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Diversity and Abundance of Macrobenthic Fauna in Mangrove, Saltmarsh and Tidal Flat Ecosystems of Baththalangunduwa Island, Sri Lanka

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Abstract

Macrobenthos play a significant role in maintaining ecosystem functions. This study investigated the diversity, composition and abundance of macrobenthos in three coastal ecosystems of Baththalangunduwa Island, off Kalpitiya, namely mangrove, saltmarsh and tidal flat. The study was conducted from August to September 2024 in 09 sampling locations representing three ecosystems (03 from each) once a month. Soil samples were collected using a PVC core inserted to 15cm depth along a 10m transect line at 5m intervals (n=18). Faunal species were identified to the lowest possible taxonomic level. A total of 39 species were recorded. The mangrove ecosystem showed the highest abundance (240.41×10³ ind./m³) and species richness (26 species), followed by tidal-flat (100.69×10³ ind./m³; 10 species) and saltmarsh (29.41×10³ ind./m³; 9 species). Jaccard's similarity index was highest (0.14) between mangrove and tidal flat. One-way ANOVA revealed significant differences ($P<0.05$) in abundance among ecosystems. All sites had loamy sand soils. These findings highlighted the ecological importance of different ecosystems in supporting diversity of macrobenthos, where the mangrove ecosystem provides a stable habitat for many varieties.

Key words: Diversity indices, Coastal ecosystems, Ecology, Macrobenthos, Soil texture

1.0 Introduction

Macrobenthos play a prominent role in aquatic ecosystems as primary and secondary consumers and act as a great food source for many predator species especially for large number of commercially important fish species and these macrobenthic organisms can be found in naked eye which are larger than 1mm and those that not pass through 0.5 mm mesh screen (Dahanayaka & Wijeyaratne, 2010; Li et al., 2022; Ma, 2021; Tagliapietra & Sigovini, 2010). According to the location, rather than the size classification, macrobenthic invertebrates can be differentiated by the position they occupy on or in bottom sediments. Animals that live in sediments are known as infauna and almost all worms and bivalves belong to this category. Epifauna are organisms that are living on the surface of bottom sediments such as crabs and gastropods (Tagliapietra & Sigovini, 2010). The factors affecting the distribution of benthic organisms are water temperature, salinity, dissolved oxygen levels, sediment

characteristics, depth, substrate type, food availability, pH, and the presence of pollutants (Martins et al., 2019). Sediment is also important for the abundance of macrobenthic communities. According to Martin et. al 2018 the particle size distribution is one of the essential controls of soil structure and functioning and soil processes, properties and specific features are usually related to these distributions, commonly named soil texture These factors significantly impact the diversity and abundance of benthic organisms in different ecosystems (Snelgrove, 1999; Martins et al., 2019; Martins & Barros, 2022). These benthic creatures are distributed worldwide that can be found in marine, estuarine, and freshwater ecosystems, with notable diversity in continental shelf regions, deep-sea habitats, and Polar Regions. As per the previous records most of the benthic biodiversity is recorded in tropical and temperate marine environments (Ramirez-Llodra et al., 2010; Roberts et al., 2002).

The marine ecosystem surrounding Baththalangunduwa Island, located in the Kalpitiya Lagoon, is experiencing significant ecological and sustainability challenges due to increasing human activities and environmental changes (Abeyrathna et al., 2018; Kodippilige et al., 2017)). As a region closely linked to the Bar Reef Marine Sanctuary, the Island's waters support a diverse range of marine organisms, including macrobenthic communities, which are essential for maintaining ecosystem stability and productivity. Macrobenthos are important as bio-indicators of ecosystem health, but there is a significant lack of scientific research and data on the diversity and abundance of macrobenthic community in the Baththalangunduwa Island. One of the primary challenges in understanding the status of marine ecosystems in Baththalangunduwa is the absence of baseline data on macrobenthic communities and their responses to environmental changes and anthropogenic activities towards them. Habitat destruction, small-scale fishing operations, pollution, sedimentation, environmental stressors, and other anthropogenic activities, can significantly impact macrobenthic diversity, disrupting overall ecosystem stability of the marine environment and potentially causing cascading effects on higher tropic levels. However, the gap in the available data on macrobenthic diversity in this region limits the ability to assess the health and sustainability of its marine ecosystem. This knowledge gap limits the development of effective conservation strategies and sustainable management practices necessary to protect Baththalangunduwa Island's fragile marine ecosystem.

