the mangrove forest in Banglas Village

From Figure 2, it can be seen that the results of the calculation of the abundance value of *P. expansa* have varying values at each station. ANOVA test results on the abundance of *P.expansa* between stations showed a significant value of 0.98 where p= value> 0.05. Based on the calculation of the abundance of Lokan clams between stations in the mangrove forest in Banglas Village, the average abundance was 11.44 ± 5.053 ind/m^2. The highest abundance was found at station III with an average of 16.33 ± 5.508 ind/m^2, while the lowest abundance was

found at station II with an average of 8.33 ± 2.082 ind/m^2. This is because station III is a location that is still relatively safe and has suitable habitat for protecting Lokan clams from various threats in the water and other environmental factors, so it is suitable for the survival of Lokan clams. This is to the research of Guntara (2020) that the high abundance of mussels at a station is due to the lack of human activity. Moreover, it is supported by the statement of Nurdin et al. (2006), stating that habitat conditions and high human activity can affect the abundance of bivalves in the waters. Subagio & Muliadi (2014) state that biotic aspects, especially activities and other organisms, also affect organisms' high and low abundance. Station II is between Station I and III, which means human activities are still reaching it. Whereas station I, close to the road, has

The lowest abundance is due to the large number of human activities. Polluted environmental conditions and human activities can inhibit the growth of Lokan mussels. Differences in abundance between subzones were also analyzed using an ANOVA test. *P. expansa* abundance between subzones in the mangrove forest of Banglas Village. Then, an LSD (Least Significant Difference) test was conducted to determine the level of difference in abundance in each subzone that had been observed. The Mangrove Forest Subzone can be seen in Figure 3.

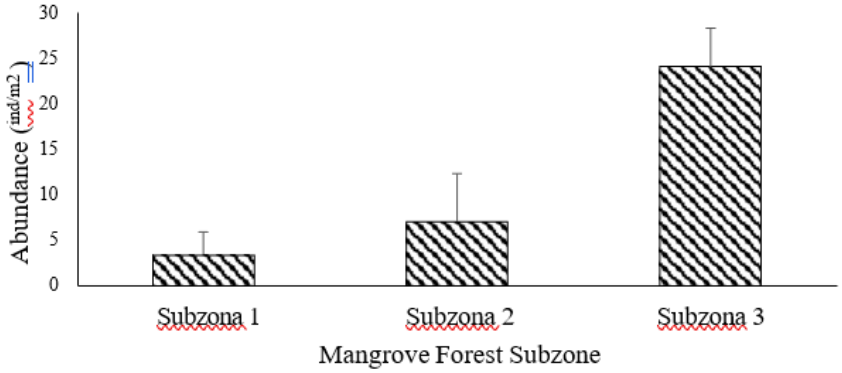

Figure 3. An abundance of *P. expansa* lokan clams in subzones of mangrove forest in Banglas Village

Overall, the abundance of local mussels in the Banglas Village mangrove forest is influenced by environmental factors, human activities, and habitat characteristics. The high organic matter content of mangrove forests is a food source and spawning ground for biota, including Lokan mussels. Sediment types (mud, sandy mud, muddy sand) are also suitable for the habitat of Lokan mussels. Mangrove forests provide substrates with abundant organic matter and algae and diatoms as food. ANOVA test showed no significant difference in *P. expansa* abundance between stations. However, there was a significant difference in *P. expansa* abundance between subzones. LSD further test showed significant differences between Subzone 1, Subzone 2, and Subzone 3. Specifically, there was no significant difference between Subzone 1 and 2, but there was a significant difference between Subzone 1 and 3 and Subzone 2 and 3.

3.2. Distribution Pattern of P. expansa

The distribution pattern of *P. expansa* in mangrove forests in Banglas Village uses the Morista index. The calculation of the distribution pattern of *P. expansa* can be seen in Table 1.

Table 1. Distribution pattern of lokan mussels

Observation Station	Id	Distribution Pattern
I	3,30	Clustering
II	2,94	Clustering
III	3,21	Clustering

Table 1 shows that the motorist's distribution index value at station I is 3.30, station II is 2.94, and station III is 3.21. The distribution pattern of Lokan shells in the mangrove forest in Banglas village is Id> 1, indicating that the distribution pattern is clustered. Based on the Morista index criteria found at station I, station II, and station III with a value of Id> 1, the Morista index's highest value is found at station I, namely 3.30 ind/m^2, and the lowest value is found at station II, namely 2.94 ind/m^2, it can be concluded that the distribution of Lokan clams in mangrove forests in Banglas Village shows a clustered distribution pattern. This is supported by the statement of Sari (2023), stating that organisms whose distribution patterns are clustered due to environmental conditions in a habitat are almost the same.

Population distribution patterns are divided into three parts: random, uniform, and clustered. Clustered distribution patterns can occur due to suitable habitat conditions, including food availability, reproductive behavior, predator threats, and other limiting factors (Molles, 2010). Clustered distribution patterns are caused by environmental characteristics and limited food availability, causing competition between individuals to obtain the same space (Taula et al., 2022). This condition is due to the collection of individuals in the face of weather and

seasons, habitat changes, and reproductive processes, thus increasing competition between individuals for food and space (Tarida et al., 2018). A group's way of life competes with other animals, especially in eating. Clustering distribution patterns are closely related to environmental conditions, eating habits, and reproduction.

