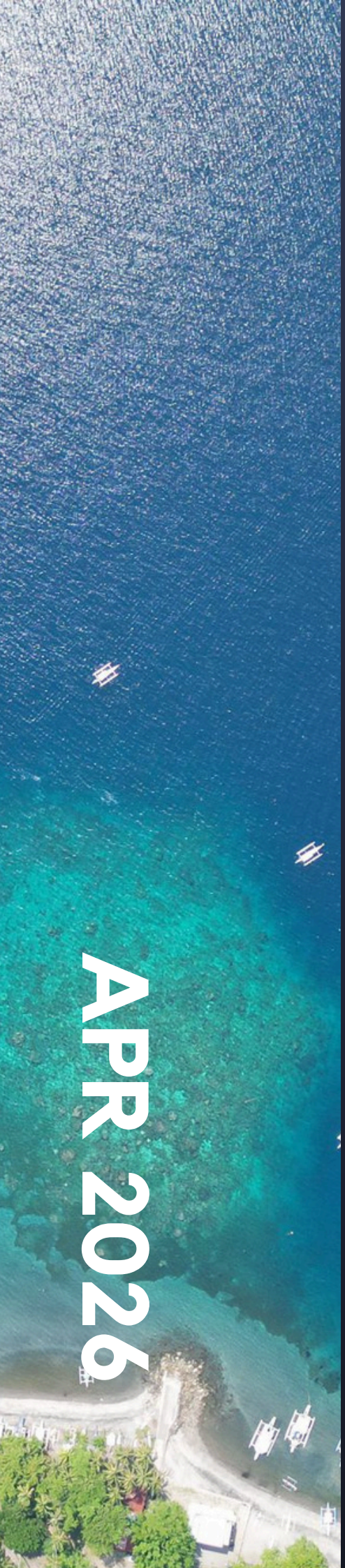


Marine Conservation Philippines

Semiannual Report

ZAMBOANGUITA

APR 2026

marineconservationphilippines.org

EXECUTIVE SUMMARY

Marine Conservation Philippines Report Zamboanguita - September - February 2026

Marine Conservation Philippines (MCP) conducted a total of **1,728 surveys** across four survey methodologies (Fish, Substrate, Invertebrates, and Predation) across the three municipalities we monitor (Zamboanguita, Siaton and Santa Catalina) between September 2025 and Februrary 2026. With **808 surveys** conducted in the September - November 2025 season, and **920 surveys** conducted in the December - February season.

	Fish	Substrate	Invertebrates	Predation
Number of Surveys	412	472	419	435

The chart below shows the average fish biomass for the latest survey season for the nine sites monitored in Zamboanguita Municipality, focusing on the density and average size of fish in each of the reefs. Given our focus on food security, we have specifically selected fish families of commercial interest for analysis. **The average commercial biomass for Zamboanguita was ~9.36kg per 150m^2** (Figure 1).

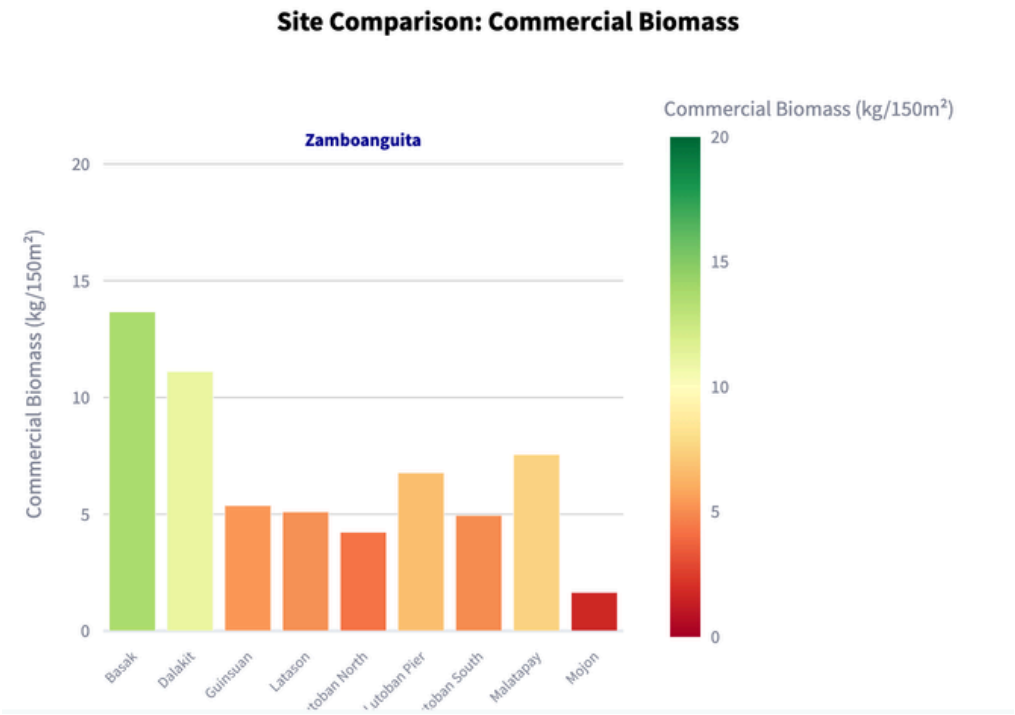


Figure 1. Commercial fish biomass (kg per 150m^2) across all survey sites in the Zamboanguita Municipality, September–February 202/265. Biomass values represent the estimated weight of commercially important reef fish, providing an indicator of food security potential and MPA effectiveness.

Hard coral cover is an excellent indicator of the overall health of a coral reef, as it is this type of coral that builds the long-term physical structure of the reef. The average hard coral cover for Zamboanguita was 21.9% compared to 37% in 2017 when monitoring began (Figure 2). Interestingly, the highest coral cover was recorded at Lutoban Pier, a non-MPA, at ~32.8%.

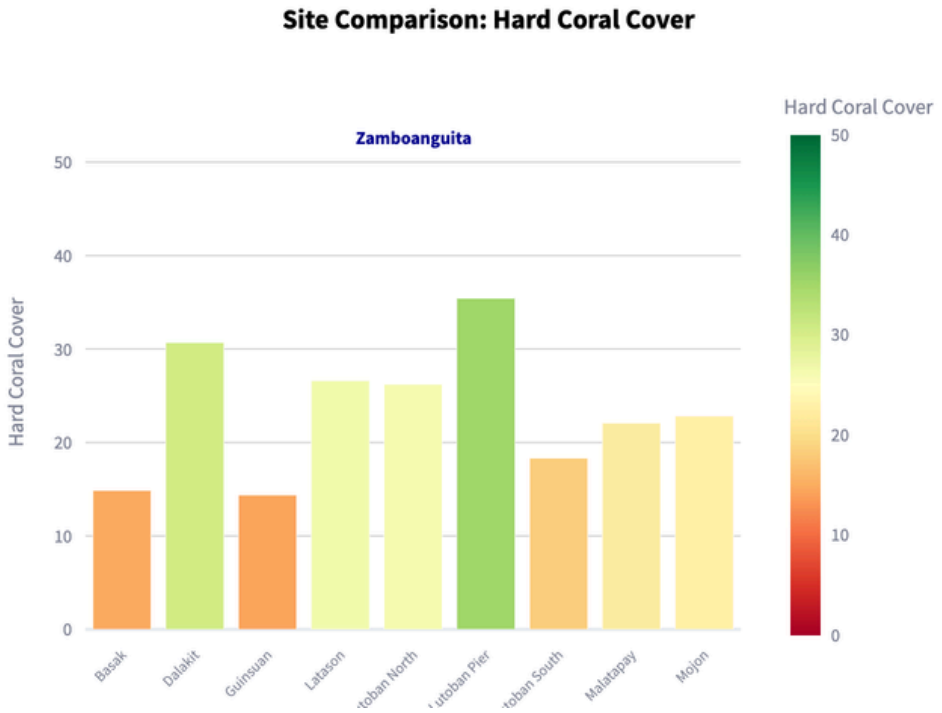


Figure 2. Average hard coral cover across survey sites in the Zamboanugita Municipality September–February 2025/26 Data is expressed as average percentage cover.

Of the hard coral present, 99% was recorded as healthy, with approximately 1% observed to be affected by bleaching. Predation and silt were present, but only in small amounts. Globally, ocean temperatures are rising in response to human-caused climate change, and incidences of bleaching are becoming increasingly widespread and severe. However, it is interesting to note that the waters off the eastern and southern coasts of Southern Negros can be as much as 1 degree Celsius cooler than the waters of the Sulu Sea to the west, which does afford the area some natural protection against bleaching events. Events of bleaching in the municipality have gradually reduced since 2022, when 18% of hard corals were recorded as bleaching.

1728

Surveys completed

1.05% Increase

21.9%

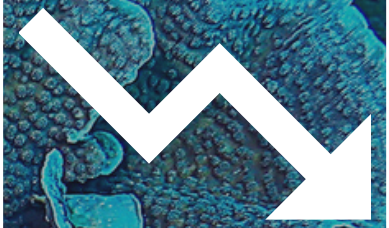
Hard Coral cover

5.51% Increase

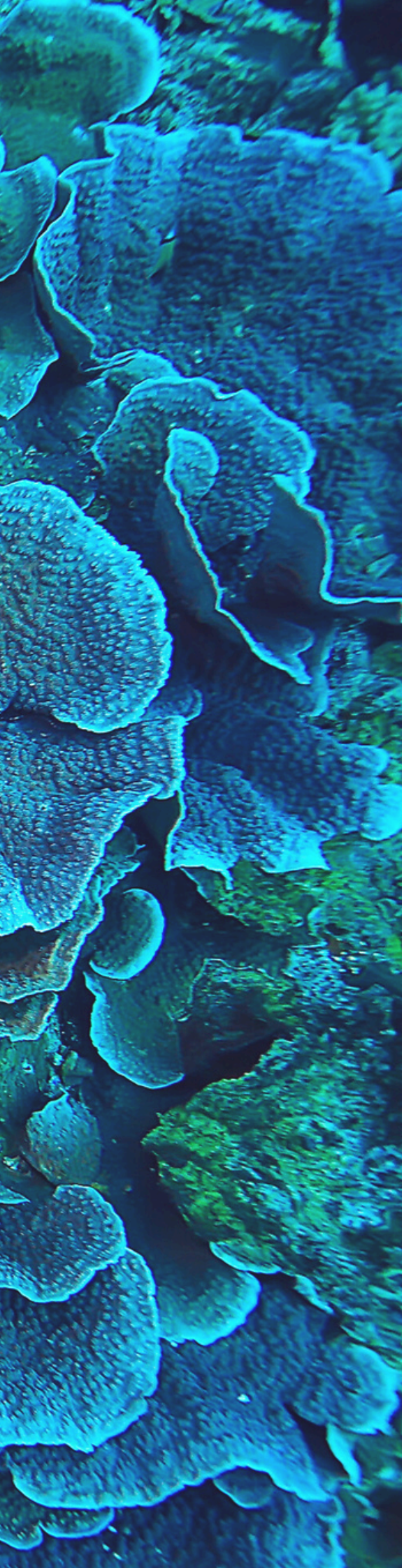
9.36 kg

Commercial Biomass

13.77% Decrease



"Using science to understand how local and global pressures affect marine ecosystems, we empower, engage, and build local and national capacity to reduce and adapt to these pressures, aiming for a sustainable future for the Philippine people and environment."



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Monitoring and Science at MCP

The Philippines, situated in the heart of the Coral Triangle, boasts the highest number of Marine Protected Areas (MPAs) of any country in the world, with approximately 1,600-1,800 protected areas. Some of these, such as Tubbataha Reef, are managed at a national level under the NIPAS program and have been implemented to protect and enhance biodiversity. However, the majority are much smaller in scale and managed in combination by the LGU and local community. These MPAs have been created to promote food security and sustainability for the local community. The 1998 Fisheries Code legislation calls for 15% of coastal municipal waters to be protected within no-take MPAs.

Despite the encouraging number of MPAs in the Philippines, they need to be managed effectively if they are to succeed in their goal of enhancing food security. Three things are of fundamental importance to effective management.

- Engagement with, and support from, the local community
- Effective demarcation of the boundaries of the MPA
- Consistent and sustained support from the LGU to patrol and enforce the MPA.

Through a volunteer-based scientific diving program, Marine Conservation Philippines focuses on collecting and analysing biophysical data on the effectiveness & resilience of locally managed MPAs, and offers support to local and regional management units.

MCP's expertise is directed towards using abundance of commercial biomass and MPA effectiveness as the primary indicators of progress in assuring long-term food security. Substrate composition and resilience are considered indirect indicators, being essential for maintaining the commercial productivity of the ecosystem.



MCP's ecological monitoring program has been developed to provide a broad understanding of the regional health and abundance within the reef ecosystems. Its well refined scope of data collection across all MPA sites, through all depth levels, ensures high coverage and accurate data input, with transparency and data quality remaining constant priorities.

Commercial fish & invertebrates diversity, abundance, and fluctuations as well as substrate lifeforms composition & resilience in the MPAs, are being monitored on a seasonal basis. By collecting the same representative dataset per season, change can be tracked, giving a much more detailed picture of change in the MPA over time. Seasons have been defined following PAGASA's (Philippines Atmospheric, Geophysical and Astronomical Services Administration) local recommendation ([December, January, February]; [March, April, May]; [June, July, August]; [September, October, November]).

The monitoring method employed uses 30m transects in a stratified random sampling strategy that recognises three depth ranges (3-7m, 9-13m, 15-19m). The depth ranges selected were chosen based on the spatial distribution of indicator life forms and the difference in indicator densities at different depths.

To collect a dataset representative of the ecosystem, it was necessary to identify these spatial differences and account for them to avoid bias. By observing each depth range and treating the results as an ecologically representative set, it is possible to generate an accurate model of the entire reef structure and community, determine its relative health, and track changes in the ecosystem over time.

The challenge in collecting an ecologically representative dataset lies in conducting a sufficient number of replicates to ensure that all present life forms are accounted for. For each of our sites, monitoring is therefore conducted across the 3 depth ranges and repeated a calculated number of times to ensure high validity. At least 12 replicates were conducted per site, per season and for each ecological indicator group (invertebrates, substrate and fish) to accurately represent the ecosystems of interest. These replicates were used to create 1 representative average of the ecosystem per site and season.