The main objective of this research is to identify macrobenthic species present in three different coastal ecosystems- mangrove, salt marsh and mudflats in Baththalangunduwa Island and to assess the diversity and abundance of macrobenthos across three coastal ecosystems, to compare macrobenthic community

in these three different coastal ecosystems; and to determine the soil texture of those three ecosystems.

2.0 Materials and methods

2.1. Study area and sampling

Baththalangunduwa is a small island located approximately 38 km off the coast of Kalpitiya in the Puttalam District, Sri Lanka (8.508444N, 79.780833E). Surrounded by the Indian Ocean, the island is surrounded by the Indian Ocean and is known for its ecological diversity, including mangroves, saltmarshes, and tidal flats, and serves as a significant hotspot for fisheries activities in the northwestern region (figure 1. Sampling was conducted from August to September 2024 at three randomly selected sites) representing mangrove (Site A -8.499642N, 79.781196E), saltmarsh (Site B- 8.502538N, 79.781664E), and tidal flat ecosystems (Site C- 8.505116N, 79.780347E).

Each site included three sampling points spaced at 5 m intervals along a 10 m transect line. Sediment core samples were collected using a poly vinyl chloride (PVC) core with 5cm diameter and 20cm length, inserted to a depth of 15 cm. A total of 18 soil samples (3 samples per site *3 sites*2 visits) were collected. Sediments were sieved through a 1 mm mesh (with a 0.5 mm sieve underneath), washed with distilled water, and preserved with 100 ml of 10% formalin and rose bengal stain. Containers were labeled with site details. Additional sediment samples were collected for soil texture analysis without chemical preservatives and stored in sealed zip-lock bags. For further analysis, samples were stored at <4°C.

2.2. Laboratory analysis

In the laboratory, samples were rinsed and organisms preserved in 4% formalin. Macrobenthos were sorted and identified to the lowest possible taxonomic level using a stereomicroscope and identification keys from (WoRMS Editorial Board, 2025), (Fernando, 2020); and (Alomari, 2011). Soil texture analysis was done by a jar test method (Soil Science Division Staff, 2017), allowing the separation of sand, silt, and clay after 48 hours of sedimentation. The soil textural triangle was then used to classify the soil types.

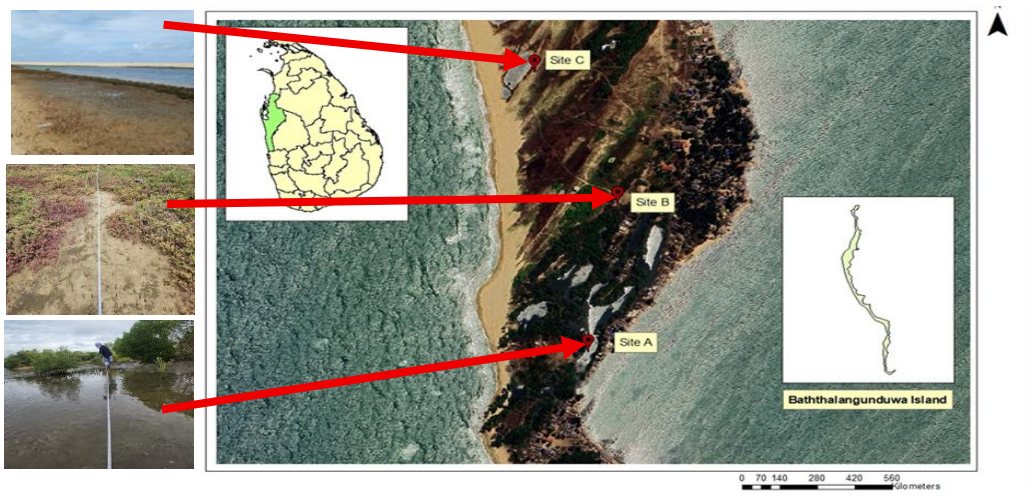


Figure 1. Map of the study area showing the sampling sites

2.3. Data analysis

Species composition, abundance, and diversity indices were analyzed using Microsoft Excel 2010. The number of individuals per taxon was recorded, and color photographs were taken. For the diversity assessment species richness was measured by total species count. Shannon's and Simpson's Diversity indices were used to assess diversity, Shannon's and Simpson's Evenness indices were used to estimate evenness. Jaccard's similarity index was used to evaluate β diversity between sites (Magurran, 2004). Differences in total macrobenthos abundance among mangrove, saltmarsh, and mudflat ecosystems were tested using the Kruskal-Wallis test after the normality test. Total abundance for each replicate sample was calculated as the sum of abundances of all recorded macrobenthic taxa and interpreted in individuals per m^3 (ind./m^3) units. Anthropogenic disturbances were identified through direct field observations and recorded its presence and absence in three ecosystems.

