Life Science 14 (2) (2025)

Life Science

https://journal.unnes.ac.id/journals/UnnesJLifeSci

Diversity and Distribution of Gastropods in the Southern Coastal Area of Gunungkidul, Yogyakarta

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Article Info

Submitted:
07 August 2025
Revised:
26 October 2025
Accepted:
30 November 2025

Keywords:
Gastropods; diversity; distribution; Gunungkidul coast; coastal ecosystem

Abstract

The southern coast of Gunungkidul, Yogyakarta, exhibits high gastropod diversity across varied substrates, offering a critical framework to study their distribution and ecological role in coastal ecosystem balance. This study aims to analyze the level of gastropod diversity and distribution in the Sundak Beach, Indrayanti Beach, and Drini Beach areas to support area management and maintain the survival of organisms and water productivity. Research was conducted using a 1x1 meter quadrat plot method systematically placed in the intertidal zone at three coastal locations. Data collection was carried out over a period of three months (October–December 2024). Gastropod species identification was based on shell morphological characteristics, while data analysis included calculations of the Shannon-Wiener diversity index (H'), Simpson dominance index (C), Pielou evenness index (E), abundance (ind/m2), and Morisita dispersion index (Id) to determine distribution patterns. Environmental parameters measured included temperature, pH, and salinity. The results found 23 gastropod species from 12 families across the three study locations, diversity values (H' = 2.63), evenness (E = 0.84), and dominance (C = 0.10). The distribution pattern of most species was clumped, influenced by food availability and substrate characteristics. Environmental factors such as temperature (28–31°C), pH (7), and salinity (30–32%) supported the stability of gastropod communities. The findings provide scientific insight into gastropod community structure and the environmental factors shaping their abundance. Furthermore, this research contributes essential baseline data for intertidal biodiversity monitoring, strengthens evidence-based coastal management in southern Gunungkidul, and serves as a reference for future conservation-oriented studies.

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p-ISSN 2252-6277
e-ISSN 2528-5009

INTRODUCTION

The ocean is a spacious habitat for marine life, providing enormous potential resources such as coral reefs, seagrass beds, and mangroves (Rangan et al., 2015). Gastropods are a group of aquatic invertebrates from the phylum Mollusca that have soft bodies. Individuals in this class use their ventral muscles (foot) to move and are generally covered with a shell, although a small number of species do not have one (Salwiyah et al., 2022). Gastropods are an important component that supports the life of organisms and plays a role in maintaining the balance of other organisms in the energy flow or food chain in an ecosystem (Mornaten & Kilay, 2022). The gastropod community plays an important role in the trophic network of seagrass ecosystems, acting as primary consumers utilizing decomposed seagrass detritus and debris. Akbar et al. (2024) describe that gastropods can serve as environmental indicators due to their sensitivity to changes

in water quality, such that changes in the diversity and abundance of gastropod species can reflect the condition of aquatic ecosystems.

Beaches in the Gunungkidul area of Yogyakarta have high biodiversity potential. The southern coastal area of Gunungkidul, Yogyakarta, has several beaches that are potential sites for gastropod biodiversity research, such as Indrayanti Beach, Sundak Beach, and Drini Beach. These three beaches, which serve as research sites, have distinct and unique substrate characteristics, thereby providing important habitat variation for studies on gastropod diversity and distribution. Sundak Beach has a substrate dominated by dead coral and coral fragments, creating a stable and complex rocky environment for gastropods that prefer hard substrates. Drini Beach also has a fairly dominant coral substrate, but with a combination of coral rocks and seagrass beds, providing a slightly more diverse habitat with seagrass vegetation as an additional factor in microhabitat diversity. Unlike the other two beaches, Indrayanti Beach is dominated by coarse sand and scattered coral fragments, presenting a softer and more dynamic substrate condition. These differences in substrate characteristics are crucial for understanding how gastropods adapt and distribute themselves across each unique coastal environment.