3.3. Frequency Distribution of Individual Size of *P. expansa*

The frequency of the most lengths found in the size of Lokan mussels was divided into eight classes, while the frequency of the most found in the size of 3.40 - 3.89 cm, namely 21 individuals. At the same time, the frequency of the least size found is 2.90 - 3.39 cm, namely three individuals. At a size of 3.90 - 4.39 cm, found as many as 17 individuals; at a size of 4.40 - 4.89 cm, found as many as 15 individuals; at a size of 4.90 - 5.39 cm, found as many as 17 individuals; at a size of 5.40 - 5.89 cm found as many individuals. Ten individuals, at a size of 5.90 - 5.39 cm, found as many as 14 individuals, and 6.40 - 6.89 cm, found as many as six individuals.

According to Sunarni (2017), two factors can affect the growth of biota, namely internal factors and external factors. Internal factors include (genetics), sex, disease, age, and maturity. External factors include the amount and size of food available, the number of biota that use food sources, temperature, dissolved oxygen, ammonia levels in waters, and salinity.

Exploitation pressure influences the growth of Lokan mussels, resulting in changes in the frequency of size groups. In addition to exploitation, environmental parameters and substrate composition determine Bivalve growth. The abundance obtained influences the length frequency of Lokan mussels, so there is less competition for food. In addition to seasonal factors, the presence of Lokan clams in the Mangrove Forest in Banglas Village is also influenced by daily human activities by local fishermen. Fishermen around Banglas Village catch lokan clams without paying attention to the survival and life cycle of the loan clam. The fishing activities of local fishermen, without regard to the survival and life cycle of the shellfish, also affect the presence and size distribution of the shellfish. In other words, the size distribution of scallop mussels in the mangrove forest of Banglas Village is influenced by a combination of biological adaptations, environmental conditions, food availability, and human activities, especially fishing by fishermen.

4. Conclusions

The highest average abundance was found in the mangrove forest area near the fishing port (station III), and the lowest was in the mangrove forest area near the dorak beach (station II). The distribution pattern of *P. expansa* lokan clam bivalves in the mangrove forest in Banglas Village, Meranti Islands Regency, is clustered. The frequency distribution of individual sizes of *P. expansa* lokan mussels in mangrove forests in Banglas Village, Meranti Islands Regency, is dominated by the size class 3.40-3.89 cm.

5. References

Andriyanto, A. (2019). Studi Populasi dan Habitat Ikan Semah (*Tor* sp.) di Sungai Napal Licin Kabupaten Merangin. *Biocolony*, 2(1): 1-7.

Brower, J.E., Zar, J.H., & Von Ende, C.N. (1998). *Field Laboratory Method for General Ecology*. 3rd Edition. WmC. Brown Publisher, USA.

Guntara, D.A. (2020). *Kelimpahan dan Pola Distribusi Bivalvia Donax cuneatus dan Donax deltoides pada Subzona Intertidal Pantai Surantih Kabupaten Pesisir Selatan Provinsi Sumatera Barat.* Universitas Riau.

Molles, M.C. (2010). *Ecology: Concept and Application*. 5th ed, McGraw-Hill, New York.

Nurdin, J., Marusin, N., Izmiarti, I., As, A., Deswandi, R., & Marzuki, A. (2006). Kepadatan Populasi dan Pertumbuhan Kerang Darah (*Anadara antiquota*) di Teluk Sungai Pisang di Kota Padang Sumatera Barat. *Makara Science*, 10(2): 6-101.

Odum, E.P. (1993). *Dasar-Dasar Ekologi.* Edisi Ketiga. Gadjah Mada University Press. Yogyakarta.

Rizaldi, M.A., Redjeki, S., & Hartati, R. (2022). Morphometric Characteristics of Mangrove Snails (*Telescopium telescopium*) in the Mangunharjo Mangrove Forest, Semarang City. *Jurnal Moluska Indonesia*, *6*(2): 41-53.

Sari, W.A. (2023). Kepadatan dan Pola Sebaran Kerang Tahu (*Meretrix Meretrix*) Sebagai Dasar Pengelolaan Sumberdaya Berkelanjutan di Kawasan Batu Belubang Kabupaten Bangka Tengah. *Akuatik: Jurnal Sumberdaya Perairan*, 17(2): 102-109.

Subagio, S., & Muliadi, S. (2014). Keanekaragaman Jenis dan Dominansi Gastropoda pada Daerah Pasang Surut (*Zona Intertidal*) di Kecamatan Sekotong Kabupaten Lombok Barat Berdasarkan Habitat. *Jurnal Ilmiah IKIP Mataram* 1(2): 155-162.

Sunarni, S. (2017). Hubungan Panjang Bobot dan Faktor Kondisi Ikan Belanak *(Mungil dussumieri)* di Muara Sungai Kumbe Kabupaten Merauke. *Jurnal Agricola*, 7(1): 136-143.

Tarida, T., Pribadi, R., & Pramesti, R. (2018). Struktur dan Komposisi Gastropoda pada Ekosistem Mangrove di Kecamatan Genuk Kota Semarang. *Journal of Marine Research*, 7(2): 106-112.

Taula, T., Findra, M. N., Bahtiar, B., & Purnama, M. F. (2022). The Habitat Preferences of Lamp Shell (*Lingula unguis*) in Nambo Waters, Kendari City, Southeast Sulawesi. *Habitus Aquatica*, *3*(2): 51-67