3.0 Results

3.1. Macrobenthic abundance in the study area

A total of 39 species belong to 22 families, 06 classes and 03 phyla were recorded in three study areas (mangroves, saltmarshes and tidal flats) in Baththalangunduwa (table 1). According to table 1, *Tellina* sp is the only species found in all three ecosystems.

Table 1: List of species present in three ecosystems. Site A – mangrove ecosystem, site B – saltmarsh ecosystem and site C – mud flat ecosystem. ●- Species present, × -species absent. UBSp-unidentified bivalve species, UGSp-unidentified gastropod species, UCSp- unidentified crab species, UPSp- unidentified polychaeta species

No	Class	Family	Species	Site A	Site B	Site C
	Bivalvia					
01		Arcidae	*Arcidae sp*	●	×	×
02		Donacidae	*Donax sp*	●	×	×
03		Lucinidae	*Lucina sp*	●	×	×
04		Veneridae	*Marcia opima*	●	×	●
05		Tellinidae	*Tellina sp*	●	●	●
06		Veneridae	*Venuse sp*	×	●	×
07			UBSp 1	●	×	×
08			UBSp 2	●	×	×
09			UBSp 3	×	●	×
10			UBSp 4	×	×	●
	Clitellata					
11		Lumbricidae	*Lumbricus terrestris*	×	●	×
	Gastropoda					
12		Ancillariidae	*Amalda tindalli*	●	×	×
13		Cerithiidae	*Cerithium coralium*	●	×	×
14		Neritidae	*Clithon oualaniense*	●	×	×
15		Ellobiidae	*Ellobium gangeticum*	●	×	×
16		Littorinidae	*Littoraria undulate*	●	×	×
17		Eulimidae	*Melanella sp*	×	×	●
18		Nassariidae	*Nassarius pullus*	●	×	×
19		Nassariidae	*Nassarius sp*	●	×	×
20		Nassariidae	*Nassarius stolatus*	●	×	×
21		Naticidae	*Natica sp*	●	×	●
22		Neritidae	*Nerita sp*	●	×	×
23		Potamididae	*Pirenella cingulate*	●	×	×
24		Potamididae	*Pirenella conica*	●	×	×
25		Pyramidellidae	*Pyramidella sp*	●	×	×

26		Cancellariidae	*Scalptia scalarina*	●	×	×
27		Muricidae	*Semiricinula tissoti*	●	×	×
28		Trochidae	*Umbonium vestiarium*	●	×	●
29			UGSp 1	×	●	×
30			UGSp 2	×	●	×
31			UGSp 3	×	×	●
	Insecta					
32		Staphylinidae	*Bledius sp*	×	●	×
	Malacostraca					
33			*Amphipoda sp*	●	×	×
34			UCSp 1	●	×	×
	Polychaeta					
35		Nereididae	*Nereis sp*	×	×	●
36		Nereididae	*Platynereis sp*	×	×	●
37			UPSp 1	●	●	×
38			UPSp 2	×	●	×
39			UPSp 3	×	×	●

The six classes namely bivalvia, clitellata, gastropoda, insecta, malacostraca, and polychaeta were recorded during the study (Figure 2). Mangrove ecosystem (Site A) exhibited the highest species richness, with a total of 26 species recorded with 16 species of gastropods, 7 species bivalves, 1 species of polychaeta and 2 species of class malacostraca. Out of 26 species *Cerithium coralium* has the highest abundance in site A which is 148.20*10^3 ind./m^3 followed by *Pirenella cingulata* (18.10*10^3 ind./m^3), and bivalves such as *Tellina* sp. (19.23*10^3 ind./m^3).