Krebs (1989) states that a community has complex structural characteristics, including species composition, biodiversity levels, and temporal changes that occur within the community. The structure and composition of communities undergo temporal changes with the seasons and over time. High anthropogenic pressure in aquatic areas can reduce environmental quality, thereby affecting the dynamics of coastal aquatic ecosystems, particularly mollusk populations that are ecologically sessile in specific locations (Situngkir et al., 2022). Research on gastropod diversity in the southern coastal area of Gunungkidul has been conducted extensively in terms of diversity, but there has been little study of the spatial distribution of gastropods in various coastal locations with different characteristics in the area. Therefore, this study adds a dimension of analysis in the form of gastropod distribution to provide a more comprehensive picture of gastropod distribution patterns. This approach is expected to enhance understanding of the dynamics of gastropod communities influenced by environmental factors and human activities in the southern coastal area of Gunungkidul. As a result, the outcomes of this study not only complement species diversity data but also enrich ecological information regarding the distribution and habitat of gastropods in the region. This study was conducted to analyze the diversity and distribution of gastropods on the southern coast of Gunungkidul, Yogyakarta, particularly on Sundak, Indrayanti, and Drini beaches, given the important role of gastropods in coastal ecosystems. Important ecological knowledge must be understood for optimal coastal zone management in order to maintain the survival of organisms and the productivity of the waters.

METHODS

This study was conducted in the southern coastal area of Gunungkidul Regency, Special Region of Yogyakarta. The study was conducted at three locations: Sundak Beach (Sidoharjo Village, Tepus Subdistrict), Indrayanti Beach (Tepus Village, Tepus Subdistrict), and Drini Beach (Banjarejo Village, Tanjungsari Subdistrict). The research period lasted three months, from October to December 2024.

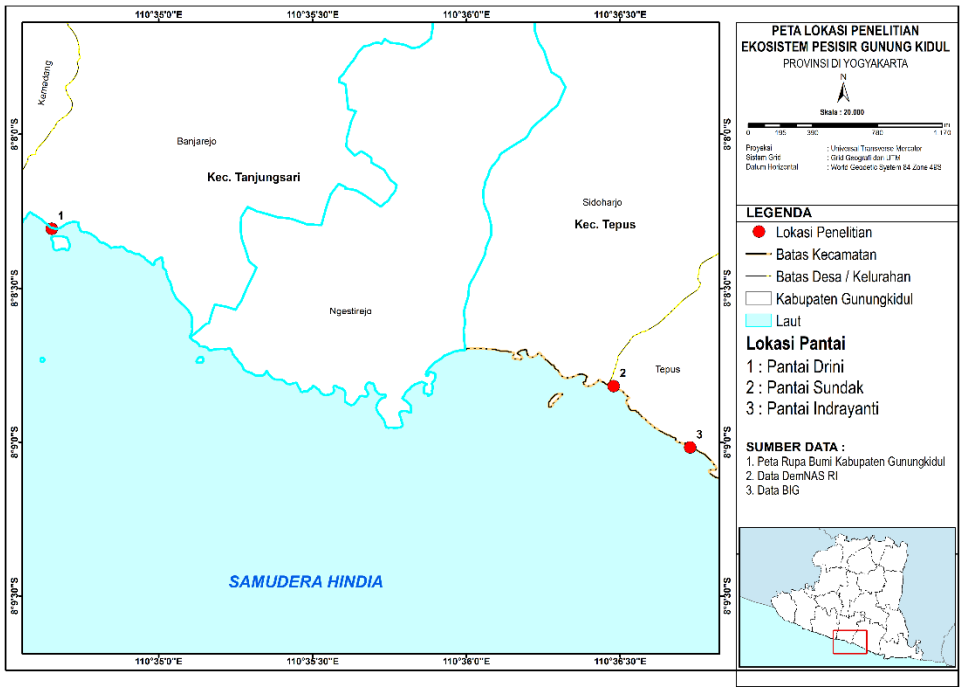

Figure 1. Research location map

Data collection was carried out using a 1 x 1 m² quadrat plot method, placed on five transects perpendicular to the coastline with a distance of 20 meters between transects, and five plots per transect with a distance of 10 meters between plots, adjusting for tides and the furthest ebb line distance of about 50 meters from the coastline. Data collection was repeated three times during the study period. Data collection times are adjusted to the maximum low tide conditions at the observation site. In August, data collection was conducted during low tide between 11:00 AM and 1:00 PM WIB. Subsequently, in November, data were collected during low tide between 10:00 AM and 12:00 PM WIB. Finally, in December, data collection was conducted during the low tide period between 8:00 AM and 10:00 AM WIB. The gastropods obtained were then collected, cleaned, preserved, and labeled before morphological identification using the reference "The Living Marine Resources of the Western Central Pacific" by Carpenter and Niem (1998), Handbook Shells (1992), Book on Marine Resources in the Coastal Waters of Gunungkidul, Yogyakarta (LIPI, 2015), and supporting sources from the World Register of Marine Species (WoRMS).