MONITORING SITES

Zamboanguita Municipality

MCP has been conducting its Long Term Monitoring Program since 2017, though monitoring at some sites started later. The complete list of survey sites, along with some key details can be found below.

Site Name	Status	Size (hectares)	Established	Monitored Since
Basak Can Unsang South	MPA	9.1	2006	2017
Dalakit Poblacion	MPA	10.1	2014	2019
Guinsuan	MPA	5.6	2022	2017
Latason	MPA	1.9	2022	2022
Lutoban Gac-Ang	MPA	15.1	2000	2019
Lutoban Pier	Non-MPA	-	-	2017
Maluay Malatapay	MPA	1.6	2022	2017
Mojon	MPA	2.11	2024	2025

ZAMBOANGUITA
Community Projects

Marine Conservation Philippines is pleased to continue our work for and with the local community. The following is a summary of the community projects we have undertaken in the last report period of September 2025 - February 2026

- **International Coastal Clean-Up Day**

For International Coastal Clean-Up Day 2025, beach and dive cleans were conducted in Salag and Andulay, alongside Pro Ocean, Siaton Fisher Folk Association, members of the LGU and the local community, collecting 89 kgs of waste.

- **SCUBA Training**

Continuing our work in training members of LGU departments across Negros, in October, we hosted 22 people from BATASS, training them in a mixture of Open Water and Advanced Open Water.

- **Monitoring Dashboard**

Our new dashboard is now live on our website, giving communities instant access to the current and historical data for each MPA.

- **Dumaguete Youth Congress**

In December, MCP was invited to speak at the Youth Congress - Building a future for good Governance.

- **Immersion Program**

Ten science students from Basay National High School joined us for a 2-day immersion program in December. Taking part in presentations, fisher folk forums, seaweed surveying and a discovery dive.

- **White Gifts**

In 2025 we held a White Gift event in Olympia to help local communities that suffered due to the untreated molasses spill in Bias. We also held a White Gift event in Lutoban and Siaton.

- **Mangrove Planting**

Togther with MENRO, Tourism officers and DNER we planted 200 mangrove seedlings at the Santa Catalina Mangrove Boardwalk.

Food Security

Biomass of Commercial species

One fundamental measure of an MPA's success is the amount of fish biomass it produces. If there is higher fish biomass inside of an MPA, then there will be more fish available for the community to harvest outside of the MPA. This is known as the '**spillover effect**', and is one of the main ways in which an MPA can promote food security.

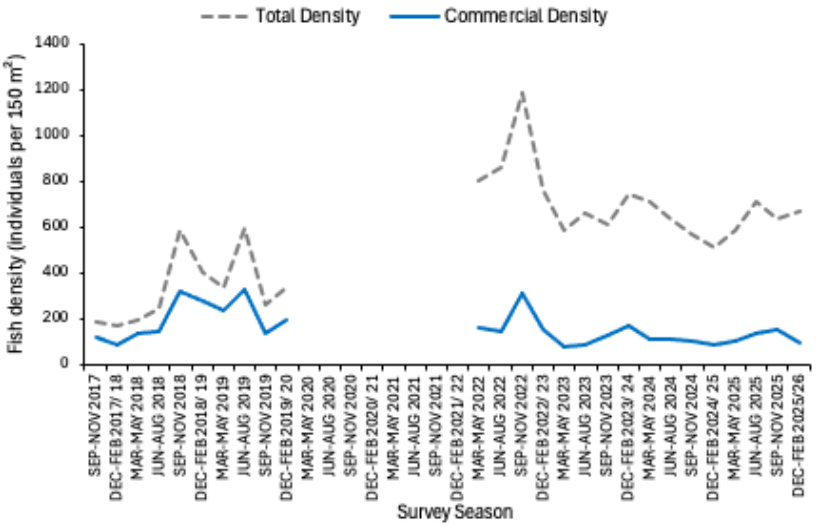


Figure 3. Temporal trends in total fish density and commercial fish density across Zamboanguita Municipality from (2017-2026). Values represent average individuals per 150 m^2 recorded during seasonal surveys.

Current Status:

In Sep–February 2025/26, Zamboanguita's MPAs recorded an **average total fish density of ~655 individuals per 150m^2,** with **commercial species contributing ~122 individuals** per 150m^2 (Figure 3). We consider this data separately as we monitor some non-commercial fish that are often occur in high numbers (particularly Damselfish), this would misrepresent the data if they were combined together. The average fish density of the reefs in this municipality has remained relatively consistent, with some small seasonal peaks. Damsel fish were added to the indicator list after the COVID-19 gap, causing the large jump in total density.

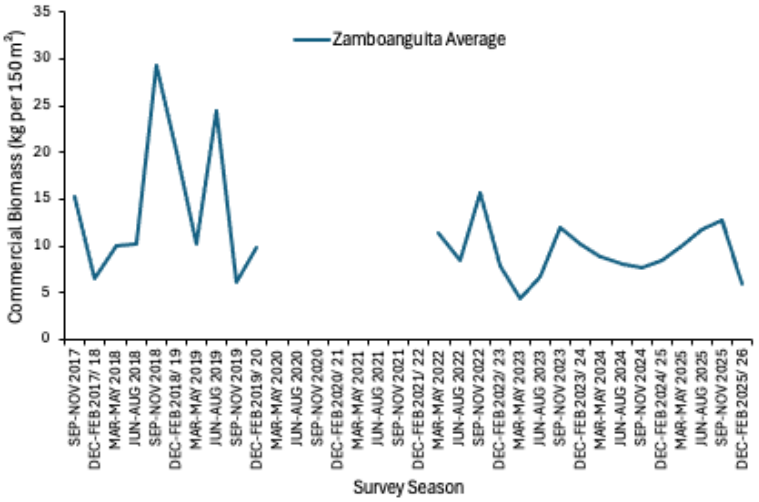


Figure 4. Temporal trends in commercial fish biomass (kg per 150m^2) across the Zamboanguita Municipality, (2017-2026). Biomass values represent the estimated weight of commercially important reef fish, providing an indicator of food security potential and MPA effectiveness. Data gaps (2020–2022) reflect periods when surveys were suspended due to COVID-19.

Commercial biomass was ~9.36 kg per 150m² (~720 kg/ha) (Figure 4), indicating a moderate level of commercially important fish biomass across the municipality.

Herbivores were the dominant trophic group (~541 individuals), followed by carnivores (~80 individuals), whole omnivores (~12 ind.), corallivores (~10 ind.), and detritivores (~11 ind.) were present in smaller numbers. This indicates that the fish community across Zamboanguita reefs is strongly dominated by herbivorous fish, with relatively lower numbers of higher trophic level predatory fish. Overall, Zamboanguita reefs support moderate to high fish density and moderate commercial biomass, with herbivores forming the majority of the fish community.

The high intra-annual variation is likely due to the seasonal appearance of fish visiting the area to feed or breed. Breeding aggregations have been observed in some sites. Commercial biomass in Zamboanguita has been highly variable, with strong pre-COVID peaks that have not yet been replicated in recent years. Current values suggest partial recovery but remain well below earlier highs, reflecting the ongoing vulnerability of commercial fish populations to fishing pressure and the slow recovery of larger-bodied taxa.

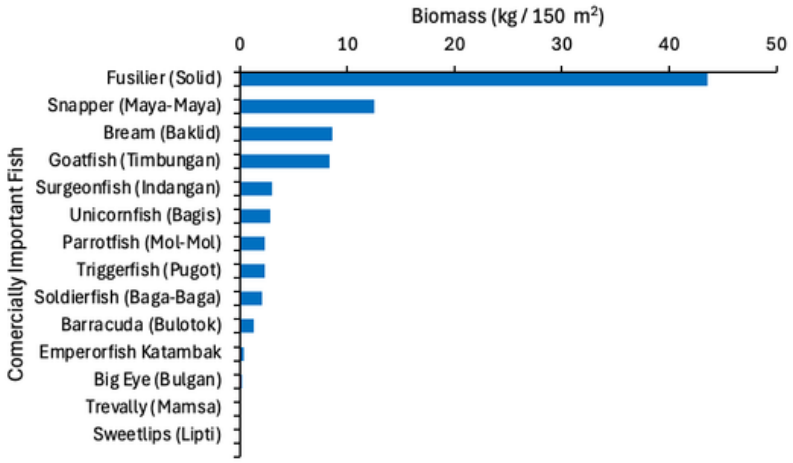


Figure 5. Biomass (kg per 150 m²) of commercially important reef fish groups in Zamboangutia Municipality, averaged across MPAs during September–February 2025/26. The values represent the average (mean) biomass observed on each survey, highlighting variation in key target families that contribute to local fisheries, food security, and ecosystem resilience.

Commercial Groups:

The commercial fish community across Zamboanguita is strongly dominated by fusiliers, which contribute the largest proportion of commercial density and biomass (Figure 5). Snappers are the second most important commercial group, followed by bream and goatfish. Other commercial species contribute relatively small proportions to overall biomass. The dominance of fusiliers indicates that much of the commercial biomass is driven by schooling mid-water species, while the presence of snappers, groupers, trevally, and barracuda indicates that some high-value predatory fish are present but in relativley low abundance. This suggests that while the reefs support commercially important species, large predatory fish are still relatively limited across the municipality.

Recent change:
Compared with the last reporting season, total fish density remained relatively stable (646 → 655 individuals). Commercial density increased slightly (117 → 122 individuals), while commercial biomass decreased (10.85 → 9.36 kg), suggesting that although more commercial fish were present, they were likely smaller in size. Herbivore density increased slightly (502 → 541 individuals), while carnivore density decreased slightly (90 → 80 individuals), and other trophic groups remained relatively stable. These results suggest that fish abundance across the municipality is relatively stable, but commercial biomass may fluctuate due to the size or abundance of commercially important fish species.

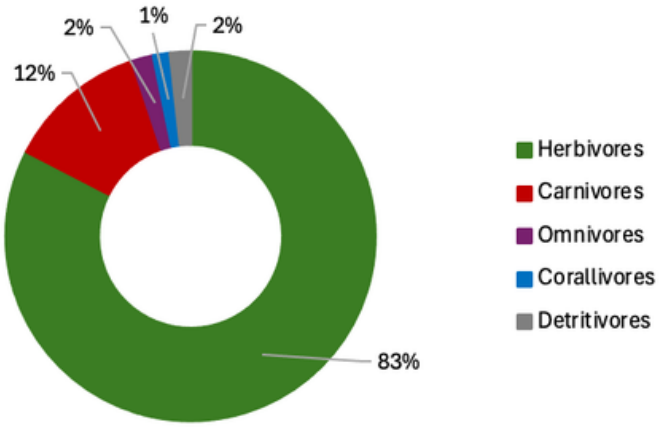


Figure 6. Proportional contribution (%) of dietary groups to total fish density for the Zamboanguita Municipality during Sep–Feb 2025/26. Data include both commercial and non-commercial species, highlighting the ecological importance of abundant herbivores in supporting algal–coral balance.

Dietary structure:
The fish community across Zamboanguita is dominated by herbivores, which make up ~83% of total fish density, followed by carnivores at ~12%, while omnivores, corallivores, and detritivores together make up the remaining ~5% (Figure 6). This trophic structure indicates that grazing is the dominant ecological function across the municipality's reefs. High herbivore abundance is generally associated with healthier reef systems, as herbivore abundance is generally associated with healthier reef systems, as herbivores help control algal growth and allow corals to grow and recruit. However, the relatively low proportion of carnivores suggests that predatory fish populations are still relatively low compared to herbivores, which may reflect fishing pressure on larger predatory fish species.

Long-term context:
Long-term data from Zamboanguita show a clear increase in fish density over time. Zamboanguita's fish communities have shown high variability since monitoring resumed following the COVID-19 pandemic. Commercial biomass has fluctuated over time but has generally remained moderate, with some higher biomass periods (e.g. 2018-2019 and 2025). Overall, the long-term trends suggest that fish abundance across Zamboanguita has increased over time, likely reflecting the positive effects of marine protected areas and fishing management. However, increases in commercial biomass have been slower and more variable than increases in total fish density, suggesting that recovery of large commercially important fish species takes longer than an increase in overall fish abundance.

Ecological interpretation:
The reefs of Zamboanguita support moderate to high fish density, moderate commercial biomass, and a fish community strongly dominated by herbivores. The long-term increase in fish density suggests that marine protected areas in the municipality are having a positive effect on fish abundance, particularly herbivorous fish, which play an important role in maintaining reef health and resilience. However, the relatively moderate commercial biomass and low abundance of large predatory fish suggest that recovery of large commercially valuable species is still ongoing. Differences between sites indicate that some MPAs (such as Basak, Guinsuan, and Malaapay) are more effective in supporting commercial biomass and predatory fish, while others (such as Laason and Mojon) are dominated by herbivorous and smaller fish.

Overall, the data suggests that MPAs in Zamboanguia are contributing to increased fish abundance and supporting commercially important species, but continued protection and effective management are needed to allow fish to grow to larger sizes and increase overall biomass across the municipality.

Reef Health and Resilience

Substrate Composition

The Philippines is situated in the Coral Triangle, an area of immense biodiversity that contains approximately 30% of the world's reefs. Many factors determine the health of coral reefs, but two of the most important are Hard Coral Cover (HCC) and Algae Cover. Hard corals build the reef itself, providing habitat for thousands of other species, many of which are commercially important. Algae, particularly fleshy macroalgae, compete with coral for space. Too much algae can lead to algae dominating the reef. Without the coral and the living space it provides, much of the biodiversity of the reef is lost. Globally, hard coral cover has been decreasing since 2010.

