Journal Of Biology Education Research (JBER)
Vol 7(1) 2026 | ISSN: 2774-7859
DOI: 10.55215/jber.v7i1.107

https://journal.unpak.ac.id/index.php/jber

Comparative Diversity of Gastropods and Bivalves Among Coastal Habitats

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Received: February 11th 2026 Revised: April 2nd 2026 Accepted: May 1st 2026

Abstract

Gastropods and bivalves are important components of coastal ecosystems, functioning as detritivores, grazers, and filter feeders, as well as serving as bioindicators of environmental conditions. However, recent data on mollusc biodiversity in Pari Island remain limited, despite increasing anthropogenic pressures such as tourism and coastal pollution. This study aimed to assess the diversity and community structure of gastropods and bivalves across three coastal ecosystems on Pari Island, Seribu Islands, Jakarta, namely Star Beach, Virgin Sand Beach, and mangrove areas. Sampling was conducted using a combination of direct sampling and time searching methods, with four researchers collecting specimens for 30 minutes at each site, while abiotic parameters (temperature, pH, salinity, and humidity) were measured simultaneously. The results showed that Star Beach exhibited the highest diversity, with low dominance and high evenness, indicating a stable and balanced ecosystem supported by heterogeneous sandy substrates. The mangrove ecosystem showed moderate diversity with relatively even species distribution, reflecting its role as a habitat for specialized gastropods adapted to muddy, organic rich conditions. In contrast, Virgin Sand Beach had low diversity and low evenness, with strong dominance of the Neritidae family, particularly *Clithon oualaniense*, indicating ecological pressure and reduced environmental stability likely caused by intensive tourism activities. These differences in community structure are strongly influenced by habitat characteristics and abiotic factors, where substrate type, salinity, and humidity play key roles in shaping species distribution. This study highlights that habitat type and environmental conditions are major drives of mollusc diversity, while also emphasizing the negative impact of anthropogenic disturbance on ecosystem balance. The findings provide updated baseline data on mollusc diversity in Pari Island and contribute to supporting sustainable coastal management and marine biodiversity conservation in small island ecosystems such as the Seribu Islands.

Keywords: bivalves; coastal ecosystem; diversity; gastropods; mangrove

INTRODUCTION

Coastal ecosystems in the Seribu Islands, Jakarta, are increasingly exposed to anthropogenic pressures such as tourism activities and coastal pollution from Jakarta Bay, which may affect the stability of marine biodiversity. These pressures can alter habitat conditions and influence the distribution of benthic organisms, including molluscs. Pollution originating from Jakarta Bay, including organic waste and nutrient enrichment, has been reported to degrade water quality and influence benthic communities in coastal areas (Corvianawatie & Abrar, 2018; Winanti & Sari, 2025). Molluscs, particularly gastropods and

bivalves, play important ecological roles as bioindicators due to their sensitivity to environmental changes and limited mobility. Changes in their diversity and abundance can reflect shifts in environmental quality and habitat conditions. Therefore, assessing molluscan communities is essential for understanding the ecological status of coastal ecosystems. In areas such as Pari Island, where environmental pressures are evident, studies on molluscan distribution are necessary to support sustainable coastal management.

In this context, molluscs, particularly gastropods and bivalves, are important components of coastal ecosystems. They function as detritivores, grazers, and filter feeders, and also serve as bioindicators due to their sensitivity to environmental changes (Ratih *et al*., 2021; Fatonah *et al.,* 2023; Octavina *et al*., 2023; Putri *et al*., 2023; Ningrum *et al*., 2024). The diversity and distribution of molluscs are strongly influenced by habitat characteristics such as substrate type, vegetation density, and abiotic factors. Previous studies have shown that mangrove ecosystems with dense vegetation and muddy substrates tend to support higher abundance and diversity of molluscs (Yanti *et al*., 2022; Ningrum *et al*., 2024). Therefore, mollusc diversity can reflect environmental quality, ecosystem stability, and the level of anthropogenic disturbance.