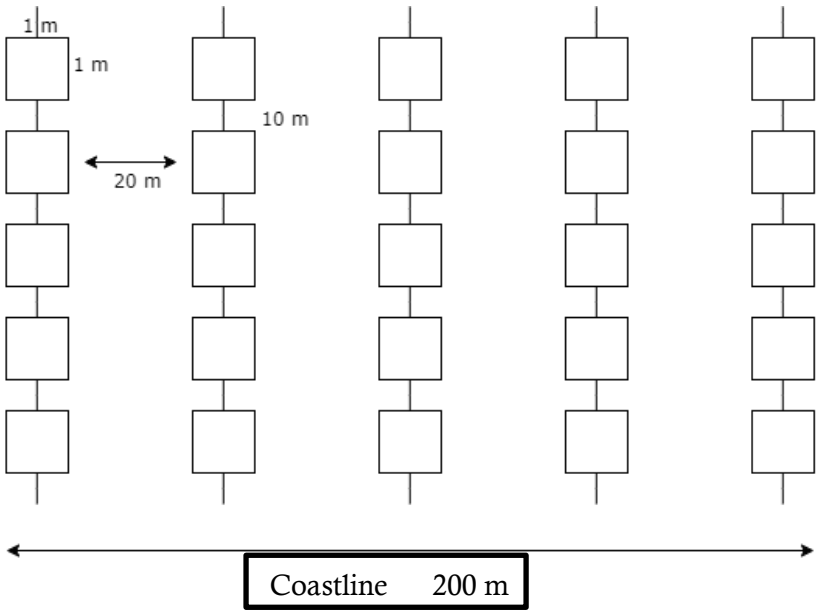

Figure 2. Transect line layout

Environmental factors measured were physical factors such as temperature, pH, and salinity. Physical factors were measured using instruments such as thermometers, universal pH paper, and refractometers. In addition, biological factors were also studied, including the algae and seagrass communities found in the intertidal zone, to provide a comprehensive picture of the environmental conditions affecting the presence of gastropods in the study area.

The diversity index (H') is calculated using the following diversity index (Ardhana, 2012):

$$H' = -(\sum \text{pi} \ln \text{pi})$$

Description:
H' = Species diversity index
Pi = ni/N ni = Number of individuals of each species
N = Total number of individuals

The criteria for the diversity index (H') are as follows:

H < 1: Low diversity
1 ≥ H < 2: Moderate diversity
2 ≥ H < 3,0: High diversity

The dominance index can be calculated using Simpson's dominance index (C) with the following formula:

$$C = \sum \left(\frac{ni}{N}\right)^2$$

Description:
C = Dominance index
ni = Number of individuals per species
N = Total number of individuals of all species

The dominance index ranges from 0 to 1, where a smaller dominance index value indicates that no species dominates, while a larger dominance index value indicates that a particular species dominates (Odum, 1993). The Simpson dominance index (C) ranges as follows:

$0 < C \leq 0{,}5$: Low dominance
$0{,}5 < C \leq 0{,}75$: Moderate dominance
$0{,}75 < C \leq 1{,}0$: High dominance

Equity can be calculated using the equity index formula according to Pielau (1996) as follows:

$$E = \frac{H'}{\ln S}$$

Description:
E = Evenness value
H' = Shannon-Wiener diversity index
S = Number of individuals

The uniformity index value ranges from 0 to 1. The uniformity index value is categorized as follows:

$0 < E \leq 0.5$: Low evenness
$0.5 < E \leq 0.75$: Moderate evenness
$0.75 < E \leq 1.0$: High evenness

Individual abundance was calculated using the following formula (Odum, 1993):

$$K\ (ind/m^2) = \frac{n}{A}$$

Description:
K = Individual abundance
n = Number of individuals
A = Total area (m^2)

The distribution pattern of gastropods was calculated using the Morisita dispersion index (Id) following the formula of Brower et al. (1990).