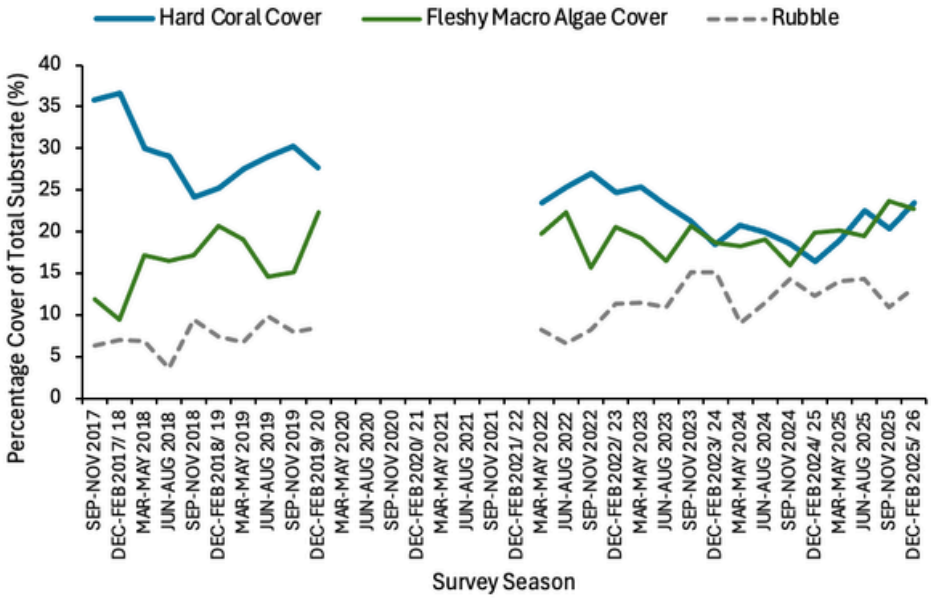
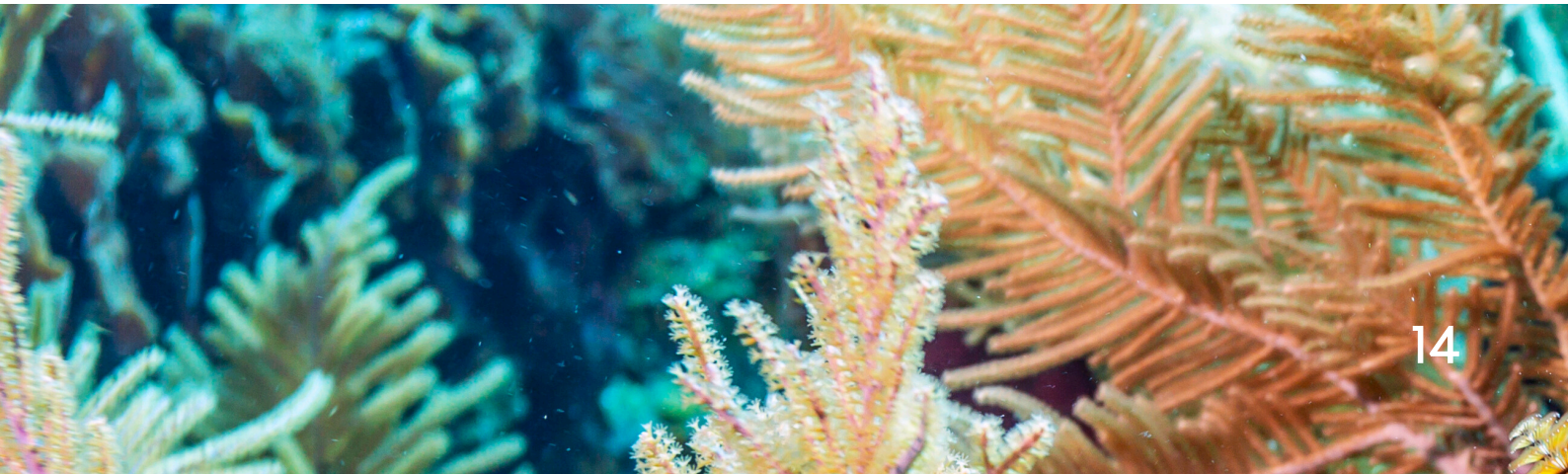


Figure 7. Temporal trends in average hard coral cover, fleshy macroalgae cover, and rubble across the Zamboanguita Municipality (2017–2026). Data is expressed as average percentage cover per survey season.



Current Status:

In September 2025-February 2026, the Zamboanguita municipality recorded an average hard coral cover of ~21.9%, fleshy macroalgae of ~23.2%, and rubble of ~12.1% (Figure 7). Unlike Siaton, where coral remains the dominant benthic group, Zamboanguitta reefs show a macroalgae-dominated system, with macroalgae slightly exceeding hard coral cover across the municipality. Rubble levels are also moderate, indicating areas of unconsolidated substrate. Bleaching levels were low across the municipality during this period, averaging ~1.5%, indicating low thermal stress at the time of monitoring (Figure 8). Overall, reefs in Zamboanguita can be described as algae-influenced reefs with relatively low coral cover and moderate rubble presence.

Recent Change:

Compared with the previous report, hard coral cover increased slightly (20.8.% → 21.9%), and macroalgae also increased (19.8% → 23.2%). Rubble levels decreased (14.2% → 12.1%). This suggests that although substrate stability may be improving (less rubble) and coral cover has increased slightly, macroalgae are increasing faster than coral, indicating increasing algal dominance at the municipal scale. Overall, this indicates a shift toward algal dominance rather than coral recovery.

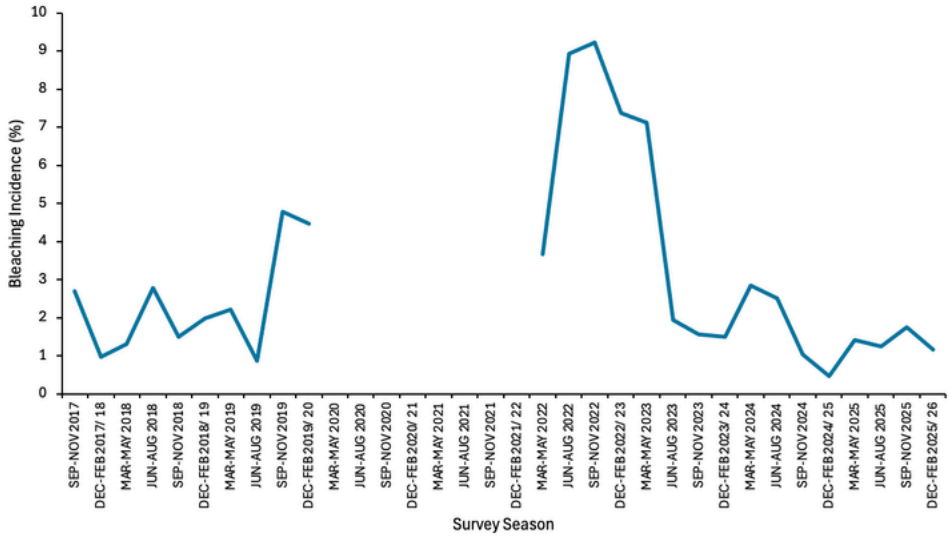


Figure 8. Seasonal bleaching incidence in Zamboanguita Municipality (2017–2026), shown as average percentage of colonies observed with visible bleaching (either partially or fully bleached) per survey season.

Structural implications:
The combination of low coral cover, high macroalgae, and moderate rubble suggests that reefs in Zamboanguita are under greater ecological pressure. Macroalgae levels above ~20% are often associated with reduced coral recruitment, as algae occupy available settlement space and outcompete coral recruits. Although rubble has decreased slightly, indicating some substrate consolidation, this has not yet resulted in significant coral recovery, likely due to algal competition. This suggests that biotic factors are currently a stronger driver of reef condition than physical disturbance.

Long-term context:
In 2017-2018, coral cover was higher (~30-36%), indicating more coral-dominated reefs. Between 2019-2023, coral declined while macroalgae and rubble increased, and bleaching events occurred. During 2023-2024, coral cover reached its lowest levels (~18-20%), while rubble peaked (~15%). In 2025-2026, coral has slightly increased, rubble has decreased, but macroalgae have increased, preventing full coral recovery. This suggests the municipality has undergone a coral decline followed by a shift toward algae-influenced reef systems, rather than clear coral recovery.

Ecological interpretation:
At the municipality scale, Zamboanguita reefs appear to be in a particularly degraded state, with macroalgae now equal to or exceeding coral cover across many sites. The recent decrease in rubble suggests that physical reef structure may be stabilising, which is a positive sign. However, the continued increase in macroalgae indicates that algal competition is currently limiting coral recovery. Overall, Zamboanguita reefs appear to be transitioning from coral-dominated systems to mixed coral-aglae systems, with some sites at risk of becoming algae-dominated if macroalgal growth continues. Without reductions in local stressors and protection of herbivore populations, the trajectory risks favouring algae over corals. Continued monitoring and management will be essential to stabilise these reefs and support recovery capacity.

Algae are less biodiverse than corals and support fewer species of fish and invertebrates. A shift from hard corals to algae will result in lower climate change resilience, as well as significantly reduced commercial value. Since monitoring resumed after the COVID-19 pandemic, the cover of fleshy macroalgae has at times exceeded that of hard coral, suggesting a risk of algae becoming dominant. Algae thrive on phosphorus and nitrogen, which can be found in high amounts in nutrient runoff from agriculture and sewage. Reefs located near river mouths are likely to see more algal growth in the wet seasons due to upland agricultural runoff. It is unlikely that corals can reclaim the lost substrate in the dry seasons, unless the area supports a healthy population of herbivorous species that can consume the algae.

The increase in rubble cover in recent years likely reflects a combination of destructive natural events (typhoons, storms) and anthropogenic impacts, such as anchor damage, fishing gear, or blast fishing. Rising rubble reduces substrate stability and limits the potential for coral recruitment, further constraining reef resilience.

Benthic Composition

Invertebrate Status

Across Zamboanguita municipality, invertebrate communities exhibited relatively high overall abundance and moderate diversity, with an average density of 29.71 individuals per survey, and a species richness of 2.5 (Figure 9-10). These values indicate a comparatively productive system when contrasted with other municipalities, although this productivity was unevenly distributed across sites. Notably, sites such as Dalakit (40.3 individuals) and Lutoban (29.6 individuals) supported the highest densities, alongside high species richness at Dalakit (4.5) and Mojon (4.3). In contrast, Guinsuan, Malatapay, and Luotban Pier exhibited lower species richness (<1.6), suggesting more simplified or potentially stressed communities despite moderate densities.

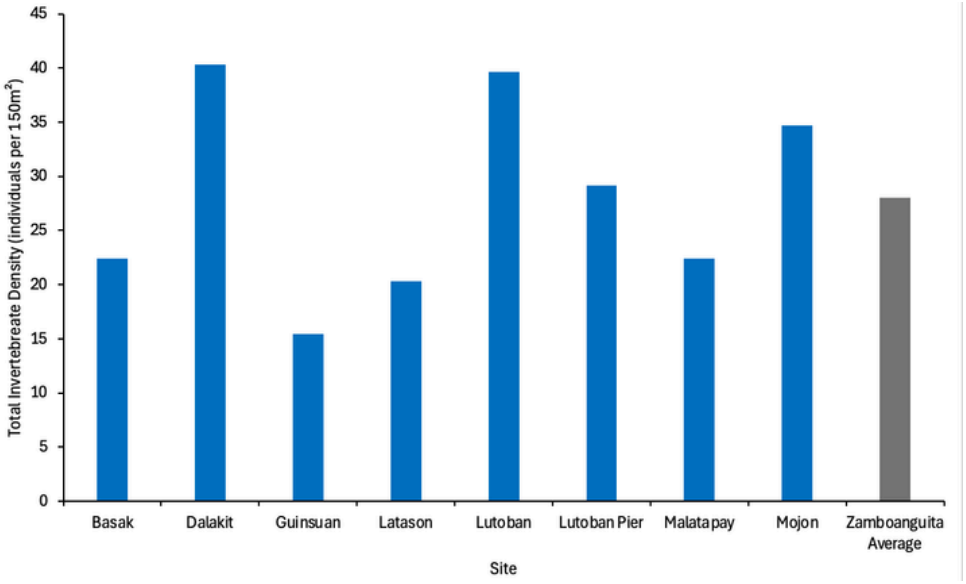


Figure 9. Invertebrate density across sites within the Zamboanguita Municipality during Sep–Feb 2025/26. Values represent average density per survey.

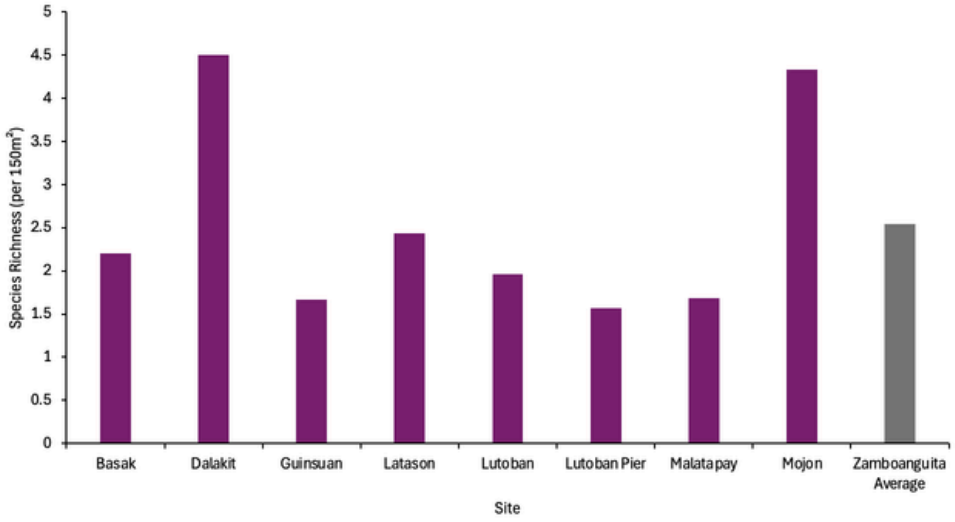


Figure 10. Species richness across sites within the Zamboanguita Municipality during Sep–Feb 2025/26. Values represent average species richness per survey.