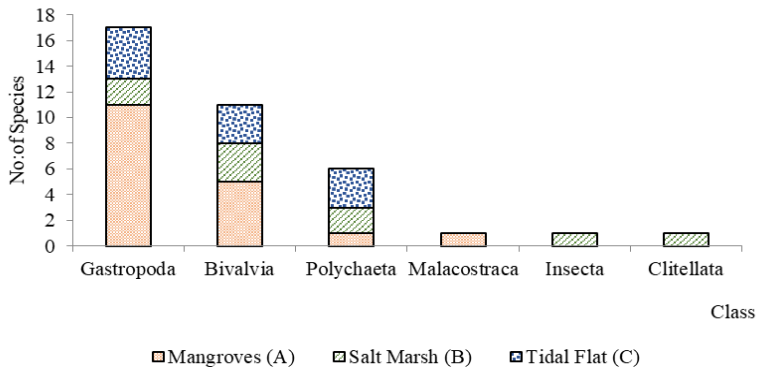


Figure 2. Distribution of species according to the class across four ecosystems

Polychaeta species were recorded in comparatively lower numbers at site A, with an average abundance of 10.18×10^3 ind. m^{-3}. Species richness was 9 at salt marsh ecosystem (site B) and 10 at mudflat ecosystem (site C). At Site B, the community comprised 2 gastropod species, 3 bivalve species, 2 polychaeta species, 1 clitellate species, and 1 insect species. In contrast, Site C contained 4 gastropod species, 3 bivalve species, and 3 polychaeta species (figure 3). Polychaetes were the dominant group at Site C, exhibiting an average abundance of 78.06×10^3 ind. m^{-3}.

The total macrobenthic abundance varies across three coastal ecosystems studied in the Baththalangunduwa Island. The mangrove ecosystem (Site A) exhibited the highest macrobenthic abundance, accounting average abundance of $240.40*10^3$ ind./m^3, followed by tidal flat ecosystem (Site C) with average abundance of $100.69*10^3$ ind./m^3. Lowest macrobenthic abundance was recorded at saltmarsh ecosystem (Site B) which was $29.41*10^3$ ind./m^3 of average macrobenthos abundance (table 2). Total macrobenthos abundance differed significantly among the three ecosystems (Kruskal-Wallis test, $H = 7.20$, $p = 0.027$).

Table 2: Average macrobenthos abundance in each ecosystem in Baththalangunduwa island.

×

Site	Total Abundance (ind./m^3)	Standard Deviation (SD) ±
Mangrove (Site A)	$240.40*10^3$	6.70
Saltmarsh (Site B)	$29.41*10^3$	5.69
Mudflat (Site C)	$100.69*10^3$	6.66

3.2. Macrobenthos diversity in three coastal ecosystems

Table 3 presents the diversity indices describing species heterogeneity across the three ecosystems. Among the study sites, the mangrove ecosystem (Site A) recorded the highest Shannon diversity index ($H' = 1.5731$), followed by the saltmarsh ecosystem (Site B; $H' = 1.4453$) and the mudflat ecosystem (Site C; $H' = 1.1623$). Kruskal-Wallis test shows no statistically significant difference in H' among the three ecosystems ($H = 2.49$, $df = 2$, $p = 0.29$). These results indicate that species diversity and heterogeneity were greatest in the mangrove habitat.

Table 3: Diversity Indices for macrobenthos across three ecosystems.

Biodiversity Indices	Sampling Sites

	Mangrove ecosystem (Site A)	**Saltmarsh ecosystem (Site B)**	**Tidal Flat ecosystem (Site C)**
Species Richness	26	9	10
Shannon's Diversity Index (H')	1.5731	1.4453	1.1623
Simpson's Diversity (1-D)	0.6096	0.3512	0.4996
Shannon's Evenness Index (E)	0.5443	0.6578	0.5048
Simpson's Evenness Index (E_D)	0.1422	0.1712	0.1998

Although the mudflat ecosystem exhibited higher species richness than the saltmarsh ecosystem, it showed a lower Shannon diversity index. This discrepancy can be explained by the comparatively low species evenness in the mudflat habitat, as reflected by its Shannon's evenness value (Site A; E = 0.5443, Site B; E = 0.6578 and Site C; E=0.5048).The dominance of polychaetes, particularly their high abundance relative to other taxa, resulted in an uneven distribution of individuals among species, thereby reducing overall diversity despite the presence of a relatively high number of species. Simpson diversity (1-D) values (site A; = 0.6096, site B; = 0.3512 and site C; = 0.4996) also confirmed the same species heterogeneity pattern.

Table 4: Jacard's similarity Index between ecosystem pairs.

Ecosystem pair	**Jaccard Similarity**
Mangrove and Saltmarsh	0.06
Mangrove and Tidal flat	0.14
Saltmarsh and Tidal flat	0.06

Jacard's similarity index (C_J) between ecosystem pairs is calculated to get an understanding about the β diversity. According to the results presented in table 4, the highest similarity can be seen between mangrove and mudflats (C_J = 0.14), while mangrove-saltmarsh and mudflat-saltmarsh pairs depict similar C_J values. Figure 3 shows the number of common species and unique species in each ecosystem pair.