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

Description:
Id = Morisita dispersion index
n = Number of plots
N = Total number of individuals in all plots
ΣX^2= Quadrats of all individuals per plot

The results of the Morisita Index obtained are grouped as follows (Krebs, 1989):

Id > 1, clumped distribution pattern
Id < 1, uniform distribution pattern
Id = 1, random distribution pattern

RESULT AND DISCUSSION

Gastropods Diversity

Research findings in the coastal water ecosystem of southern Gunungkidul, Yogyakarta, identified 23 species of gastropods belonging to 17 genera and 12 families (Table 1).

Table 1. Diversity index, evenness index, and dominance index, and abundance of gastropods

No.	Species	Beach			Total
		Sundak	Drini	Indrayanti	
1.	*Planaxis sulcatus*	15	16	13	40
2.	*Conus ebraeus*	5	0	6	11
3.	*Conus imperialis*	0	0	4	4
4.	*Conus coronatus*	3	0	4	7
5.	*Conus miliaris*	2	0	7	9
6.	*Nerita signata*	11	11	8	30
7.	*Nerita albicilla*	0	0	2	2
8.	*Orania xuthedra*	0	0	4	4
9.	*Morula granulata*	11	15	22	48
10.	*Trochus maculatus*	4	3	0	7
11.	*Trochus radiatus*	2	7	6	15
12.	*Clypeomorus petrosa*	28	41	31	100
13.	*Cypraea annulus*	31	18	5	58
14.	*Cypraea tigris*	0	10	0	10
15.	*Staphylaea staphylaea*	0	1	3	4
16.	*Bistolida kieneri*	0	5	0	5
17.	*Monetaria caputserpentis*	0	0	7	7
18.	*Strigatella pauperculata*	18	14	17	49
19.	*Strigatella literata*	0	17	30	47
20.	*Pardalinops testudinaria*	3	4	4	11
21.	*Monoplex parthenopeus*	3	0	0	3
22.	*Engina mendicaria*	0	2	3	5
23.	*Turbo setosus*	3	12	11	26
Number of Individuals		**139**	**176**	**187**	**502**
Number of Species		**14**	**15**	**19**	**23**
Diversity (H')		**2,24**	**2,41**	**2,62**	**2,63**
Evenness (E)		**0,71**	**0,77**	**0,83**	**0,84**
Dominance (C)		**0,14**	**0,11**	**0,09**	**0,10**
Abundance (Ind/m^2)		**5,56**	**7,04**	**7,48**	**20,08**

All three locations have high species diversity (H') (Sundak Beach: 2.24; Drini Beach: 2.41; and Indrayanti Beach: 2.62). Furthermore, the evenness index values obtained were moderate at Sundak Beach (0.71), high at Drini Beach (0.77), and Indrayanti Beach (0.83). The dominance index obtained at the three beaches indicates that dominance at all three locations is low (Sundak Beach: 0.15; Drini Beach: 0.11; and Indrayanti Beach: 0.09). The highest average abundance was found at Indrayanti Beach, at

7,48 individuals per square meter. This was followed by Drini Beach with an average abundance of 7,04 Ind/m², and the lowest abundance value was at Sundak Beach at 5,56 Ind/m². The average total abundance of gastropods at the study site was 20,08 ind/m².

Based on ecological principles, the higher the diversity of an ecosystem, the higher the stability of that ecosystem. A high diversity index indicates that the ecosystem is balanced, while a low diversity index indicates an unbalanced gastropod habitat (Huang et al., 2020). This high diversity is supported by a high degree of evenness, meaning that the distribution of individuals among species is relatively even and no single species dominates excessively. *C. petrosa* is a gastropod species with a high abundance of individuals compared to other gastropods, making it a potential dominant species in its habitat. Although the overall community dominance is low, the abundance of *C. petrosa* influences the community structure. This dominance indicates suitable environmental conditions, such as the availability of food and rocky-sandy substrates. Houbrick (1985) further notes that Cerithiidae is an intertidal gastropod that is highly tolerant to changes in temperature, salinity, and waves, and is commonly found on rocky and coral coastlines in the Indo-Pacific region.