Although several studies have reported molluscs diversity in coastal ecosystems, recent and comparative data across different habitats in Pari Island remain limited. Previous studies generally focused on single habitats or did not integrate abiotic factors with community structure, making it difficult to understand how environmental variations influence molluscs distribution. In addition, increasing anthropogenic pressures may have altered current biodiversity patterns, so earlier data may no longer represent present ecosystem conditions. Pari Island, located in the Seribu Islands, is a coastal area characterized by sandy beaches and mangrove ecosystems with diverse habitat conditions. The research sites include Star Beach, Virgin Sand Beach, and mangrove areas, each with distinct substrate and vegetation characteristics. These variations provide an opportunity to examine differences in mollusc community structure across multiple coastal ecosystem types within a single area, as habitat heterogeneity and environmental gradients are known to significantly influence the spatial variation of gastropods communities and their distribution patterns (Nugroho *et al*., 2020; Kadim *et al.,* 2026).

However, recent data on the diversity and distribution of molluscs in Pari Island remain limited. Existing studies generally focus on single habitat types and do not provide comprehensive comparisons across different ecosystems. In addition, previous research has not sufficiently integrated abiotic factors with mollusc community structure. As a result, the relationship between habitat characteristics, environmental conditions, and mollusc diversity is not yet fully understood. Furthermore, available data may no longer represent current conditions due to increasing anthropogenic pressures in the Seribu Islands. These limitations indicate a research gap in understanding mollusc diversity across different coastal ecosystems on Pari Island, as previous studies have reported that data on gastropods and bivalves diversity in specific coastal regions are still scarce and often limited to particular habitats without broader environmental comparisons (Egilsdottir *et al*., 2019; Hasidu *et al.*, 2020; Mawardi *et al*., 2023).

This study examines the diversity and abundance of molluscs, particularly gastropods and bivalves, across three coastal ecosystems on Pari Island Star Beach, Virgin Sand Beach, and mangrove areas while also evaluating the influence of environmental factors on their distribution patterns. By comparing multiple habitat types, this study provides a comprehensive overview of current ecological conditions in the coastal ecosystems of Pari Island. Furthermore, it enhances understanding of the relationships among abiotic factors, substrate characteristics, and mangrove vegetation in shaping molluscan community structure, as well as supports future coastal ecosystem management strategies in the Seribu Islands. This study aimed to assess the diversity of gastropods and bivalves in three ecosystems: Star Beach, Virgin Sand Beach, and mangroves.

METHOD

Data collection was conducted in the intertidal zone at three sampling sites: Star Beach, Virgin Sand Beach, and a mangrove area, located at approximately 6°0′14″ S and 106°46′44″ E, which represent different coastal ecosystem characteristics, including sandy beach and mangrove habitats. The sampling locations were determined qualitatively using a purposive sampling method based on the main research

objective of obtaining as many gastropods and bivalves samples as possible to provide an overview of the ecological indices at the study sites. The collection of gastropods and bivalves was conducted using a combination of direct sampling and time-searching methods, with a systematically explored search pattern along the shoreline. The sampling effort was carried out for 30 minutes by four researchers, covering an area of approximately ± 2 km. This method was selected because it increases the likelihood of detecting hidden species and is flexible for heterogeneous habitats (sand, seagrass, and coral) (Reid, 2016; Rumape *et al*., 2022).