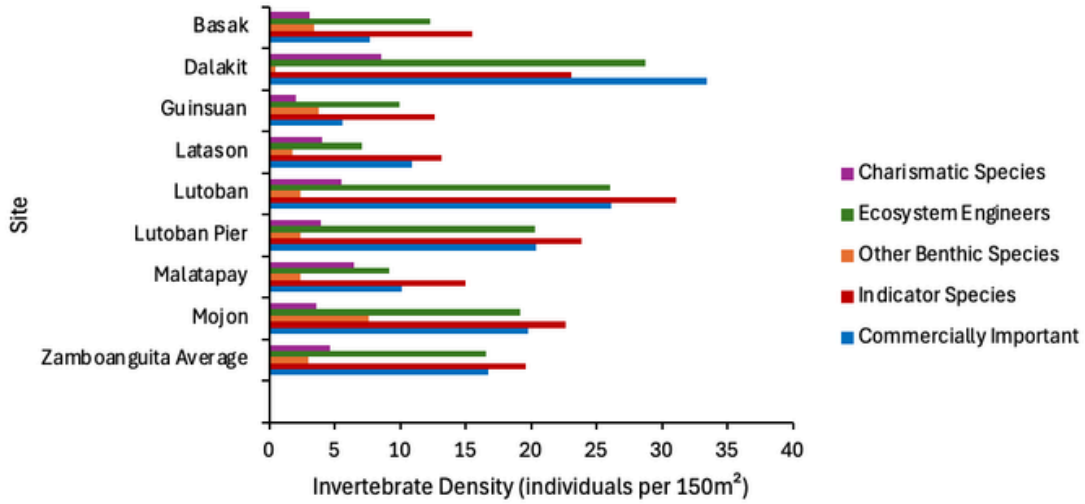


Figure 11. Composition of invertebrate functional group density at Zamboanguita reef sites (September - February 2025/2026).

Commercially important taxa were strongly represented across the municipality (16.76 individuals per survey), with particularly high values at Dalakit (33.4 individuals per survey) and Lutoban (26.2 individuals per survey) (Figure 11, Table 1). This pattern reflects a dominance of harvestable species composition, which was heavily skewed toward Diadema sea urchins (9.97 individuals per survey), followed by rock-boring urchins and a range of gastropods and bivalves. The prominence of these taxa suggests both ecological importance and potential fishing pressure, particularly in sites with elevated densities.

Sea Urchins - Diadema	9.97
Sea Urchins - Rock Boring	0.87
Bivalves - Other	0.73
Gastropods - Cone	0.73
Gastropods - Other Shell	0.61
Sea Cucumbers - Pinkfish	0.59
Gastropods - Scorpion Spider Conch	0.43
Gastropods - Tiger Cowrie	0.31

Table 1. Most abundant commercial invertebrates in the Zamboanguita Municipality during Sep–Feb 2025/26. Values represent average density per survey and highlight the dominant contributors to the commercial benthic community.

Indicator (sensitive) species were also well represented (19.6 individuals per survey), exceeding commercially important densities at several sites, including Basak and Guinsuan. This may indicate that, despite exploitation pressures, certain reef areas still maintain conditions suitable for more sensitive taxa. However, this pattern was not consistent across all sites, with lower indicator densities observed in areas such as Latason and Malatapay, suggesting spatial variability in environmental quality or disturbance.

Ecosystem engineers, primarily dominated by sea urchins, showed high densities across the municipality (16.6 individuals per survey), with peaks at Lutoban (26.1), and Lutoban Pier (20.3). Urchin abundance was notably high overall (mean = 11.20-12.78 individuals per survey), reinforcing their strong ecological role in structuring benthic communities. In contrast, sea cucumber abundance remained low (<1 individual per survey), and giant clams were scarce (< 0.55 per survey), indicating limited representation of these key functional groups.

Other benthic-associated and predatory taxa were present at relatively low densities (3.02 individuals per survey), suggesting that higher trophic level invertebrates may be less abundant or more sensitive to environmental pressures. Charismatic species showed moderate representation (4.7 individuals per survey), with particularly high values at Dalakit and Malatapay, likely driven by the presence of visually conspicuous or ecologically notable taxa.

Ecological Interpretation:
The invertebrate assemblages in Zamboanguita municipality appear to be strongly shaped by the dominance of sea urchins, paritcularly Diadema species. Elevated urchin densities, especially at sites such as Lutoban and Dalkit, may indicate reduced predation pressure and can have important ecological consequences, including increased grazing on benthic and potential impacts on coral recruitment. While this grazing can help control algal growth, excessively high urchin densities may also lead to bioerosion and reduced habitatt complexity.

The coexistence of relativley high indicator species densities alongside high commercial species abundance suggests a mixed ecological signal. Some reefs, particulalry Dalakit and Mojon, may be functioning relativley well, support both diversity and abundance across functional groups. However, other sites with lower species richness and skewed community structures (e.g., Guinsuan and Lutoban Pier), may reflect environmental stress, habitat degradation, or localised fishing impacts.

The consistenttly low abundance of sea cucumebrs and giant clams across the municipality is notable, as these taxa play important roles in nutrient cycling and reef health. Their scarcity may be indicative of overharvesting or slow recovery rates, particulalry given their high commerical value and vulnerability to exploitation.

Overall, Zamboanguita reefs demonstrate moderate to high invertebrate productivity but are characterised by uneven community structure and strong dominance by a few key taxa. This suggests that while some reefs remain relatively healthy, others may be experiencing ecological imbalance, highlighting the importance of continued management and protection efforts, particularly in regulating harvesting and maintaining predator populations to support more balanced reef ecosystems.

TOURISTIC VALUE

Iconic and Charismatic Species

Southern Negros not only hosts some beautiful coral reefs, but is world famous for the abundance of small, rare animals found in its waters. This is a significant draw for divers and contributes substantially to the local tourism industry.

Tourism has an increasingly vital role to play in the success of Marine Protected Areas, provided it is managed in a thoughtful and conservation-minded manner. The effective ticketing of recreational diving activities will generate income for the communities surrounding an MPA, as well as help cover ongoing maintenance costs. This will enhance the MPA's ability to provide food security.

The table below summarises a wide range of animals with high tourism value which divers and snorkelers would be interested in seeing. The figures represent the percentage of times an indicator was observed during dives between September 2025 and February 2026 (Table 2). This provides a representation of how likely divers are to encounter these creatures, aiding dive operations in selecting sites that suit customers.

	Basak MPA	Dalakit MPA	Guinsuan MPA	Latason MPA	Lutoban MPA	Lutoban Pier	Malatapay MPA	Mojon MPA	Municipal Average
Barracudas	16.63	-	4.55	15.56	17.18	10.17	**19.15**	-	10.40
Cephalopods	8.71	-	2.73	11.08	10.04	3.08	14.06	**16.67**	8.29
Cowries	**56.79**	40.18	29.06	36.02	32.44	26.36	39.47	37.5	37.23
Eels and Snakes	**63.13**	40.18	50.79	37.11	43.84	32.82	24.15	54.17	43.27
Frogfish	12.1	-	10.44	**15.18**	7.29	2.47	2.02	3.13	6.58
Giant Clams	15.05	**79.47**	6.27	22.54	25.60	24.51	13.06	8.34	24.35
Porcupinefish and Pufferfish	**90.28**	86.61	87.56	76.99	81.05	77.81	87.94	84.38	84.07
Scorpaenidae	64.03	13.40	55.58	40.12	55.24	47.92	63.68	**82.29**	52.80
Sharks	-	-	-	**9.61**	0.48	-	-	-	1.26
Shrimps	**63.92**	35.72	45.42	62.90	58.12	40.99	58.64	54.17	52.48
Slugs	71.27	66.07	35.14	65.53	78.34	69.96	**81.86**	61.46	66.20
Stingrays	**21.27**	-	-	2.64	0.96	0.77	1	-	3.33
Syngnathidae / Pegasidae	7.81	-	2.73	13.17	10.34	15.10	7.06	**46.88**	12.88
Turtles	44.57	-	**55.68**	14.02	23.78	38.38	55.47	33.34	33.15

Table 2. Average percentage frequency (%) of sightings for key charismatic species across sites in the Zamboanguita Municipality between September and February 2025/26.

Across the Zamboanguita Municipality, recent sightings of **mobula rays** (Basak) and **bamboo sharks** (Latason, Lutoban) provide an essential boost to the municipality's tourism value, adding rare pelagic and shark encounters to an already diverse range of reef species. These sightings enhance the ecotourism potential of Zamboanguita, reinforcing its reputation as a well-rounded diving destination with both macro and megafauna.

Zamboanguita municipality demonstrates strong tourism potential, with particularly high encounter rates for porcupinefish and pufferfish (84.1%) across all sites (Figure 12). Slugs (66.2%) and shrimps (52.5%) are also consistently abundant, making the area highly attractive to macro-divers. Cowries are present at moderate levels (37.2%), while eels and snakes (43.3%) add additional interest to reef exploration. Giant clams (24.4%) are common sightings in several sites, with Dalakit MPA showing exceptionally high values (79.5%), thereby enhancing the reef's appeal. Basak hosts the highest of many touristic value species across Zamboanguita, with the largest percentage of cowries, eels and snakes, shrimps and stingrays.

Charismatic megafauna are more variable, with turtles averaging 33.2% across sites, supported by particularly high sightings in Malatapay (55.5%) and Guinsuan (55.7%). However, sharks (1.3%) and stingrays (3.3%) are infrequent. Frogfish (6.6%) occur in relatively low but notable numbers, with Latason standing out (15.2%).

Overall, Zamboanguita's tourism value lies in its high reliability of reef-associated species, molluscs, and macrofauna, with strong highlights for pufferfish, slugs, shrimps, and turtles. It offers a consistent and diverse diving experience that strongly appeals to macro-divers and reef enthusiasts.

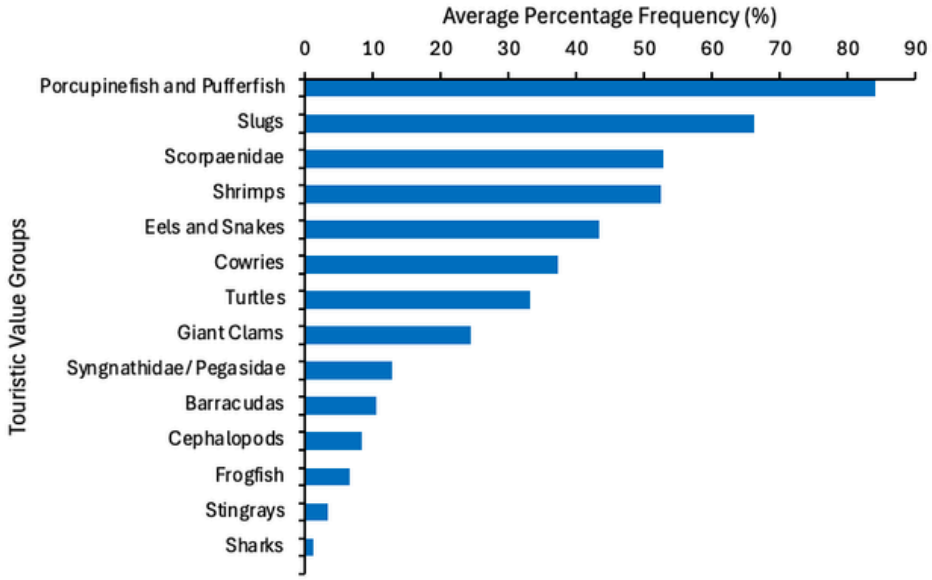


Figure 12. Sightings of high-value tourist species across the Zamboanguita Municipality during Sep–Feb 2025/26. Data is presented as the percentage of dives in which each group was recorded.

In this context, Scorpaenidae refers to lionfish, scorpionfish, and stonefish, while Syngnathidae and Pegasidae includes seahorses, pipefish, sea moths, and sea dragons.

Approximately 200 million tons of trash are currently circulating in our global oceans, with around 11 million tons added each year. The Philippines is responsible for approximately 2.7 million tons of plastic waste alone that is introduced into the sea.

This trash can have devastating effects on marine and coastal ecosystems, from ghost nets killing animals that go to waste and large pieces physically smothering the reef, to microplastics being ingested and concentrated in animals that we ultimately eat, introducing potentially dangerous plastics into our own bodies.

Our partner NGO, Pro Ocean, conducts beach cleans 6 days a week along the coastline from Sibulan to Bayawan, playing a vital role in limiting the ecological damage that trash can cause. The following chart summarises the trash they've collected from September 2025 to February 2026 (Figure 13).

In addition, MCP conducted 8 beach and 9 dive cleans between September 2025 and February 2026, collecting a further 304.44 kg of trash, complementing Pro Ocean's ongoing efforts.