Some species can survive on rocky or coral substrates, while others prefer sand. In addition, variations in the availability of natural food sources, such as algae, seagrass, or detritus, also determine which species can survive on a particular beach. The presence of predators, adaptation, competition, food availability, and habitat structure can also influence species diversity in the area (Rahmawati et al., 2021). Most gastropods from the Nerita group, such as *N. signata* and *N. albicilla*, as well as cowries such as *C. annulus* and *C. tigris*, are more commonly found on rocky substrates or coral substrates. Other species, such as *T. stellatus*, *T. radiatus*, *M. granulata*, and *P. sulcatus,* also tend to live attached to coral surfaces or rocks, where they utilize algae as a food source. On the other hand, some gastropods tend to live on sandy or coral sand substrates, such as *S. pauperculata, S. literata*, and *P. testudinaria*, although they are often still found around scattered coral or rocks. Meanwhile, several species from the genus Conus, such as *C. miliaris* and *C. imperialis*, can be found on both rocky and sandy substrates, demonstrating a fairly broad adaptation to coastal environments.

Baharuddin (2018) indicated that habitat complexity, such as rocky substrates and coral reefs, increases gastropod diversity in the intertidal zone because it protects from predators and waves, as well as supports food sources such as algae. Gastropod communities in rocky intertidal zones are dominated by the families Muricidae, Neritidae, and Trochidae, as well as Cerithiidae, which have specialized adaptations such as thick shells and strong attachment capabilities to substrates. Some species also hide in rock crevices during large waves to reduce physical stress. These conditions naturally select gastropods that can withstand extreme environments, forming a community dominated by those capable of surviving. Gastropod diversity on the southern coast of Gunungkidul is influenced not only by substrate complexity but also by the availability of food sources such as algae, seagrass, and detritus. Gastropod abundance is known to correlate with algal cover and organic matter, as demonstrated in the study by Bouchet & Warén (2016). A combination of abundant food sources with complex habitats can enhance mollusk diversity. In rocky areas, the Trochidae and Neritidae families tend to dominate due to the

presence of *Ulva* sp. and *Sargassum* sp. algae as their main food source. Meanwhile, *Thalassia* sp. seagrass also plays an important role by providing detritus and stable microhabitats, thereby supporting gastropod abundance. The discovery by Morrison et al. (2014) emphasized this by showing that seagrass beds increase gastropod diversity through physical protection and optimal nutrient availability. Thus, the interaction between food availability and habitat structure is a key factor in determining gastropod diversity in this region.

The differences in gastropod diversity and distribution at Drini, Sundak, and Indrayanti beaches are also influenced by differences in topography, geographical conditions, and physical factors at each beach. Drini Beach has a relatively open topography with varied substrates, ranging from sand, gravel, to coral rocks. This substrate variation creates various microhabitats that support gastropod diversity, although wave exposure at this location is moderate and does not significantly disturb the benthic community. In contrast, Sundak Beach has a steeper shoreline with stronger wave exposure due to its direct exposure to the open sea. These conditions exert greater physical pressure on benthic organisms, resulting in lower abundance and even diversity of gastropods on this beach, with dominant species being those that are tolerant of strong waves and dynamic environmental changes. Meanwhile, Indrayanti Beach has a flatter topography with a fine sand and shell substrate, and there are small folds along the shoreline that create moist and sheltered zones. These conditions provide a more stable and comfortable habitat for gastropods, resulting in higher species richness and abundance at this location, with a more uniform community structure.

Distribution of Gastropods

The distribution pattern of gastropods mostly shows a clumped distribution, although some species are uniformly distributed. Species tend to form groups in areas with abundant resources (food, shelter). In addition, rocky, coral, or sandy substrates provide different habitats for gastropods. Locations with abundant food attract more individuals, resulting in a clumped distribution. Complex substrates (with many crevices and surfaces) allow gastropods to shelter and attach themselves, so they tend to gather in areas with suitable substrates. This pattern is most commonly observed in gastropods along the southern coast of Gunungkidul, particularly in areas with rocky substrates rich in algae and seagrass. Furthermore, external reproduction may also contribute to the distribution patterns of certain species, such as clustered distribution (Salwiyah et al., 2022).

Based on the results of the Morisita index calculation, there are 19 species with a clumped distribution pattern and 4 species with a uniform distribution pattern (Table 2).