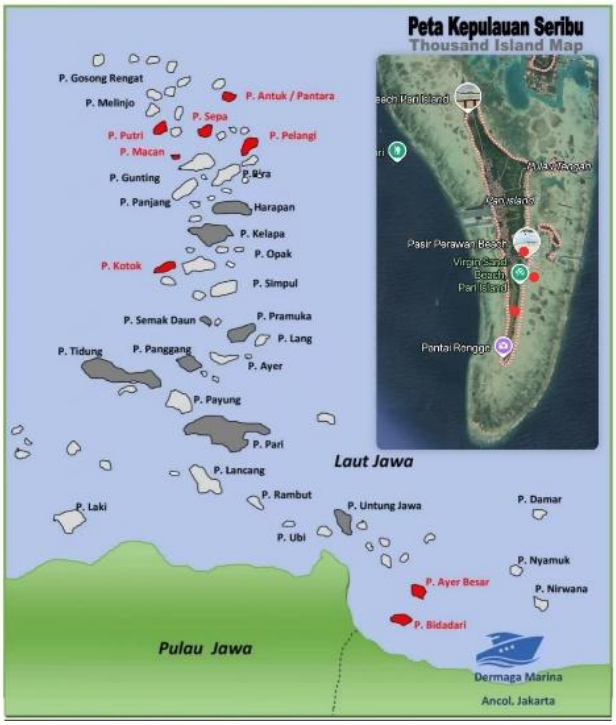

Figure 1. Location of the study site

The tools used in this study were limited to the main equipment, including sampling tools (shovel, sieve, and tray) and measuring instruments (thermometer, refractometer, pH meter, and hygrometer). Meanwhile, the materials used were 70% alcohol for preserving mollusc samples. The abiotic parameters measured in this study included water temperature, water pH, salinity, and air humidity. All instruments were calibrated prior to measurement to ensure data accuracy. This study also involved abiotic factors as supporting subjects, namely temperature, pH, salinity, and humidity. These factors were chosen because they have a direct influence on the distribution and abundance of molluscs. By measuring abiotic parameters, this study can link environmental conditions with variations in the mollusc community, thus producing more comprehensive results. The abiotic parametes were measured using digital thermometers for temperature, pH meters for pH, refractometers for salinity, and hygrometers for humidity. All data were recorded in field worksheets and then analyzed to determine the relationship between environmental factors and mollusc diversity. With this data collection technique, the study was able to describe the overall condition of the coastal ecosystem of Pari Island.

All collected individuals were counted and identified to the lowest possible taxonomic level. This technique provides quantitative data on the abundance and distribution of molluscs, including both dominant and less abundant species. The data obtained from field observations were analyzed using a descriptive comparative approach to determine differences among sampling sites. Species diversity was analyzed using the Shannon–Wiener diversity index to describe the diversity of mollusc species at each sampling site. The diversity index was calculated based on the proportion of individuals of each species relative to the total number of individuals recorded, with the contribution of each species weighted by the

natural logarithm of its relative abundance (Magurran, 1988). In this calculation, the relative abundance of each species was obtained by dividing the number of individuals of a given species by the total number of individuals observed. Diversity values were classified as low when the Shannon–Wiener diversity index (H′) was less than or equal to 1, moderate when H′ was greater than 1 but less than or equal to 3, and high when H′ exceeded 3. This index was used to describe the level of species variation within the ecosystem, where higher H′ values indicate greater diversity and better ecosystem conditions.

Species dominance was analyzed using the Simpson dominance index to determine the extent to which certain species dominate the community. The dominance index was calculated based on the proportion of individuals of each species relative to the total number of individuals, with the squared relative abundance of each species summed to obtain the overall dominance value (Magurran, 1988). In this calculation, the relative abundance of each species was determined by dividing the number of individuals of a given species by the total number of individuals observed. Dominance values were interpreted as low when the Simpson dominance index (D) ranged from greater than 0 to 0.50, moderate when D was greater than 0.50 but less than or equal to 0.75, and high when D was greater than 0.75 up to 1.00. A high dominance value indicates that one or a few species dominate the community structure, suggesting lower ecosystem balance.

Species evenness was calculated to determine the distribution of individuals among species using the Evenness index (E) (Magurran, 1988). The evenness index was calculated by dividing the Shannon–Wiener diversity index (H′) by the natural logarithm of the total number of species (S). Evenness values range from 0 to 1, with values closer to 1 indicating a more uniform distribution of individuals among species. Evenness values were classified as low when E was less than or equal to 0.4, moderate when E was greater than 0.4 but less than or equal to 0.6, and high when E exceeded 0.6. The combined interpretation of diversity, dominance, and evenness indices provides a comprehensive assessment of ecosystem condition, where high diversity and evenness accompanied by low dominance indicate a more stable and healthier ecosystem.

RESULT AND DISCUSSION

Star Beach is a location with a relatively stable and heterogeneous sand substrate. The Table 1 presents the number of gastropods and bivalves individuals based on the families found at this location. This data is important for observing the composition of species living on sandy beaches and how the substrate supports the existence of bivalves and gastropods. By knowing the number of individuals per family, the dominance and distribution of species in this ecosystem can be analyzed. In addition, this information can be used to identify which families are more adaptable to sandy substrates. Environmental factors such as wave action, sediment type, and organic matter availability may also influence the presence of these organisms. The variation in individual numbers among families may indicate differences in ecological roles and survival strategies. Therefore, this data provides a foundation for further ecological studies and conservation efforts in coastal environments.