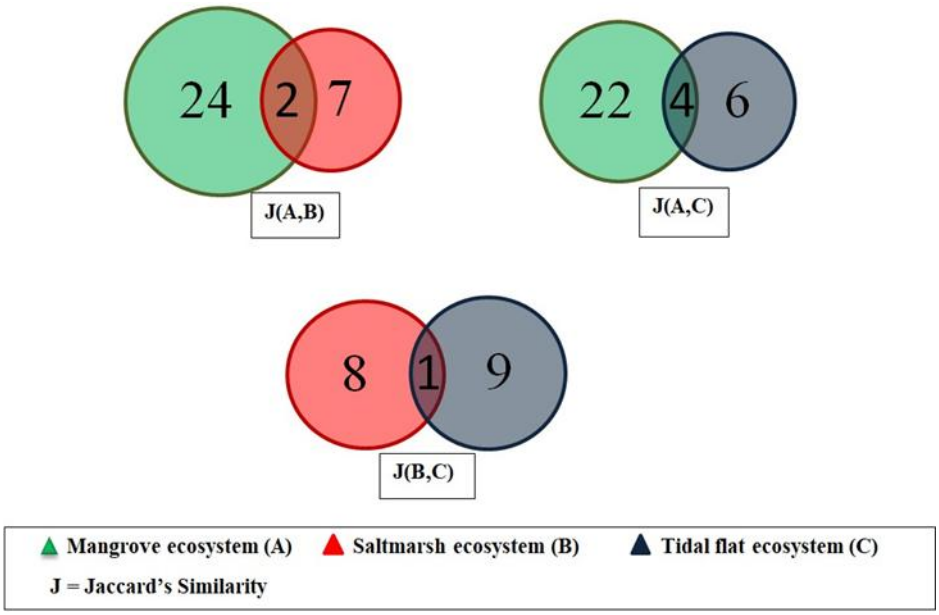


Figure 3: Visual Representation of Species Using Jaccard's Index in pairs across three

3.3. Soil characteristics in study site

According to the soil texture it has been found that soil texture in three ecosystems is similar in sand, silt, and clay compositions. According to the composition the soil type in three ecosystems is loamy sand (table 5). The soil texture analysis indicated that all three ecosystems were classified as loamy sand soils. This consistent texture classification suggests that the sites share similar physical soil characteristics, with coarse-textured soils likely promoting rapid drainage and relatively low water and nutrient retention capacities.

Table 5: Soil texture type according to the three coastal ecosystems.

Site	Soil Texture Percentage			Soil Texture Type
	Sand	Silt	Clay	
Site A	84%	13%	2%	Loamy Sand
Site B	86%	11%	3%	Loamy Sand
Site C	85%	11%	4%	Loamy Sand

3.4. Anthropogenic disturbances in study sites

Anthropogenic activities observed during the study period across three ecosystems are presented in table 6. The mangrove ecosystem exhibited all activities, including

debris accumulation, tourism, fishing (fishing practices, fishing boats parking, and dumping fish waste), and land use activities such as constructions, housings, indicating strong human pressure and habitat disturbances. The saltmarsh ecosystem experienced disturbances such as debris accumulation, tourism and high land use influence (such as local residences, sewage water lines and small constructions) but no fishing activities. The tidal flat ecosystem displayed minimal human impact.

Table 6: Presence of human disturbances in three ecosystems. ● – Presence, × - Absence

Sampling Site	Anthropogenic Activities			
	Debris	**Tourism activities**	**Fishing activities**	**Land use Activities**
Mangrove	●	●	●	●
Saltmarsh	●	●	×	●
Tidal flat	●	×	×	●

4. Discussion and Conclusion

The present study provides one of the few comprehensive assessments of macrobenthic communities across multiple coastal ecosystem types in Baththalangunduwa Island, Sri Lanka, and demonstrates that habitat heterogeneity plays a major role in structuring macrobenthic abundance, diversity, and community composition. A total of 39 species representing three phyla, six classes, and 22 families were recorded. Species composition differed significantly among mangrove, saltmarsh and tidal flat, highlighting the influence of sediment characteristics, salinity fluctuations, organic matter availability, and anthropogenic disturbances on benthic community structure. The mangrove ecosystem exhibited the highest species richness and abundance, confirming the widely recognized role of mangrove habitats as biodiversity hotspots. Mangrove sediments are characterized by high organic matter content, complex root systems, and relatively stable substrates that provide feeding grounds, refuge from predation, breeding sites, and nursery habitats for numerous benthic organisms. Similar observations have been reported from coastal ecosystems in Kalpitiya, where diverse macrobenthic assemblages were associated with mangrove habitats (Herath et al., 2023). The present findings also align with broader ecological studies demonstrating that mangrove ecosystems support higher macrobenthic diversity than adjacent coastal habitats because of enhanced nutrient availability and habitat complexity (Kumar et al., 2014). Therefore, the elevated abundance observed in Baththalangunduwa mangroves is likely a consequence of both increased resource availability and greater environmental stability. Compared with previous Sri Lankan studies, Baththalangunduwa appears to support substantially higher macrobenthic diversity. For example, Niroshana and Terney