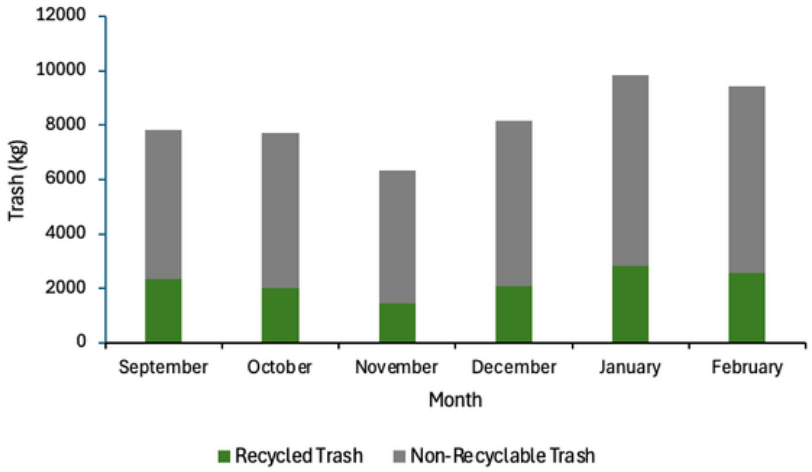
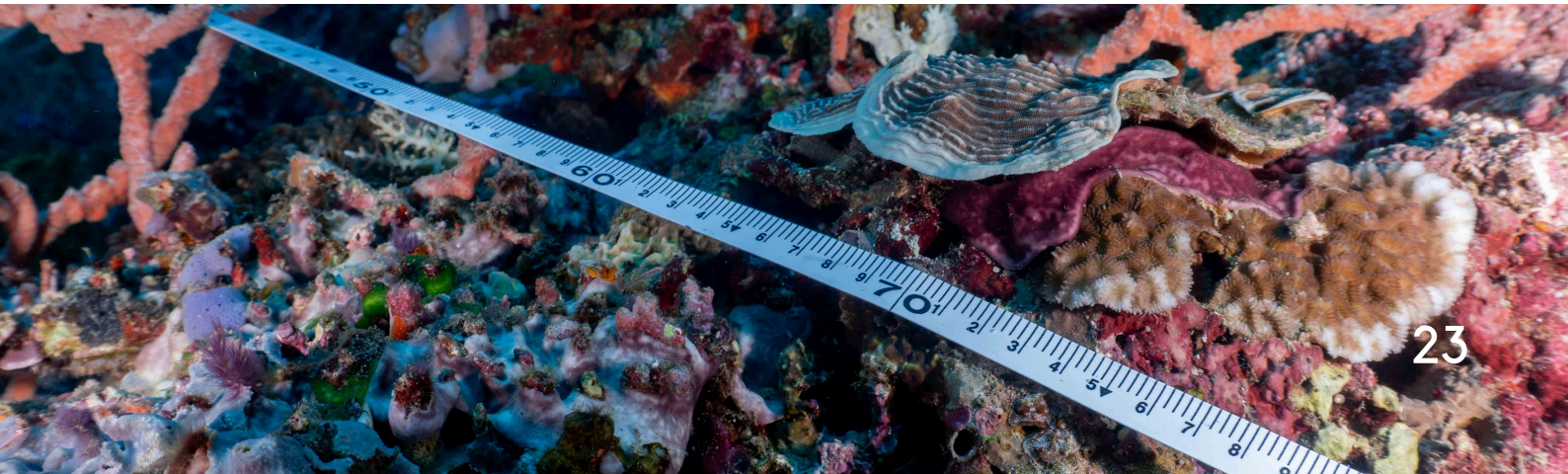
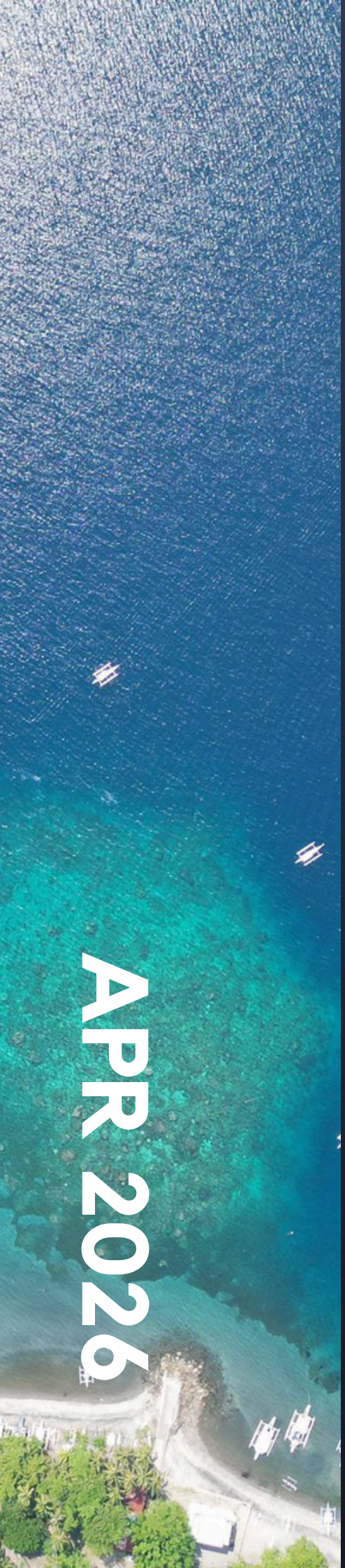


Figure 13. Monthly totals of recycled and non-recyclable trash (kg) collected by Pro Ocean during beach cleans along the Sibulan–Bayawan coastline, Sep–Feb 2025/26. Regular clean-up efforts play a key role in reducing the ecological impacts of marine debris in a region where plastic pollution poses a major threat to coastal ecosystems.

Management Suggestions

- Demarcation is ongoing for sites in Zamboanguita
- Develop enforcement strategies
- Community engagement and education
- Continue long-term monitoring
- Regular coastal and underwater clean-ups
- Consider MPAs in coastal activities that could lead to runoff, especially sites in the vicinity of river mouths
- Sustainable tourism management - Implement or improve environmental user fees for divers and snorkelers.
- Use of safe materials in artificial reefs: https://www.marineconservationphilippines.org/wp-content/uploads/2018/02/factors-and-principles-artificial-reef-creation.pdf
- Consider expanding MPAs to include areas with high coral cover and fish biomass.
- Increased focus on the collection of ticketing revenue for recreational water activities
- Seasonal closures for commercially important species to protect predatory fish
- Consideration of temporary restriction on herbivorous fish in sites of algal domination.
- Maintain restrictions on catching key herbivores (parrotfish, surgeonfish, rabbitfish) to prevent algal overgrowth and support coral recovery.
- Identify and manage nutrient inputs from sewage, agriculture, and coastal development
- Increase protection for groupers, snappers, trevallies, and barracudas to improve ecosystem balance and increase biomass.





APR 2026

Marine Conservation Philippines

Semiannual Report

ZAMBOANGUITA

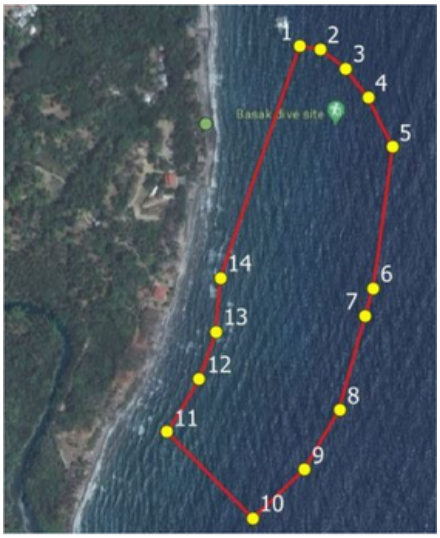
Section 2

Site Specific Results

marineconservationphilippines.org

Basak Can-Unsang South MPA

Basak South MPA has an area of 9.1 hectares and comprises coral reefs, sandy patches, and seagrass beds. There is a relatively narrow band of shallow reef (1-4 m) and a more extensive area of deeper reef (8 - 19 m) on the southern part of the MPA. A river mouth next to the MPA can introduce sediment to the site during the rainy season. The reef is often exposed to wind, longshore currents and wave action. Basak is well-recognised as a dive site and is regularly visited by SCUBA divers.



MPA demarcation based on DENR coordinates

BASAK CAN-UNSANG SOUTH MPA

Food Security

The strong currents that Basak is exposed to can bring in nutrients that support a large amount of life. In particular, the planktivores that make up the majority of fish are likely taking advantage of such plankton being brought in by those strong currents. The rapid increase in biomass observed in various seasons is attributed to the presence of large schools of plankton feeders, primarily fusiliers.

Current Status:

In September–February 2025/26, Basak recorded an average total fish density of ~933 individuals per 150 m^2, with commercial species contributing ~278 individuals per 150 m^2. **Commercial biomass was ~24.7 kg per 150m^2 (~1,647 kg/ha)**, making Basak one of the highest biomass sites within Zamboanguita municipality (Figure 14). Herbivores (~793 ind.) dominated the community, followed by carnivores (104 ind.), while omnivores (~8.5 ind.), corallivores (~11.5 ind.), and detritivores (~14.6 ind.) were present in lower numbers. These values indicate a high-density, high-biomass fish community, characteristic of a well-performing MPA.

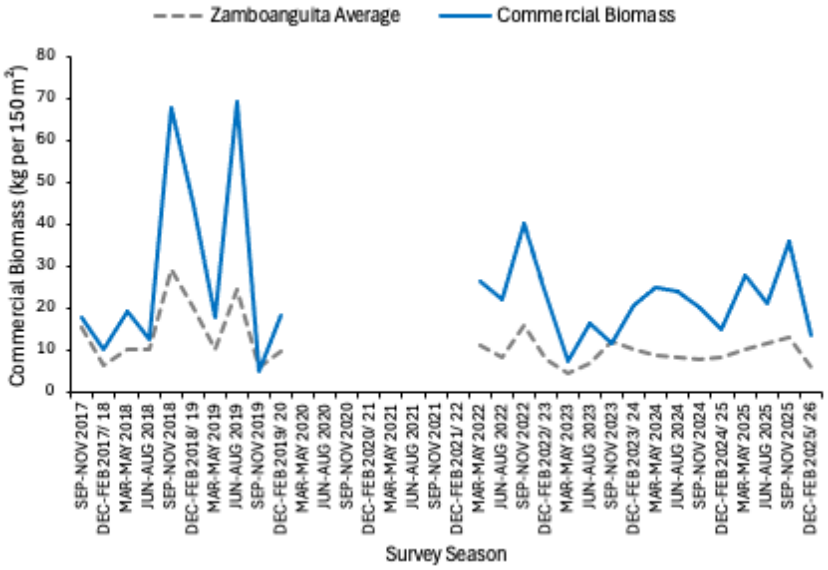


Figure 14. Temporal trends in commercial fish biomass (kg per 150m^2) at Basak MPA (2017-2026). Biomass values represent the estimated weight of commercially important reef fish, providing an indicator of food security potential and MPA effectiveness.

Recent Change:

Compared with the previous reporting season, total fish density increased substantially (713 → 933 ind. per 150 m^2) (Figure 15). Commercial density also increased markedly (179 → 278 individuals), while commercial biomass remained relatively stable (24.57 → 24.73 kg per 150 m^2. Herbivores showed the largest increase (547 → 793 ind.), while carnivores remained relatively stable (109 → 104 ind.). Omnivores remained stable, while corallivores. and detritivores decreased slightly. This pattern indicates a strong increase in fish abundance, particularly among herbivores and commercial species, while biomass stability suggests that fish size structure has been maintained.

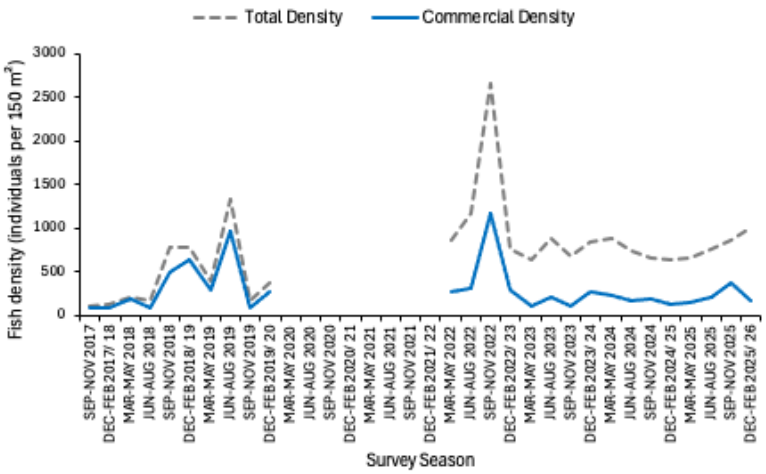


Figure 15. Temporal trends in total fish density and commercial fish density at Basak MPA from (2017-2026). Values represent average individuals per 150 m^2 recorded during seasonal surveys.

Dietary structure:

The dietary profile at Basak is strongly dominated by herbivores (85%), followed by carnivores (11%), with omnivores, corallivores, and detritivores making up the remaining ~4% (Figure 16). This trophic structure reflects a healthy reef system with strong grazing pressure supporting coral resilience.

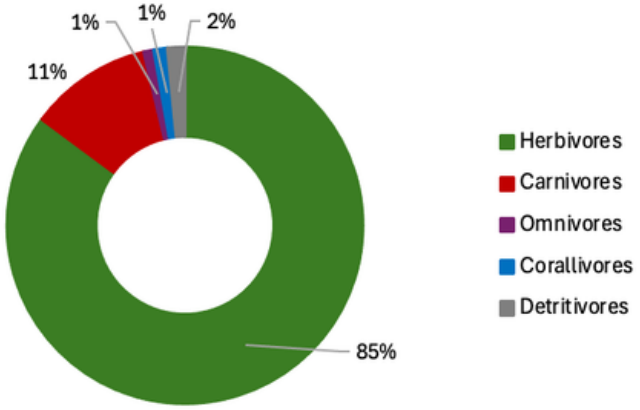


Figure 16. Proportional contribution (%) of dietary groups to total fish density at Basak MPA during Sep–Feb 2025/26. Data include both commercial and non-commercial species, highlighting the ecological importance of abundant herbivores in supporting algal–coral balance.

Commercial Groups:

At Basak, fusiliers are the dominant commercial group, contributing the largest proportion of both density and biomass (Table 3). Snappers and bream provide additional biomass contributions, while goatfish, unicornfish, and triggerfish are present in moderate numbers. Larger predators such as groupers and trevally are present but remain relatively low in abundance. Despite this, the overall high biomass indicates that Basak supports a well-developed commercial fish community, with contributions from multiple trophic levels.

Fusilier	55.75	**Triggerfish**	3.65
Snapper	21.95	**Grouper**	2.63
Bream	7.01	**Trevally**	1.49
Goatfish	5.56	**Surgeonfish**	1.30
Unicornfish	5.54	**Parrotfish**	1.22

Table 3. Mean biomass (kg per 150m^2) of the ten most abundant commercial fish groups at Basak MPA during Sep–Feb 2025/26. Values represent average biomass per survey and highlight the dominant contributors to the commercial fish community.

Long-term context:
Basak has shown some of the highest fish densities and biomass values across all monitored sites since 2017, with particularly strong peaks in recent years. Current biomass levels (>1,600 kg/ha) are approaching those observed in well-enforced MPAs within the Coral Triangle, indicating strong recovery and protection effectiveness.

Ecological interpretation:
Basak MPA represents a highly successful protected reef system, with both high fish abundance and high commercial biomass. The strong presence of herbivores supports reef resilience, while the high commercial biomass indicates that fish are surviving long enough to reach larger sizes. The stability in biomass alongside increasing density suggests that the site is maintaining a healthy size structure, rather than being dominated by small individuals. Although large apex predators remain relatively limited, the overall fish community structure indicates a well-functioning ecosystem. Continued protection and enforcement will be essential to maintain these high biomass levels and support further recovery of top predators, enhancing both ecosystem stability and fisheries spillover potential.