Based on Table 1, the data recorded 22 species of gastropods and bivalves at Star Beach, consisting of 11 species of bivalves and 11 species of gastropods, distributed across 18 families. Bivalves dominated in terms of abundance with 32 individuals, compared to 17 individuals of gastropods. A high variety of bivalves comes from the Arcidae and Tellinidae families, with relatively high numbers of individual. In contrast, gastropods were less abundant, likely due to their preference for harder substrates. This confirms that sandy substrates support the existence of bivalves due to their burrowing and feeding adaptations (Asadi *et al*., 2018; Prado *et al*., 2024). Furthermore, the dominance of bivalves suggests that the sediment characteristics at Star Beach are favorable for infaunal organisms. The presence of multiple families also indicates a relatively diverse and stable ecosystem. Differences in abundance between gastropods and bivalves may reflect variations in mobility and habitat utilization. Overall, these findings highlight the ecological importance of sandy beach habitats in supporting diverse benthic communities.

Table 1. The sampling result form Star Beach

Species Name	Class	Family	Total
Plagiocardium pseudolima	Bivalves	Cardiidae	2
Anadara pilule	Bivalves	Arcidae	14
Chama sp.	Bivalves	Chamidae	1
Gafrarium pectinatum	Bivalves	Veneridae	2
Spondylus sp.	Bivalves	Spondylidae	1
Spondylus sinensis	Bivalves	Spondylidae	1
Tellina albinella	Bivalves	Tellinidae	1
Quidnipagus palatam	Bivalves	Tellinidae	2
Moerella pulchella	Bivalves	Tellinidae	1
Asaphis violascens	Bivalves	Psammobiidae	2
Abra aequalis	Bivalves	Semelidae	5
Murex trapa	Gastropods	Muricidae	1
Reishia clavigera	Gastropods	Muricidae	2
Astraea undosa	Gastropods	Turbinidae	1
Erosaria sp.	Gastropods	Cypraeidae	1
Zeacumantus subcarinatus	Gastropods	Batillariidae	5
Phorcus turbinatus	Gastropods	Trochidae	2
Volegalea cochilidium	Gastropods	Melongenidae	1
Crepidula dilatata	Gastropods	Calyptraeidae	1
Lambis lambis	Gastropods	Strombidae	1
Lasaea sp.	Gastropods	Lasaeidae	1
Natica gualteriana	Gastropods	Naticidae	1
	Total		49

Mangrove ecosystems have muddy substrates and abundant leaf litter, which support characteristic gastropods species (Bayudana *et al*., 2022; Setiawan *et al*., 2024; Wintah & Kiswanto, 2024). The sampling results from mangrove locations (Table 2) were used to analyze how mangrove vegetation and substrate conditions affect the composition of gastropods, which were the only biota recorded during sampling. The high organic content in mangrove sediments provides an important food source for detritivorous gastropods. In addition, the complex root structure of mangroves creates microhabitats that enhance species survival and distribution. Environmental stability in mangrove areas also contributes to the persistence of specialized gastropod communities. These conditions make mangroves highly suitable habitats for mollusk development. Variation in gastropod abundance may be influenced by tidal fluctuations and sediment moisture levels. Overall, the results indicate a strong relationship between mangrove habitat characteristics and gastropod presence.

Table 2. The sampling result from mangrove location

Species Name	Class	Family	Total
Melongena corona	Gastropods	Melongenidae	10
Terebralia sulcata	Gastropods	Potamididae	6
Terebralia palustris	Gastropods	Potamididae	5
Canarium urceus	Gastropods	Strombidae	4
Subulina ocrona	Gastropods	Subulinidae	3
	Total		28

The results show the dominance of gastropods, especially from the Potamididae family, such as *Terebralia sulcata* and *Terebralia discolata*. This condition is in line with the characteristics of mangrove habitats that support the abundance of decomposer gastropods. A total of 5 species were recorded in the mangrove ecosystem, all belonging to the gastropods, distributed across 4 families, with no bivalves found. Virgin Sand beach is a tourist site with high anthropogenic pressure. The following table presents the number of individu found at this location. This is important for observing the impact of tourist activities on

the composition of molluscs. Human activities such as trampling and waste disposal may alter habitat quality and reduce species diversity. Increased disturbance in coastal areas often affects the distribution and abundance of sensitive organisms. Therefore, analyzing these patterns is essential to understand the ecological response of molluscs to environmental pressure.