(2013) recorded only 10-14 species from three southern coastal locations, while Hettige et al. (2022) reported 12 genera from Mundel Lagoon, comprising mainly gastropods, bivalves, crustaceans, and polychaetes. Similarly, Hettige et al. (2024) documented 21 species from the Panadura Estuary. The greater species richness recorded in the present study may reflect the coexistence of multiple interconnected coastal habitats within Baththalangunduwa, allowing species with different ecological requirements to occupy distinct ecological niches. The inclusion of both relatively undisturbed habitats and anthropogenically affected environments may also have contributed to the higher overall diversity observed.

Gastropods dominated the macrobenthic assemblage throughout all three ecosystems, supporting findings from previous investigations in Sri Lanka and elsewhere. Hettige et al. (2022), Hettige et al. (2024), and Herath et al. (2023) similarly identified gastropods as the most abundant taxonomic group in coastal and lagoon ecosystems. The dominance of gastropods can be attributed to several ecological characteristics. Gastropods possess broad environmental tolerance, allowing them to survive under varying salinity regimes, sediment conditions, and oxygen concentrations (Amarasinghe et al., 2021; Aldea et al., 2014; Bros et al., 2016; Dewiyanti & Sofyatuddin, 2012). Furthermore, their highly diverse feeding strategies, ranging from herbivory and detritivory to scavenging and predation, enable them to exploit a wide variety of food resources (Srivastava & Singh, 2021). Such ecological flexibility allows gastropods to maintain populations in both relatively pristine and disturbed habitats, explaining their widespread occurrence across all sampling sites.

Polychaetes, particularly members of the family Nereididae, showed strong habitat specificity and were especially abundant in the tidal-flat ecosystem. The dominance of *Nereis* spp. suggests that tidal-flat sediments provide favorable conditions for polychaete establishment, including regular tidal inundation, oxygenated sediment layers, and abundant detrital resources. Polychaetes are among the most diverse and ecologically significant benthic groups and are frequently used as bioindicators because of their rapid response to environmental changes (Alomari, 2011; Hutchings, 1998). The abundance of nereidids in Site C may therefore indicate relatively productive sedimentary conditions and active nutrient cycling processes. Their presence is particularly significant because members of this family contribute substantially to bioturbation, organic matter decomposition, and energy transfer within benthic food webs.

The occurrence of *Tellina* spp. across all three ecosystems indicates broad ecological adaptability. Bivalves are highly effective filter feeders and play important ecological roles in improving water quality and nutrient cycling. Their distribution across different habitats suggests that environmental conditions within Baththalangunduwa

remain suitable for sustaining populations despite varying levels of disturbance. Similarly, the occurrence of mangrove-associated crabs in Site A further highlights the ecological integrity of mangrove habitats. Crabs function as ecosystem engineers through burrowing activities that modify sediment structure, enhance nutrient mineralization, and influence benthic productivity (Kristensen, 2008; Ngo-Massou et al., 2018; Theuerkauff et al., 2018).

Statistical analyses further support the ecological distinctiveness of the three ecosystems. The significant Kruskal Wallis test result ($p = 0.027$) confirms that macrobenthic abundance varied among habitats, reflecting the combined effects of sediment structure, nutrient availability, salinity, hydrodynamics, and human disturbance. The low Jaccard similarity values observed among sites indicate considerable habitat specialization and limited overlap in species composition. Such spatial heterogeneity emphasizes the importance of conserving multiple habitat types rather than focusing on a single ecosystem, as each contributes uniquely to regional biodiversity.