BASAK CAN-UNSANG SOUTH MPA

Reef Health And Resilience

Current status:
During the September–February 2025/26 monitoring period, Basak recorded an **average hard coral cover of ~14.8%**, **~13.7% fleshy macroalgae**, and **~19.3% rubble**. The border substrate composition indicates that sand (~23%) and hard coral remain among the dominant benthic components, followed by sessile invertebrates (~16%) and rock (~15%) (Figure 17).

Bleaching remained low at ~1.2%, suggesting limited immediate thermal stress on coral colonies during the survey periods. Rubble represents a substantial proportion of the substrate, approaching 1/5 of the benthic composition. While coral remains a significant component of the reef structure, the relatively high proportion of rubble indicates ongoing structural instability. Rubble can result from disturbance events such as typhoons, anchor damage, or destructive fishing practices, and may limit the ability of coral larvae to successfully settle and consolidate the reef framework.

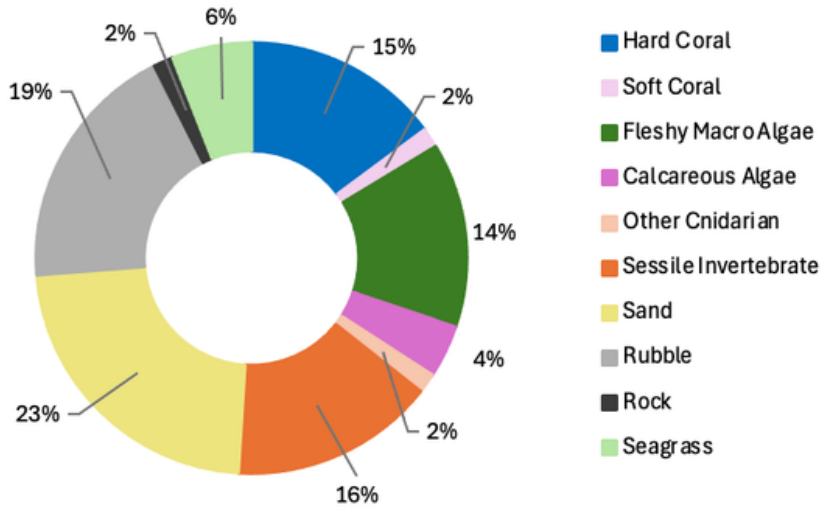


Figure 17. Average benthic substrate composition at Basak MPA (Sep-Feb 2025/26). Values represent the proportional contribution (%) of different benthic categories pooled across all surveys.

Recent change:
Compared with the previous six-month reporting period (March-August 2025), **hard coral cover declined slightly (15.3% → 14.8%),** representing a minor reduction (Figure 18). Macroalgae cover increased noticeably (10%–13.7%), indicating a strengthening algal presence across the site. Meanwhile, rubble increased from 19.3%, marking the most significant structural shift during this reporting period. Bleaching increased slightly (0.5% → 1.2%), though values remain very low overall and are not currently indicative of widespread thermal stress (Figure 19). Overall, Basak experienced stable coral cover but rising rubble and macroalgae, suggesting that substrate instability and algal competition remain important factors shaping the benthic community.

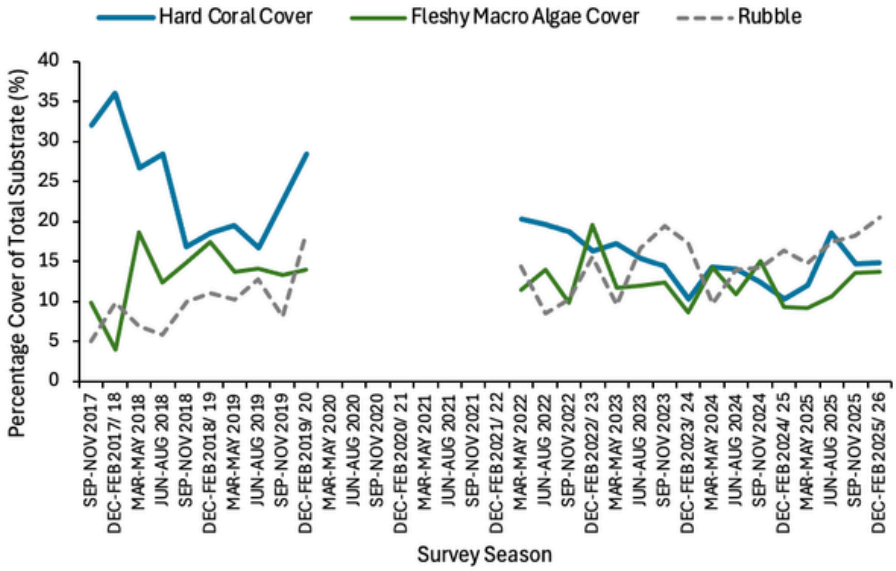


Figure 18. Temporal trends in hard coral cover, fleshy macroalgae cover, and rubble at Basak MPA (2017–2026). Data is expressed as average percentage cover per survey season.

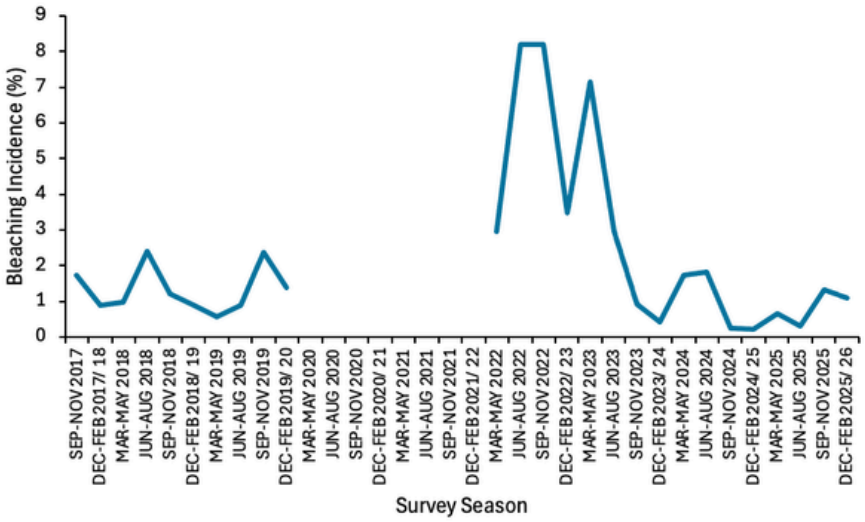


Figure 19. Seasonal bleaching incidence at Basak MPA (2017–2026), shown as average percentage of colonies observed with visible bleaching (either partially or fully bleached) per survey season.

Structural implications:

The combination of moderate macroalgal cover and increasing rubble suggests that the reef substrate remains vulnerable to disturbance and slow structural consolidation. Elevated rubble levels reduce habitat stability and may limit coral recruitment if rubble fragments continue to shift or fail to consolidate into stable substrate. The presence of substantial sessile invertebrate cover (~16%) contributes to reef complexity and biodiversity but may also compete with corals for available space. Although macroalgae have increased slightly during this reporting period, levels remain below thresholds typically associated with algal phase shifts. Continued herbivory will be important to prevent further algal expansion and maintain suitable space for coral recovery.

Long-term context:
Long-term monitoring shows that Basak historically supported much high coral cover, exceeding 30-36% during 2017-2018. Coral cover declined substantially though 2022-2024, reaching lows near 10-14%, likely associated with regional bleaching events and disturbance. Since 2024, coral cover has shown modest stabilisation, generally fluctuating between 14-19%, although it has not yet returned to historic levels. Rubble has remained consistently elevated during this period, often exceeding 15%, suggesting that disturbance legacies continue to influence reef structure. Bleaching peaked during 2022-2023 (7-8%) but has declined dramatically, remaining below 2% in recent monitoring periods. This reduction in thermal stress may create favourable conditions for coral recovery if structural stability improves.

Ecological interpretation:
Basak's benthic community appears to be in a stable but constrained recovery phase. Coral cover has remained relatively consistent over the past year, but remains well below historic levels observed earlier in the monitoring record. The most significant limitation to recovery is the persistent and increasing rubble fraction, which reduces substrate stability and may inhibit coral recruitment. Meanwhile, the moderate rise in macroalgae suggests that competitive pressure for space could increase if herbivory declines. Encouragingly, bleaching pressure remains extremely low, reducing immediate climate stress on the reef. With continued protection and strong herbivore populations, Basak retains the potential for gradual coral recovery. However, without improvements in substrate stability and continued effective MPA management, coral expansion may remain slow.

BASAK CAN-UNSANG SOUTH MPA

Invertebrate Status

The invertebrate community at Basak showed moderate invertebrate density and species richness during the September 2025 to February 2026 monitoring period. Average invertebrate density ranged from ~21.6 to 23.3 individuals per survey, while species richness was ~2.2 species per survey, indicating a moderately abundant and moderately diverse invertebrate community.

Indicator (sensitive) species and ecosystem engineer species were the dominant functional groups at this site (Figure 20). Indicator species density was relatively high (37%), suggesting that the site supports species associated with relatively stable reef conditions. Ecosystem engineers were also abundant (29%), indicating that important ecological processes such as grazing, sediment turnover, and bioerosion are likely occurring at this site. Commercially important invertebrates were present at moderate densities (18%), while benthic-associated species and charismatic species were present at lower densities.

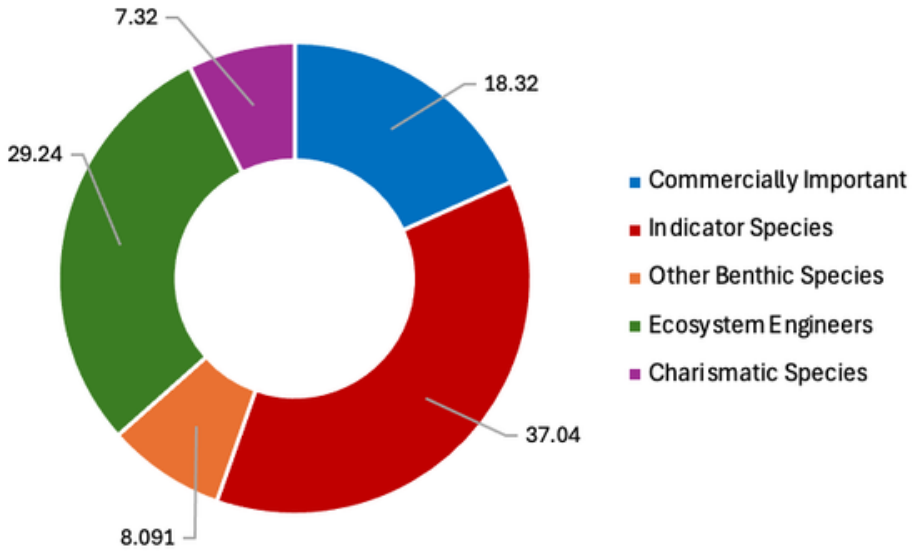


Figure 20. Proportional contribution (%) of invertebrate functional groups at Basak MPA during Sep–Feb 2025/26.

Ecological Interpretation:
The invertebrate community at Basak appears to be moderately abundant and functionally important, with particularly high densities of indicator species and ecosystem engineer species. The dominance of sea cucumbers, particularly pinkfish, suggests that sediment turnover and nutrient cycling are likely important ecological processes at this site, as sea cucumbers play a key role in bioturbation and sediment cleaning (Table 4).

Sea Cucumber - Pinkfish	1.91
Sea Urchins - Diadema	0.96
Gastropods - Other Shell	0.93
Mantis Shrimp	0.89
Bivalves - Other	0.84
Gastropods - Scorpion Spider Conch	0.41
Gastropods - Tiger Cowrie	0.36
Gastropods - Cone	0.23

Table 4. Most abundant commercial invertebrates at Basak MPA during Sep–Feb 2025/26. Values represent average density per survey and highlight the dominant contributors to the commercial benthic community.

The sea cucumber population structure, with individuals recorded across multiple size classes, including large adults, suggests that the population may be relatively stable and potentially reproducing, which is a positive sign for a commercially important species that is often heavily fished in many reef areas.

In contrast, sea urchin populations appear to be dominated by juveniles, suggesting recent recruitment but relatively few large adults, which may indicate predation pressure or environmental limitations. Giant clams were largely absent, which may indicate unsuitable habitat, past harvesting pressure, or limited recruitment at this site.

Overall, the Basak site supports a moderately abundant invertebrate community dominated by sea cucumbers rather than sea urchins, which differs from several of the Zamboanguita sites. The presence of large sea cucumbers suggests that this site may be important for commercially important invertebrates, and continued protection and management may be important to maintain these populations.

BASAK CAN-UNSANG SOUTH MPA

Tourism Value

Barracudas	16.63	**Scorpaenidae**	64.03
Cephalopods	8.71	**Sharks**	0
Cowries	56.79	**Shrimps**	63.92
Eels and Snakes	63.13	**Slugs**	71.27
Frogfish	12.1	**Stingrays**	21.27
Giant Clams	15.05	**Syngnathidae and Pegasidae**	7.81
Porcupinefish and Pufferfish	90.28	**Turtles**	44.57

Table 5. Mean encounter rates (%) of selected indicator and charismatic taxa recorded at Basak MPA from September 2025 - February 2026. Values represent the percentage of dives in which each group was observed, providing an indication of their relative tourism and ecological value.

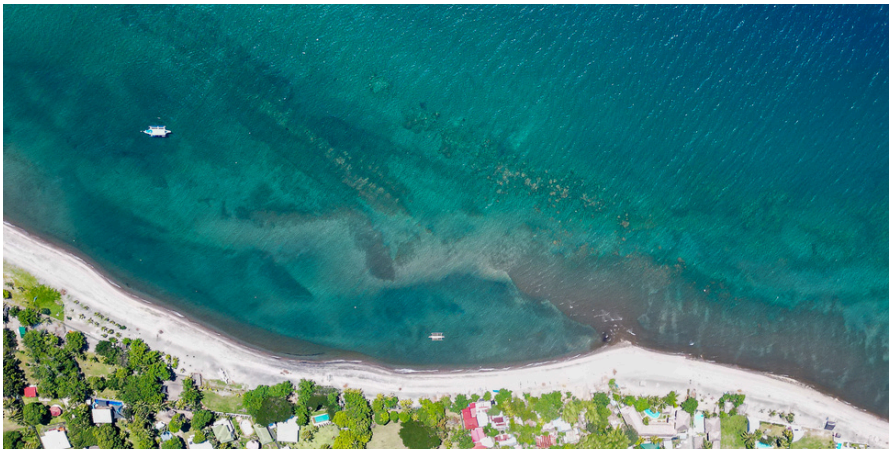
Basak is the most established dive location in Zamboanguita, enjoying regular visits from divers coming from Dauin. In particular, many large and colourful members of the Nembrotha family of nudibranchs can be found, as well as many other types of sea slug not summarised in the data. It also hosts some impressively large scorpion fish. Basak is also well known for a large school of resident barracuda, and sometimes large numbers of milkfish. This isn't reflected in the survey data because they are generally found in the sandy area in the southern part of the MPA, and rarely venture onto the reef (or at least haven't done so during our surveys).