The data shows the strong dominance of the Neritidae family, particularly *Clithon oualaniense*, with a much higher number of individuals than other species. This indicates an imbalance in the ecosystem due to the dominance of one species. Ecological indices were calculated to assess the diversity, dominance, and evenness of molluscs at three observation sites. The dominance of a single species may suggest limited competition or strong environmental filtering. Such conditions often lead to reduced overall biodiversity within the habitat. Therefore, these indices provide a comprehensive overview of community structure and ecological balance. Table 3 shows a high abundance of the Neritidae family, particularly *Clithon oualaniense*. This indicates an imbalance in the ecosystem due to the dominance of one species. A total of 4 species were recorded at Virgin Sand Beach, all belonging to gastropods, distributed across 2 families, with no bivalves species found. Ecological indices were calculated to assess the diversity, dominance, and evenness of molluscs at three observation sites.

Table 3. The sampling result from Virgin Sand Beach

Species Name	Class	Family	Total
Clithon oualaniense	Gastropods	Neritidae	22
Nerita lineata	Gastropods	Neritidae	2
Naticarius canrena	Gastropods	Naticidae	2
Natica marochiensis	Gastropods	Naticidae	4
	Total		30

The Figure 2 presents the results of the H', D, and E index. This data was used to assess the condition of the ecosystem and the stability of the molluscs community. In addition, the low number of species suggests a simplified community structure influenced by environmental stress.

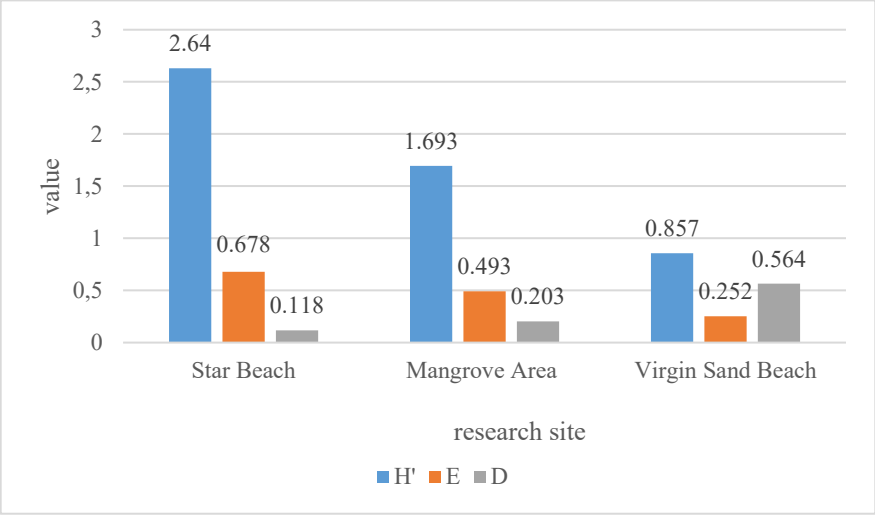

Figure 2. Graph of Shannon-Wiener Diversity Index, Simpson Dominance, and Evenness found on Star Beach, Mangrove, and Virgin Sand Beach, Seribu Islands

Star Beach shows moderate diversity (H' = 2.640), low dominance (D = 0.118), and high evenness (E = 0.678), indicating a stable community. Mangroves have moderate diversity (H' = 1.693) with moderate evenness (E = 0.493), indicating a relatively balanced ecosystem. Virgin Sand Beach shows low diversity (H' = 0.857) with high dominance (D = 0.564), due to the dominance of *Clithon oualaniense*. The

differences in these index values reflect the influence of substrate and anthropogenic pressure on the structure of the mollusc community. To understand the condition of the coastal ecosystem of Pari Island, this study not only focused on the mollusc community but also measured the abiotic factors that influence its existence.