Overall, the results demonstrate that Baththalangunduwa Island supports a diverse and ecologically complex macrobenthic community shaped by both natural environmental gradients and anthropogenic influences. The coexistence of highly productive mangrove habitats, ecologically important tidal flats, and saltmarsh environments creates a mosaic of habitats that collectively sustain regional biodiversity and ecosystem functioning. From a conservation perspective, the study highlights mangrove ecosystems as critical biodiversity reservoirs and demonstrates that ongoing anthropogenic pressures, particularly waste disposal and habitat degradation, have the potential to alter macrobenthic community composition. Although the disturbed ecosystem retained considerable diversity, this pattern likely reflects ecological adaptation rather than environmental health. Therefore, conservation strategies should prioritize pollution control, habitat restoration, community awareness programs, and long-term ecological monitoring. Protecting the interconnected coastal ecosystems of Baththalangunduwa will be essential for maintaining biodiversity, supporting ecosystem services, and ensuring the long-term sustainability of this ecologically significant island system.

References

Abele, D., Brey, T., Philipp, E., 2009. Bivalve models of aging and the determination of molluscan lifespans. *Exp. Gerontol.* 44(5), 307–315. https://doi.org/10.1016/j.exger.2009.02.012

Abeyrathna, A.W.G.N.M., Senewirathna, G.S.D., Thennakoon, T.M.S.P.K., 2018. A livelihood analysis of the fishing community in Baththalangunduwa Island of Kalpitiya, Sri Lanka. *Proc. 5th Int. Conf. Multidiscip. Approaches (iCMA)*, University of Sri

Jayewardenepura. https://graduate.sjp.ac.lk/icma/wp-content/uploads/2019/08/page85_out.pdf

Aldea, K., Morales, M. I., & Masagca, J. (2014, September). Coastal marine ecosystems and biodiversity of the Kuroshio Region: Intertidal and mangrove associated gastropods in Catanduanes Island, Philippines. Paper presented at the 8th International Symposium on Kuroshio Science, Kochi University, Kochi Prefecture, Japan

Alomari, N., (2011). *Guide to Polychaetes Annelida in Qatar Marine Sediments*. Environmental Studies Center, Qatar University, Doha, Qatar. ISBN: 99921-786-1-2.

Amarasinghe, A.A.T.N., Eswaramohan, T., Gnaneswaran, R., 2021. Gastropods diversity in Thondaimanaru Lagoon (Class: Gastropoda), Northern Province, Sri Lanka. *J. Geosci. Environ. Prot.* 9(3), 1–8. https://doi.org/10.4236/gep.2021.93002

Bros, V., Torre, I., & Santos, X. (2016). Uncovering the environmental factors that influence diversity patterns of Mediterranean terrestrial gastropod communities: A useful tool for conservation. *Ecological Research*, 31(1), 39–47. https://doi.org/10.1007/s11284-015-1310-2

Dahanayaka, D.D.G.L. & Wijeyaratne, M.J.S., 2010. Diversity of macrobenthic community in the Negombo estuary, Sri Lanka with special reference to environmental conditions. *Sri Lanka Journal of Aquatic Sciences*, 11. Available at: https://doi.org/10.4038/sljas.v11i0.2222

Dewiyanti, I., & Sofyatuddin, K. (2012). Diversity of gastropods and bivalves in mangrove ecosystem rehabilitation areas in Aceh Besar and Banda Aceh districts, Indonesia. AACL *Bioflux*, 5(2).

Fernando, M., 2018. Mangrove and mangrove associated snails and clams in Sri Lanka. *Pp.*, 28(4).

Fernando, M., 2020. Sri Lanka Gastropods. *The Malik Fernando Collections*, 15 June. Available at: https://docmalikfern.com/sri-lanka-gastropods/

Herath, K., Suresh, A., Amarasekara, K., & Yapa, N. (2023). Community structure and composition of macrobenthic fauna in the coastal ecosystems of Kalpitiya, Sri Lanka [Unpublished thesis, Ocean University of Sri Lanka].

Hettige, N., Jayawardhane, P. & Weerasekara, S., 2022. Diversity of the macrobenthic assemblage in Mundal Lagoon, Sri Lanka, Paper presented at the 9th Ruhuna International Science & Technology Conference University of Ruhuna, Sri Lanka

Hettige, N. & Wickramaarachchi, N., 2022. Diversity and composition of benthic macroinvertebrates in Puttalam Lagoon, Sri Lanka, Proceedings of the 26th International Forestry and Environment Symposium 2022 of the Department of Forestry and Environmental Science, University of Sri Jayewardenepura, Sri Lanka

Hutchings, P., 1998. Biodiversity and functioning of polychaetes in benthic sediments. *Biodivers. Conserv.* 7(9), 1133–1145.