Basak demonstrates a very high tourism value, with exceptionally frequent sightings of porcupinefish and pufferfish (90.3%), which is well above the municipal average (Table 5). The site also provides excellent opportunities for slugs (71.3%), eels and snakes (63.1%), and turtles (44.6%), making it one of the strongest locations for megafauna encounters in the municipality. **Mobula rays were also recorded in February, further enhancing the site's attractiveness for divers seeking large pelagic species.**

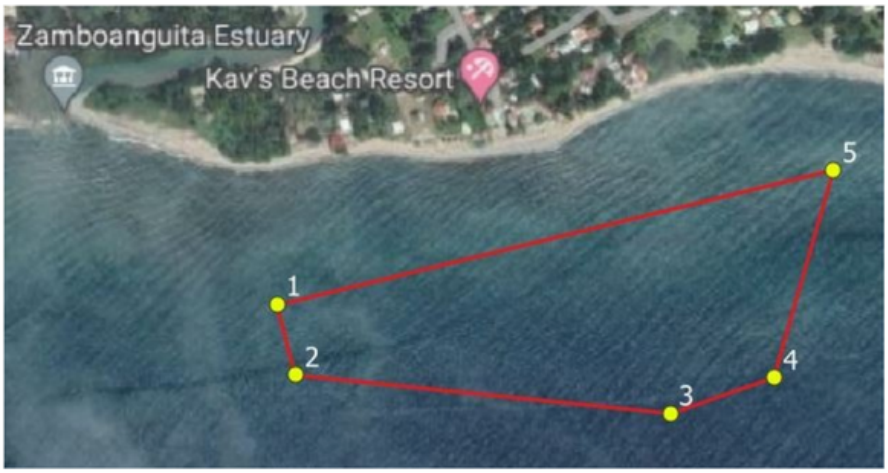
Macro-diversity is further supported by high records of cowries (56.8%), shrimps (63.9%), and scorpaenidae (64%), all of which exceed typical averages. Stingrays are also relatively common here (21.3%), among the highest frequencies recorded across sites.

Basak now stands out as a particularly high-value site for marine tourism, offering both reliable macro sightings and strong megafauna appeal, including frequent turtles and stingrays.

DALAKIT MPA



Dalakit MPA has an area of 10.1 ha and is characterised by a very shallow coral reef (0 - 5 m) surrounded by sand flats. Due to its location, the reef is relatively protected from prevailing winds and is subject to little current or wave action. MCP began monitoring Dalakit in 2019.



MPA demarcation based on DENR coordinates

DALAKIT MPA

Food Security

Dalakit MPA is notable for its extremely shallow reef, which has a maximum depth of approximately 4 m. The reef is also relatively small and isolated, being surrounded by sandy areas with occasional patches of reef and rubble. Despite this, the MPA supports a surprisingly high amount of fish biomass, although it exhibits greater seasonal variability than the municipal average.

Current Status:

In September–February 2025/26, Dalakit recorded an **average total fish density of ~437 individuals** per 150 m^2, with commercial species contributing ~52 individuals per 150 m^2 (Figure 16). **Commercial biomass was ~7.1 kg per 150m^2 (~260 kg/ha)** (Figure 21,22). Herbivores dominated the assemblage (~310 individuals per 150 m^2), followed by carnivores (~87), while corallivores (~11), omnivores (~8), and detritivores (~18) were present in smaller numbers. These values indicate a moderate-density fish community with moderate commercial biomass.

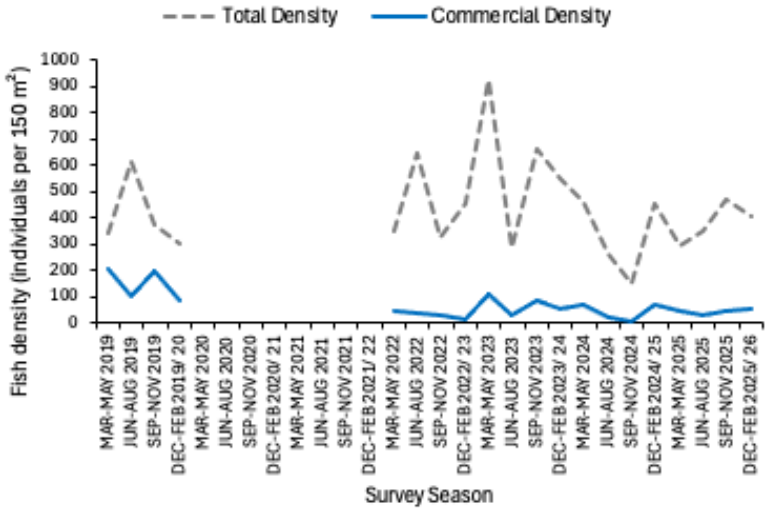


Figure 21. Temporal trends in total fish density and commercial fish density at Dalakit MPA (2019-2026). Values represent average individuals per 150m^2 recorded during seasonal surveys.

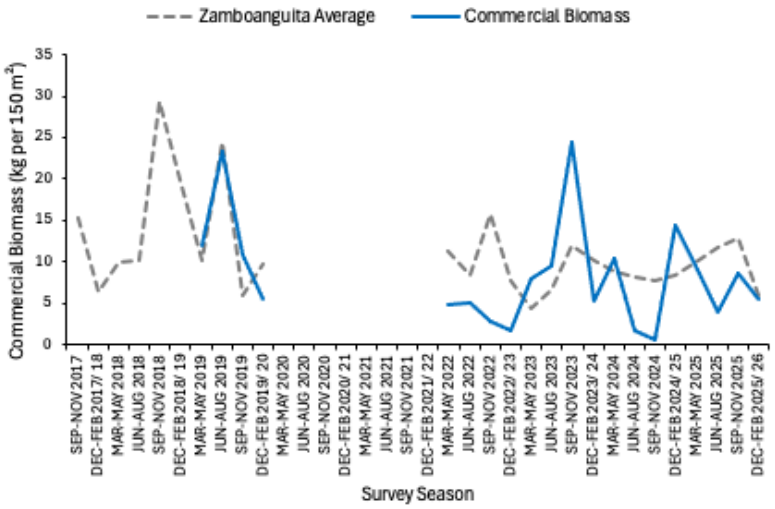


Figure 22. Temporal trends in commercial fish biomass (kg per 150m^2) at Dalakit MPA (2019-2026). Biomass values represent the estimated weight of commercially important reef fish, providing an indicator of food security potential and MPA effectiveness.

Recent Change:

Compared with the last reporting period, total fish density increased (321 → 437 ind. per 150 m^2). Commercial density also increased (39 → 52 individuals), and commercial biomass increased slightly (6.76 → 7.09 per 150 m^2) (Figure 23). Herbivores increased substantially (220 → 310 ind.), and carnivores also increased (63 →87 ind.). Omnivores decreased slightly, while corallivores remained relatively stable and detritivores increased. This indicates an overall increase in fish abundance across multiple trophic groups, suggesting an improvement in fish community structure.

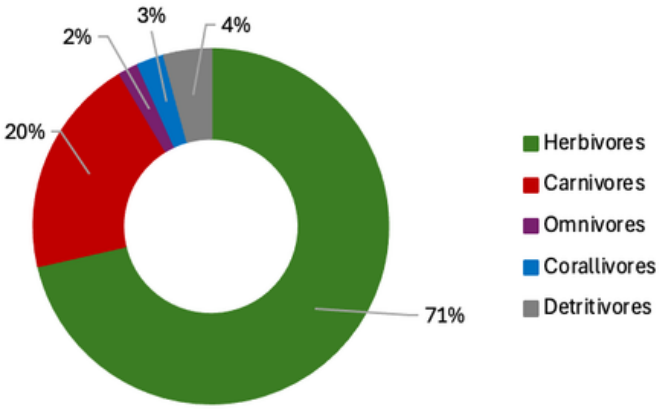


Figure 23. Proportional contribution (%) of dietary groups to total fish density at Dalakit MPA during Sep–Feb 2025/26. Data include both commercial and non-commercial species, highlighting the ecological importance of abundant herbivores in supporting algal–coral balance.

Dietary structure:

The dietary profile at Dalakit is dominated by herbivores (~71%), followed by carnivores (~20%), with omnivores, corallivores, and detritivores making up the remaining ~9% (Figure 23). Compared to many other sites, Dalakit supports a relatively higher proportion of carnivores, which may indicate a more balanced trophic structure.

Surgeonfish	8.73	**Trevally**	1.72
Snapper	7.79	**Soldierfish**	1.47
Goatfish	3.42	**Parrotfish**	1.34
Bream	2.41	**Rabbitfish**	0.87
Grouper	2.21	**Triggerfish**	0.64

Table 6. Mean biomass (kg per 150m^2) of the ten most abundant commercial fish groups at Dalakit MPA during Sep–Feb 2025/26. Values represent average biomass per survey and highlight the dominant contributors to the commercial fish community.

Commercial Groups:

At Dalakit, the commercial fish community is composed primarily of surgeonfish and snappers, followed by goatfish, bream and groupers (Table 6). Trevally and soldierfish are present in smaller numbers, while parrotfish, rabbitfish and triggerfish contribute smaller proportions to biomass. The presence of multiple commercial groups, including predators such as groupers and trevally, suggests that Dalakit supports a relatively diverse commercial fish assemblage, although overall biomass remains moderate.

Long-term context:
Dalakit's fish communities have historically been variable, with strong peaks in biomass (e.g., >20 kg per 150m^2 in earlier surveys) alternating with periods of decline. The recent increase in both density and biomass suggests that the site may currently be in a recovery phase. This variability suggests that fish populations at Dalakit are highly influenced by external pressures, likely including fishing outside MPA boundaries and limited enforcement.

Ecological interpretation:
Dalakit MPA supports a moderately abundant fish community with increasing density and slightly increasing biomass in the most recent period. The relatively higher proportion of carnivores compared to some other sites may indicate an improving trophic structure. However, commercial biomass remains lower than at stronger MPA sites such as Basak and Andulay, sugtigesitng that while Dalakit is functioning as an MPA, fish biomass and predator populations are still in the process of recovery. Continued protection will be important to allow fish to grow to larger sizes and increase overall biomass, particularly among commercially important and predatory species.

DALAKIT MPA

Reef Health And Resilience

The relationship between hard coral and macroalgae cover has been historically quite variable, with several instances of dominance switching. This is potentially concerning, particularly as the river to the south may introduce sediment to the reef, which could reduce light levels and make it more vulnerable to algal dominance.

Current status:

During the September 2025 - February 2026 monitoring period, Dalakit recorded average hard coral cover of ~29.7%, fleshy macroalgae of ~33.3%, and rubble ~5.5%. The broader substrate composition indicates that fleshy macroalgae and hard coral dominate. the benthic community, followed by sand (~18%) and sessile invertebrates (~5%) (Figure 24). Bleaching levels were very low at approximately 0.6%, indicating minimal visible thermal stress during this monitoring period. The reef at Dalakit, therefore remains characterised by a mixed coral-algal community, with substantial coral presence but also a high proportion of fleshy macroalgae occupying available substrate.

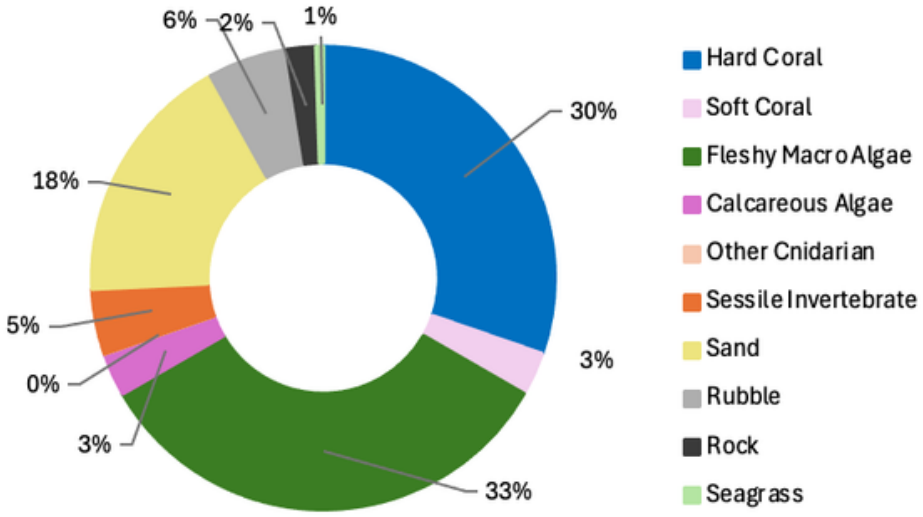


Figure 24. Average benthic substrate composition at Dalakit MPA (September-February 2025/26). Values represent the proportional contribution (%) of different benthic categories pooled across all surveys.

Recent change:

Since the last report, **hard coral cover at Dalakit has increased moderately (23.5% → 29.7%), suggesting positive coral growth or recovery across the site** (Figure 25). Fleshy macroalgae decreased slightly (39.0% → 33.3%), although still high overall, this actually represents a reduction compared with the very elevated levels observed earlier in 2025. Bleaching also decreased (1.4% → 0.6%), continuing the trend of reduced thermal stress observed across several monitoring sites (Figure 26). Overall, Dalakit experienced increasing coral cover, slightly reduced rubble, and continued but slightly reduced macroalgal dominance, suggesting improving reef stability despite ongoing algal competition.