The diversity of molluscs on Pari Island shows clear variations between locations. Star Beach has the highest diversity value (H' = 2.640; moderate category), mangroves are at a moderate level (H' = 1.693), while Virgin Sand Beach shows low diversity (H' = 0.857). The high diversity at Star Beach can be explained by the relatively stable sand substrate, lower anthropogenic pressure compared to Virgin Sand Beach, and habitat heterogeneity that supports various families of bivalves and gastropods. The sand substrate allows bivalves such as Veneridae and Tellinidae to live buried and filter feed, thereby increasing species variation. In addition, balanced environmental conditions at Star Beach promote the coexistence of multiple functional groups within the mollusc community. Mangrove areas, although less diverse than Star Beach, still provide suitable habitat conditions due to high organic matter availability. Meanwhile, the low diversity at Virgin Sand Beach is likely influenced by strong human disturbance and limited habitat stability. These differences highlight the role of substrate type and environmental pressure in shaping mollusc community structure.

The abiotic parameters measured included water temperature, water pH, salinity, and air humidity at three observation locations. It can be seen in Table 4. Measurements were taken directly in the field using standard instruments.

Table 4. Abiotic data of the Pari Island, Seribu Islands

Station	Water Temperature (ºC)	pH	Salinity (%)	Air Humidity (%)
Star Beach	29	7	37	74
Mangroves Area	28	7	35	80
Virgin Sand Beach	29	7	35	74

Based on Table 4 Star Beach has higher salinity (37‰) than the mangroves and Virgin Sand Beach (35%). These conditions support bivalves that require relatively stable salinity for filter feeding activities. Temperature and pH are relatively uniform across locations (28–29°C; pH 7), so they are not a major distinguishing factor. However, the lower humidity at Star Beach (74%) compared to the mangroves (80%) indicates that the sandy beach ecosystem is drier, making it more suitable for bivalves than gastropods. In contrast, Virgin Sand Beach shows low diversity due to the strong dominance of gastropods of the Neritidae family, particularly *Clithon oualaniensis*. The dominance of a single species causes uneven distribution of individuals and reduces diversity. This condition is exacerbated by intensive tourism, which can disturb the substrate and reduce the chances of survival for other species.

Mangroves have moderate diversity with fairly even distribution of individuals. This indicates that mangrove ecosystems support a relatively balanced mollusc community (Unthari, 2017; Syahrial *et al.*, 2019). The presence of characteristic species such as *Terebralia palustris* shows that mangrove ecosystems play an important role in supporting mollusc diversity. Differences in diversity between locations reflect the influence of substrate, human pressure, and habitat heterogeneity on the structure of the mollusc community. Star Beach is more heterogeneous and stable, mangroves support endemic species, while Virgin Sand Beach shows an imbalance due to the dominance of one species. The composition of molluscs is greatly influenced by habitat type. Sandy beaches such as Star Beach support the dominance of Bivalvia because the sandy substrate is suitable for buried life. In contrast, the mangrove zone supports Gastropods because the muddy substrate and high humidity are more suitable for species such as *Terebralia palustris* and *T. sulcata*, which act as decomposers of mangrove litter (Isnaningsih & Patria, 2018; Putri & Patria, 2018).

Virgin Beach, which is a tourist area, shows the dominance of certain species due to anthropogenic pressure. Tourist activities can alter the substrate and reduce habitat quality, so only species that are tolerant to disturbance are able to survive. Certain gastropods, such as Neritidae, have a higher tolerance to salinity fluctuations and water conditions, so they dominate this ecosystem. In addition to substrate, abiotic factors

also play a role in determining the composition of Molluscs. Higher salinity at Star Beach supports bivalves, while higher humidity in mangroves supports Gastropods. Temperature and pH are relatively uniform across locations, so they are not major distinguishing factors. Furthermore, wave exposure and sediment stability also contribute to differences in species distribution. Variations in organic matter content between sites influence food availability for benthic organisms. Overall, the interaction between biotic and abiotic factors strongly shapes the structure of mollusc communities across the studied locations.