Kodippilige, N.P., Katupotha, J. & Fernando, T.S., 2017. Coastal processes and causes of shoreline erosion and accretion of the Baththalangunduwa Island in Sri Lanka. *ResearchGate*, October. https://www.researchgate.net/publication/322926219

Kristensen, E. (2008). Mangrove crabs as ecosystem engineers: With emphasis on sediment processes. *Journal of Sea Research*, 59(1), 30–43. https://doi.org/10.1016/j.seares.2007.05.004

Kumar, J., Kumar, V., Rajanna, K. B., & Naik, K. A. S. (2014). Ecological benefits of mangrove. *Life Sciences Leaflets*, 48, 85–88.

Li, L., Li, G., Du, J., Wu, J., Cui, L. & Chen, Y., 2022. Effects of tidal flat reclamation on the stability of coastal wetland ecosystem services: A case study in Jiangsu Coast, China. *Ecological Indicators*, 145, 109697. https://doi.org/10.1016/j.ecolind.2022.109697

Ma, Y., 2021. Overview of benthos. *Journal of Fisheries Research*, 5(4). https://www.alliedacademies.org/abstract/overview-of-benthos-18096.html

Magurran, A.E. (2004), *Measuring Biological Diversity*, Blackwell Publishing, Oxford.

Martins, A.D. & Barros, F., 2022. Ecological Functions of Polychaetes Along Estuarine Gradients. *Frontiers in Marine Science*, 9. https://doi.org/10.3389/fmars.2022.780318

Martins, M.V.A., Yamashita, C., Sousa, S.H.M., Koutsoukos, E.A.M., Disaró, S.T., Debenay, J.-P. & Duleba, W., 2019. Response of Benthic Foraminifera to Environmental Variability: Importance of Benthic Foraminifera in Monitoring Studies. In: *Monitoring of Marine Pollution*. IntechOpen. https://doi.org/10.5772/intechopen.81658

Ngo-Massou, V. M., Din, N., Kenne, M., & Dongmo, A. B. (2018). Brachyuran crab diversity and abundance patterns in the mangroves of Cameroon. *Regional Studies in Marine Science*, 24, 324–335. https://doi.org/10.1016/j.rsma.2018.09.010

Niroshana, K. H. H., & Terney, P. K. P. B. (2013). Composition and diversity of the macrobenthic community in Unawatuna, Ahangama and Madiha, southern coast of Sri Lanka. *MEBIN*. http://mebin.nara.ac.lk/documents/679

Ramirez-Llodra, E., Brandt, A., Danovaro, R., De Mol, B., Escobar, E., German, C.R., Levin, L.A., Martinez Arbizu, P., Menot, L., Buhl-Mortensen, P., Narayanaswamy, B.E., Smith, C.R., Tittensor, D.P., Tyler, P.A., Vanreusel, A. & Vecchione, M., 2010. Deep, diverse and definitely different: Unique attributes of the world's largest ecosystem. *Biogeo sciences*, 7(9), pp.2851–2899. https://doi.org/10.5194/bg-7-2851-2010

Roberts, C.M., McClean, C.J., Veron, J.E.N., Hawkins, J.P., Allen, G.R., McAllister, D.E., Mittermeier, C.G., Schueler, F.W., Spalding, M., Wells, F., Vynne, C. & Werner, T.B., 2002. Marine biodiversity hotspots and conservation priorities for tropical reefs. *Science*, 295(5558), pp.1280–1284. https://doi.org/10.1126/science.1067728

Snelgrove, P.V.R., 1999. Getting to the Bottom of Marine Biodiversity: Sedimentary Habitats: Ocean bottoms are the most widespread habitat on Earth and support high biodiversity and key ecosystem services. *Bio Science*, 49(2), pp.129–138. https://doi.org/10.2307/1313538

Srivastava, A. K., & Singh, V. K. (2021). Feeding behaviours in gastropod molluscs. *Journal of Cell & Molecular Biology*, 5(1), 100013.

Tagliapietra, D. & Sigovini, M., 2010. Benthic fauna: Collection and identification of macrobenthic invertebrates. *Terre et Environnement*, 88, pp.253–261.

Theuerkauff, D., Rivera-Ingraham, G. A., Roques, J. A. C., Azzopardi, L., Bertini, M., Lejeune, M., Farcy, E., Lignot, J.-H., & Sucré, E. (2018). Salinity variation in a mangrove ecosystem: A physiological investigation to assess potential consequences of salinity disturbances on mangrove crabs. *Zoological Studies*, 57, Article 36. https://doi.org/10.6620/ZS.2018.57-36

WoRMS Editorial Board (2026). World Register of Marine Species. Available from https://www.marinespecies.org at VLIZ. Accessed 2024-09-10. https://doi.org/10.14284/170