Table 2. Distribution pattern

No	Species	Id	Description
1.	*Planaxis sulcatus*	0,96	Uniform
2.	*Conus ebraeus*	1,36	Clumped
3.	*Conus imperialis*	3,00	Clumped
4.	*Conus coronatus*	1,29	Clumped
5.	*Conus miliaris*	1,83	Clumped
6.	*Nerita signata*	0,95	Uniform
7.	*Nerita albicilla*	3,00	Clumped
8.	*Orania xuthedra*	3,00	Clumped
9.	*Morula granulata*	1,04	Clumped
10.	*Trochus stellatus*	1,29	Clumped
11.	*Trochus radiatus*	1,06	Clumped
12.	*Clypeomorus petrosa*	1,01	Clumped
13.	*Cypraea annulus*	1,32	Clumped
14.	*Cypraea tigris*	3,00	Clumped
15.	*Staphylaea staphylaea*	1,50	Clumped
16.	*Bistolida kieneri*	3,00	Clumped
17.	*Monetaria caputserpentis*	3,00	Clumped
18.	*Strigatella pauperculata*	0,97	Uniform
19.	*Strigatella literata*	1,58	Clumped
20.	*Pardalinops testudinaria*	0,82	Uniform
21.	*Monoplex parthenopeus*	3,00	Clumped
22.	*Engina mendicaria*	1,20	Clumped
23.	*Turbo setosus*	1,14	Clumped

In tropical coastal areas such as Gunungkidul, the distribution of gastropods that cluster or are uniform is greatly influenced by a combination of food availability, substrate properties, competition, predation, and the behavior and adaptations of each species. Most of the gastropod species in this study showed a clustered distribution pattern. At Indrayanti Beach, there are areas dominated by seagrass vegetation growing on substrates composed of sand and coral fragments, which provide habitat and food sources for gastropods. At Drini Beach, seagrass beds and marine algae are also widely distributed, particularly in the intertidal zone with substrates composed of a mixture of coral and sand. Meanwhile, at Sundak Beach, seagrass vegetation tends to be less abundant due to the substrate dominated by hard coral with limited sandy areas. However, algae attached to the coral are well-developed, providing habitat and nutrient supply for gastropods living on the hard substrate. Overall, the presence of seagrass and algae vegetation at Indrayanti, Drini, and Sundak Beaches is a crucial factor determining the distribution patterns of gastropods, as both provide shelter, food sources, and influence the diverse substrate characteristics at each beach.

Characteristics of gastropods as organisms with limited mobility also influence their distribution patterns. Gastropods with low mobility are highly dependent on the availability of food resources near their habitats, as they cannot travel far to find food. As a result, gastropods tend to congregate in areas that provide an abundance of algae, detritus, or other microorganisms as their primary nutrient sources.

Gastropods are generally characterized by limited mobility and a tendency to live sedentary lives, characteristics that significantly shape their distribution patterns. Due to their low mobility, gastropods are highly dependent on the availability of food sources in their habitats, as they cannot easily move to areas with better nutrition. Studies consistently show that gastropod populations congregate in locations where food and environmental conditions support resource availability, with gastropod populations declining as distance from nutrient-rich zones and water sources increases, highlighting their dependence on nearby food supplies (Islam et al., 2025). Similarly, gastropods inhabiting fragmented or isolated habitats exhibit density patterns closely linked to local food distribution.

In addition, gastropods encompass a variety of feeding strategies, from herbivores to detritivores, which play an important role in the nutrient cycle within ecosystems where their abundance and diversity are strongly influenced by the availability of food sources (Almeida & Santos, 2020). Overall, these findings emphasize that the low mobility of gastropods critically determines their spatial distribution, with population density and diversity closely related to the presence of suitable food sources and local habitat quality. These conditions reinforce a clumped distribution pattern, as individuals will concentrate in zones with optimal food resources. Clumped distribution also plays a role in resource utilization efficiency and group protection from predators. Thus, gastropod distribution is not only influenced by external factors such as substrate and environment but also by mobility constraints that make them highly dependent on local food availability. This also explains why areas with rocky substrates rich in algae and seagrass become the dominant habitat for gastropods along the southern coast of Gunungkidul.

On the other hand, a uniform distribution pattern can occur when the environment is relatively homogeneous and competition between individuals is intense, causing gastropods to spread out to optimize the use of space and resources. Some species, such as *P. sulcatus, N. signata, S. pauperculata, and P. testudinaria*, are found to have a uniform/even distribution pattern. Although less common in snails, some species can form territories to reduce competition for limited resources (Hausdorf, 2023). In uniform distribution, organisms are spread out in a fairly regular pattern. This is related to strategies for reducing competition or optimizing access to limited resources. When resources are scarce, species may disperse to minimize competition with others. Odum (1993) adds that when food and habitat conditions are uniform across an area, species may disperse randomly. If there is little competition for resources, individuals may occupy space more randomly.