The composition of molluscs on Pari Island shows habitat specialization. The sandy beach supports a variety of bivalves, the mangroves support distinctive gastropods, and the main tourist area of Virgin Sand Beach tends to show a dominance of tolerant species. This indicates that habitat type plays a major role in determining the composition of molluscs. Virgin Sand Beach shows a strong dominance of *Clithon oualaniensis* (family Neritidae), resulting in a high dominance value (D = 0.564). This dominance is an indication of ecological pressure or homogeneous habitat conditions. Intensive tourism activities can reduce substrate quality and inhibit the existence of other species, so that only one species is able to survive (Ramagita *et al*., 2023; Winanti & Sari, 2025; Febriyani *et al*., 2026). In addition, continuous human disturbance may limit recolonization by less tolerant species. Such conditions reduce community evenness and increase ecological imbalance. Therefore, habitat management is important to maintain mollusc diversity in coastal ecosystems.

In contrast, Star Beach did not show any dominant species, with a low dominance value (D = 0.118). This indicates that the community structure at Star Beach is healthier and more balanced, with an even distribution of individuals across species. This condition reflects a more stable ecosystem that is resilient to environmental changes. Mangroves have a moderate dominance value (D = 0.203), indicating that although there are more species found, such as *Terebralia palustris*, the distribution of individuals between species is still fairly even. This shows that the mangrove ecosystem supports a relatively balanced molluscs community. High dominance at Virgin Sand Beach indicates ecological pressure that causes only one species to survive. This is related to tourism activities or limited substrate quality. This condition shows that the Virgin Sand Beach ecosystem is less stable and vulnerable to environmental changes. Locations with high diversity, such as Star Beach, are more stable and resilient to environmental changes. High diversity indicates an even distribution of individuals across species, making the ecosystem more capable of withstanding external pressures. Conversely, locations with high dominance, such as Virgin Sand Beach, are more vulnerable to environmental changes. The dominance of a single species indicates an imbalance in the ecosystem that can reduce its resistance to disturbances.

Mangroves exhibit moderate diversity with a fairly even distribution of individuals, meaning that this ecosystem is still relatively stable. The presence of characteristic species such as *Terebralia palustris* indicates that mangrove ecosystems play an important role in supporting molluscs diversity. The ecological implication of these research results is that ecosystems with high diversity are more capable of withstanding external pressures, while ecosystems with high dominance are more vulnerable to environmental changes. This shows the importance of maintaining molluscs diversity to support ecosystem stability. Furthermore, the results of this study indicate that the coastal ecosystems of Pari Island have great potential to support molluscs diversity. However, anthropogenic pressures such as tourism activities can reduce diversity and increase the dominance of certain species.

The results of this study are consistent with the general theory that mangrove areas tend to have unique species that are adapted to muddy substrates and high humidity. The mangrove ecosystem of Pari Island is dominated by gastropods such as *Terebralia palustris* and *T. sulcata* (Nadaa *et al*., 2021; Arbi *et al*., 2022). This is consistent with the results of this study, which show the dominance of gastropods in mangroves. In addition, open coastal ecosystems such as Star Beach show higher diversity than areas under human pressure. It means habitat with low anthropogenic pressure have higher molluscs diversity (Fatonah *et al*., 2023; Octavina *et al*., 2023) on the Sabang coast also reports that beaches with low. This is consistent with the results of this study, in which Star Beach has the highest diversity (H' = 2.640) and an even distribution of individuals. These conditions indicate that relatively stable and heterogeneous sandy coastal ecosystems support a more balanced molluscs community.

In contrast, Virgin Sand Beach shows low diversity due to the dominance of one species, *Clithon oualaniense.* This condition is consistent with ecological theory, which states that ecosystems with high anthropogenic pressure tend to be less stable and have low diversity. Intensive tourism activities at Virgin Sand Beach can disturb the substrate and reduce habitat quality, so that only species that are tolerant to disturbance are able to survive. The distribution of gastropods and bivalves are greatly influence by substrate and vegetation condition in mangrove ecosystem (Ratih *et al*., 2021; Yanti *et al*., 2022; Putri *et al*., 2023). Ecosystems with muddy substrates and dense vegetation tend to have higher abundance and diversity. This is consistent with the results of this study, where the mangrove ecosystem of Pari Island has moderate diversity with a fairly even distribution of individuals.