Environmental Factors

Diversity and distribution of gastropods are highly influenced by environmental conditions. Environmental factors are factors that influence the life of organisms in their development process (Table 3).

Table 3. Abiotic and Biotic Parameters

Parameters	Sundak Beach	Drini Beach	Indrayanti Beach
Abiotic			
Temperature (°C)	28 - 30	28 - 31	29 - 31
pH	7	7	7
Salinity (%)	31 - 32	30 -32	30 - 31
Substrate	Sand, dead coral, coral fragments	Coarse sand and dead coral	Coarse sand and coral fragments
Biotic			
Algae	*Sargassum ilicifolium* *Sargassum duplicatum* *Corallina* sp. *Ulva* sp.	*Sargassum polycystum* *Sargassum duplicatum* *Acanthophora spicifera* *Ulva* sp.	*Sargassum polycystum* *Sargassum duplicatum* *Ulva* sp.
Seagrass	*Thalassia hemprichii*	*Thalassia hemprichii*	*Thalassia hemprichii*

Sea water temperature measurements at Sundak Beach ranged from 28–30°C, Drini Beach ranged from 28–31°C, and Indrayanti Beach ranged from 29–31°C. The pH value of the water at all three beach locations is the same, at 7. Salinity levels at Sundak Beach range from 31% to 32%, at Drini Beach from 30% to 32%, and at Indrayanti Beach from 30% to 31%. Water temperature, salinity, and pH strongly affect gastropod physiology, growth, and reproduction; stable thermal and salinity regimes and neutral–slightly alkaline pH favour optimal development and higher local biodiversity (Han et al., 2022; Parker et al., 2013). Temperature is a critical environmental parameter influencing the distribution of certain animal species. Organisms inhabiting the intertidal zone (tidal flats) and regularly exposed to dry conditions have developed high resilience to environmental fluctuations (Han et al., 2019). Akbar et al. (2017) mention that there is an optimal salinity range for the growth of biota for gastropod life, which is around 5-75%. Salinity plays an important role in shaping the diversity and distribution of marine gastropod communities. Gastropod tolerance to salinity varies among species, with some species preferring environments with high salinity and others preferring environments with lower salinity (Rumahlatu & Leiwakabessy, 2017). Arbi et al., (2022) states that pH levels in water are one of the environmental parameters that influence marine life processes. The composition of species in living organism communities requires optimal pH levels. Variations in substrate types such as sand, rock, and mud create differences in fauna composition and community structure.

The substrate at the three coastal locations is similar, consisting of sand, coral fragments, and dead coral. The types of seagrass and algae vary, with *Sargassum*, *Ulva*, and *Thalassia* being commonly found at each study site. These various types of seagrass and algae are important in supporting gastropod diversity, as they provide shelter and food sources. The composition of gastropod communities is determined by various environmental factors, including behavioral patterns, interspecies competition, food availability, substrate characteristics, water temperature, and salinity (Aditya & Nugraha, 2020). The presence and distribution of gastropods are highly dependent on surrounding environmental conditions, including food availability, predation pressure, and competition for survival. Variations in

the adaptive capabilities of individual gastropods to environmental conditions create diversity in their survival strategies and species distribution patterns (Ardiyansyah, 2018). Gastropods obtain nutrients by consuming organic material such as leaf litter and other suspended particles in the water (Hitalessy et al., 2015). As herbivorous organisms, gastropods play a role in the food chain by consuming plant debris found in seagrass habitats, such as algae and other plants that grow on rocky substrates. Habitat conditions such as the presence of seagrass, water quality, and substrate structure can influence the number and variety of gastropods present (Lubis et al., 2023). Odum (1993) adds that interactions between biotic and abiotic factors significantly determine the structure and function of a community within an ecosystem.

CONCLUSION

Gastropod diversity in the South Coast of Gunungkidul, Yogyakarta, is relatively high (H' = 2.63) with a high evenness index and low dominance. The distribution of gastropods in the southern coastal area of Gunungkidul, Yogyakarta, mostly has a clumped distribution pattern. The findings provide scientific insight into gastropod community structure and the environmental factors shaping their abundance. Furthermore, this research contributes essential baseline data for intertidal biodiversity monitoring, strengthens evidence-based coastal management in southern Gunungkidul, and serves as a reference for future conservation-oriented studies.

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