The results of this study are generally consistent with previous research, although some differences are also observed due to variations in environmental conditions and anthropogenic pressure. The higher diversity found at Star Beach is in line with studies reporting that sandy coastal ecosystems with relatively low disturbance tend to support more diverse mollusc communities due to stable substrates and suitable conditions for bivalves and gastropods. This similarity occurs because sandy substrates provide more ecological niches and support burrowing and filter feeding organisms. Similarly, the dominance of gastropods in the mangrove ecosystem corresponds with previous findings that mangrove habitats, characterized by muddy substrates and high organic matter, favor detritivorous species such as *Terebralia*. The presence of leaf litter and high humidity creates suitable microhabitats that support species adapted to decomposition processes, resulting in moderate diversity with relatively balanced community structure.

However, the low diversity observed at Virgin Sand Beach shows a contrast with less disturbed coastal ecosystems. This difference can be explained by the high anthropogenic pressure in the area, particularly tourism activities that may disturb the substrate, increase waste accumulation, and alter habitat conditions. As a result, only tolerant species such as those from the Neritidae family are able to dominate, leading to high dominance and low evenness. This finding supports ecological theory stating that ecosystems under strong environmental stress tend to exhibit reduced diversity and increased dominance by a few tolerant species. Based on the results of the study, management of the coastal ecosystem of Pari Island is necessary to maintain molluscs diversity. Virgin Sand Beach, which shows low diversity due to the dominance of *Clithon oualaniensis*, needs special attention. Monitoring of tourist activities at Virgin Sand Beach is necessary to reduce ecological pressure and prevent the dominance of a single species. Regulating the number of tourists, managing waste, and restricting activities that damage the substrate can help increase molluscs diversity.

Mangrove conservation is also important to maintain the existence of unique species such as *Terebralia palustris*, which plays an important role in the ecosystem's energy cycle. Replanting mangroves in damaged areas and protecting existing mangrove vegetation can help increase the abundance and diversity of molluscs. Mangrove ecosystems with dense vegetation have higher molluscs diversity, making mangrove conservation an important step in coastal ecosystem management (Candri *et al*., 2020; Ningrum *et al*. 2024). In addition, periodic monitoring of molluscs biodiversity on Pari Island is necessary to determine changes in ecosystem conditions over time. This monitoring can serve as a basis for sustainable coastal ecosystem management and support biodiversity conservation efforts in the Seribu Islands. Its regular monitoring is important to detect changes in molluscs diversity due to anthropogenic pressures (Susantoro *et al*., 2019; Octavina *et al.*, 2023). The management of Pari Island's coastal ecosystem also needs to involve the local community. Community participation in mangrove conservation and monitoring of tourism activities can help preserve molluscs diversity. Education about the importance of biodiversity and the impact of human activities on coastal ecosystems can raise public awareness and support conservation efforts. Thus, recommendations for managing the coastal ecosystem of Pari Island include monitoring tourism activities on Virgin Sand Beach, mangrove conservation, periodic monitoring of molluscs biodiversity, and community participation in ecosystem management. These measures are expected to preserve molluscs diversity and support the stability of the coastal ecosystem of Pari Island.

CONCLUSION

Based on the results of this study, the diversity and abundance of molluscs on Pari Island varied across different coastal ecosystems. Star Beach exhibited the highest diversity (H′ = 2.640), low dominance, and high evenness, indicating a stable and balanced ecosystem, whereas the mangrove ecosystem showed moderate diversity (H′ = 1.693) with relatively even species distribution, reflecting its function as a habitat for specialized gastropods adapted to muddy, organic rich substrates. In contrast, Virgin Sand Beach had low diversity (H′ = 0.857) and low evenness due to the dominance of the Neritidae family, particularly *Clithon oualaniense*, indicating ecological pressure and reduced environmental stability associated with anthropogenic disturbance. These differences are strongly influenced by habitat characteristics and abiotic factors such as substrate type, salinity, and humidity, where heterogeneous sandy substrates at Star Beach support more diverse communities, mangroves provide unique microhabitats, and tourist intensive areas tend to favor tolerant species. At a national level, this research supports Indonesia's marine biodiversity conservation efforts by strengthening baseline ecological data needed for sustainable coastal zone management, particularly in small island ecosystems such as Pari Island, Seribu Islands.

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