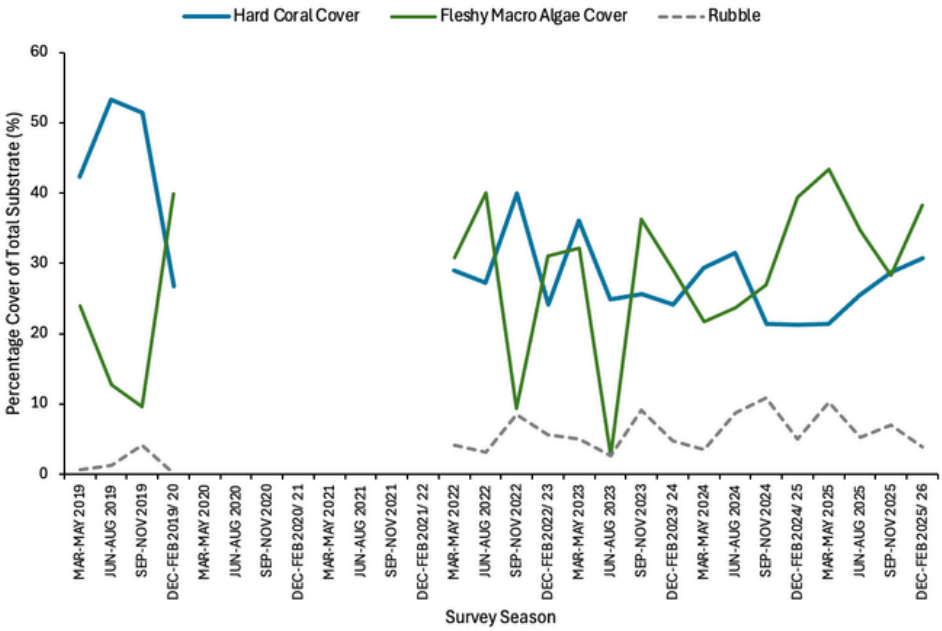


Figure 25. Temporal trends in hard coral cover, fleshy macroalgae cover, and rubble at Dalakit MPA (2019–2026). Data is expressed as average percentage cover per survey season.

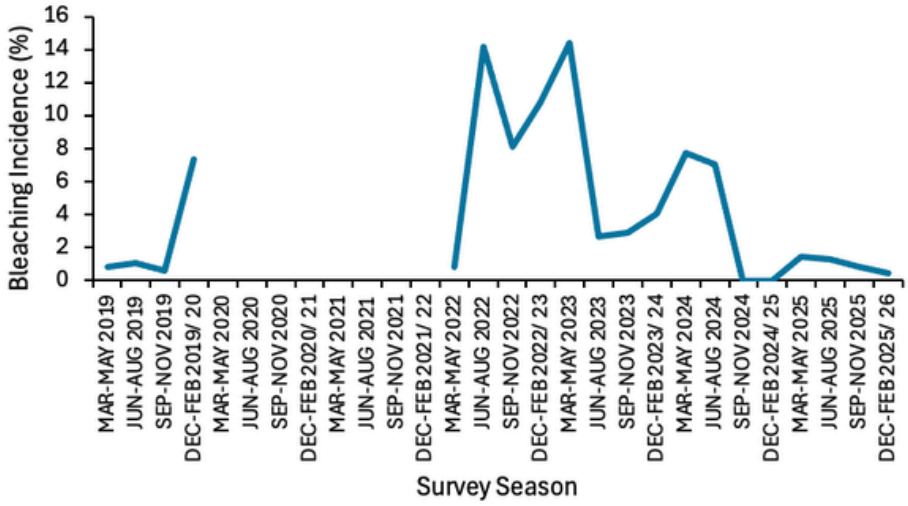


Figure 26. Seasonal bleaching incidence at Dalakit MPA (2019–2026), shown as average percentage of colonies observed with visible bleaching (either partially or fully bleached) per survey season.

Structural implications:

The coexistence of high macroalgae (~33%) and substantial coral cover (~30%) indicates a competitive benthic environment where corals and algae are both occupying significant portions of the available substrate. While coral cover approaching 30% reflects a moderately healthy reef structure, the large proportion of fleshy macroalgae suggests that grazing pressure may be insufficient to fully control algal expansion. If macroalgae continue to dominate available substrate, coral recruitment and growth may be restricted. Low rubble levels indicate relatively stable reef structure compared to some other sites. Stable substrate increases the likelihood of successful coral settlement and long-term reef consolidation.

Long-term context:
Historically, Dalakit supported very high coral cover, exceeding 50% during 2019. However, coral cover declined significantly in subsequent years, particularly during the 2022-2023 period, when bleaching events and disturbance coincided with increased macroalgal dominance. Macroalgae have remained consistently elevated across the monitoring period, frequently exceeding 30-40% cover, suggesting that Dalakit has long been characterised by strong coral-algal competition. Since 2024, coral cover stabilised within the 20-30% range, while macroalgae have fluctuated between 25-40%. Bleaching levels peaked during 2022-2023 (>10%), but have declined sharply in recent monitoring periods and now remain below 1-2%, indicating improved environmental conditions.

Ecological interpretation:
Dalakit appears to support a relatively stable yet strong competitive benthic community, in which both corals and macroalgae maintain substantial coverage of the reef substrate. The recent increase in coral cover alongside declining rubble suggests improving structural conditions for reef recovery. However, the persistently high macroalgal cover indicates that algal competition remains a key ecological constraint.

DALAKIT MPA

Invertebrate Status

The invertebrate community at Dalakit MPA showed high invertebrate density and high species richness compared to other sites surveyed. Average invertebrate density ranged from ~37.6 - 43 individuals per survey, while species richness was ~4.5 species per survey, indicating one of the most diverse and abundant invertebrate communities recorded during this monitoring period.

Commercially important invertebrates were very abundant at this site, with densities ranging from (35%), making this one of the most commercially significant invertebrate sites in the municipality (Figure 27). Indicator (sensitive) species were also present at relatively high densities (25%), suggesting that the reef still supports species associated with relatively healthy reef conditions. Ecosystem engineer species were particularly abundant (30%), largely driven by high numbers of sea urchins, which play an important role in grazing and bioerosion.

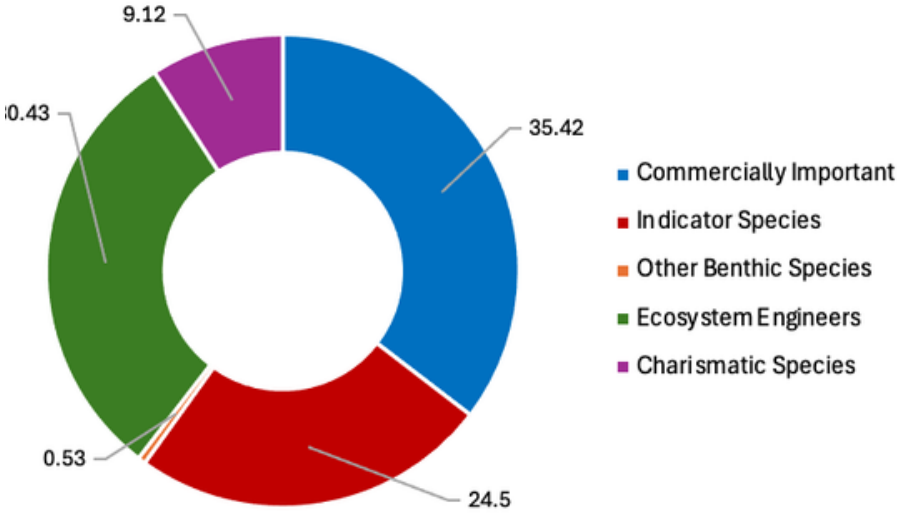


Figure 27. Proportional contribution (%) of invertebrate functional groups at Dalakit MPA during Sep–Feb 2025/26.

Ecological Interpretation:

The Dalakit site appears to be dominated by sea urchins, with very high densities of Diadema and rock-boring urchins driving patterns in commercial species density, indicator species density and ecosystem engineer density. Sea urchins play an important ecological role as grazers; however, very high densities of small urchins can indicate reef imbalance, particularly if predator populations are low or if there has been disturbance to the reef ecosystem.

Sea Urchins - Diadema	17.8
Sea Urchins - Rock Boring	5.1
Gastropods - Cone	2.5
Bivalves - Boring Giant Clam	1.5
Bivalves - Other	0.6
Gastropods - Scorpion Spider Conch	0.5
Gastropods - Other Conch	0.5
Gastropods - Nilo Top	0.5
Bivalves - Pearl Oyster	0.5

Table 7. Most abundant commercial invertebrates at Dalakit MPA during Sep–Feb 2025/26. Values represent average density per survey and highlight the dominant contributors to the commercial benthic community.

The size structure of the sea urchin population, dominated almost entirely by small individuals, suggests very high recruitment but low numbers of large adults, which may indicate high predation pressure on larger urchins, harvesting of larger individuals, or environmental stress limiting growth to larger sizes (Table 7).

The presence of giant clams across multiple size classes is a positive indicator, suggesting that the site supports clam recruitment and survival. However, the complete absence of sea cucumbers may indicate overharvesting, habitat limitations, or environmental conditions that are not suitable for sea cucumber populations.

Overall, Dalakit appears to be a high-density, high-diversity site dominated by sea urchins, with moderate giant clam populations but no sea cucumbers. The very high abundance of juvenile sea urchins suggests that this site may be experiencing strong grazing pressure, which may influence benthic community structure and coral recruitment. Continued monitoring is recommended to determine whether sea urchin populations remain high and whether sea cucumber populations recover over time.

DALAKIT MPA

Tourism Value

Barracudas	0	**Scorpaenidae**	13.40
Cephalopods	0	**Sharks**	0
Cowries	40.18	**Shrimps**	35.72
Eels and Snakes	40.18	**Slugs**	66.07
Frogfish	0	**Stingrays**	0
Giant Clams	79.47	**Syngnathidae and Pegasidae**	0
Porcupinefish and Pufferfish	86.61	**Turtles**	0

Table 8. Mean encounter rates (%) of selected indicator and charismatic taxa recorded at Dalakit MPA from September-February 2025/26. Values represent the percentage of dives in which each group was observed, providing an indication of their relative tourism and ecological value.

Dalakit MPA is not particularly well known for its abundance of charismatic species. Notably, no turtles were observed there during the most recent reporting period, from September 2025 to February 2026. This is due to the extensive sandy areas that surround the reef and the lack of the seagrass ecosystem that turtles favour.

However, Dalakit MPA is notable for the high number of giant clams found there. Fish can also be surprisingly abundant there, and it is common to see large groups of adolescent snapper and surgeonfish.

Dalakit demonstrates strong tourism potential, with very high encounter rates for porcupinefish and pufferfish (86.6%), giant clams (79.5%), and slugs (66.1%), all of which are well above typical municipal averages (Table 8). Shrimps (35.7%), cowries (40.2%), and eels and snakes (40.2%) also contribute to the site's strong macro-diver appeal.

However, the site lacked turtles, sharks, stingrays, frogfish, cephalopods, barracuda, syngnathidae and pegasidae, reducing the presence of charismatic megafauna that often attract broader ecotourism interest. Overall, Dalakit offers excellent tourism value, particularly for macro and reef invertebrate enthusiasts, but less so for those seeking encounters with large animals.

GUINSUAN MPA

Guinsuan MPA has an area of 5.6 ha and received MPA status in 2022. The monitoring of this reef by MCP began in 2017. Guinsuan consists of patchy areas of shallow reef (1 - 5 m) that are generally separated from a more extensive area of deeper reef (8 - 18 m) by wide seagrass beds. The deeper reef can be patchy, with areas of sand. Due to its location, the reef is exposed to prevailing winds and is commonly subject to longshore currents and wave action.

MPA demarcation based on DENR coordinates

GUINSUAN MPA

Food Security

Current Status:

In September–February 2025/26, Guinsuan recorded an **average total fish density of ~818 individuals** per 150 m^2, with commercial species contributing ~155 individuals per 150 m^2 (Figure 28). **Commercial biomass was ~10.9 kg per 150 m^2 (~727 kg/ha)**. The assemblage was strongly herbivore-dominated (~715 individuals per 150m^2), with carnivores (~62), omnivores (~11), corallivores (~13), and detritivores (~18) present at lower but stable densities. These values indicate a high-density fish community with moderate commercial biomass.

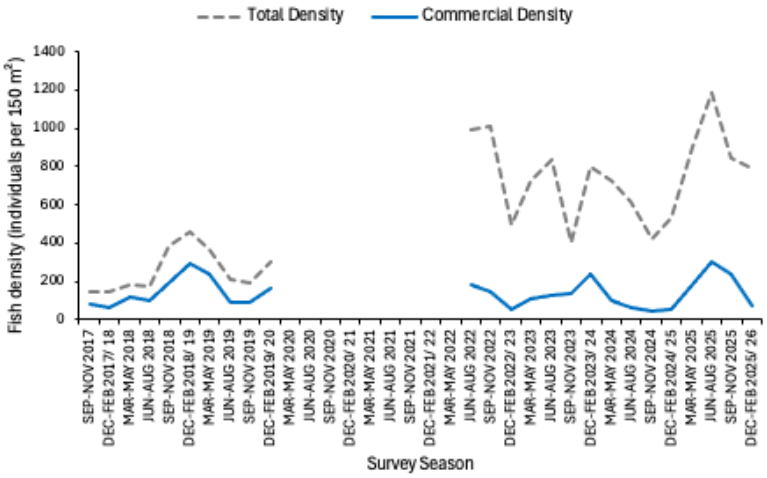


Figure 28. Temporal trends in total fish density and commercial fish density at Guinsuan MPA (2017-2026). Values represent average individuals per 150m^2 recorded during seasonal surveys.

Recent Change:

Compared with the previous reporting season, Guinsuan showed total fish density decreases (1,044 → 818 ind. per 150 m^2). Commercial density also decreased (242 → 155 individuals per 150m^2), and **commercial biomass decreased (15.26 → 10.89 kg per 150m^2)** (Figure 29). Herbivore densities decreased (872 → 715 individuals), alongside carnivores (88 → 62), while omnivores increased slightly. Corallivores remained relatively stable and detritivores decreased slightly. This indicates a decline in overall fish abundance and biomass in the most recent period following a particularly high previous period.

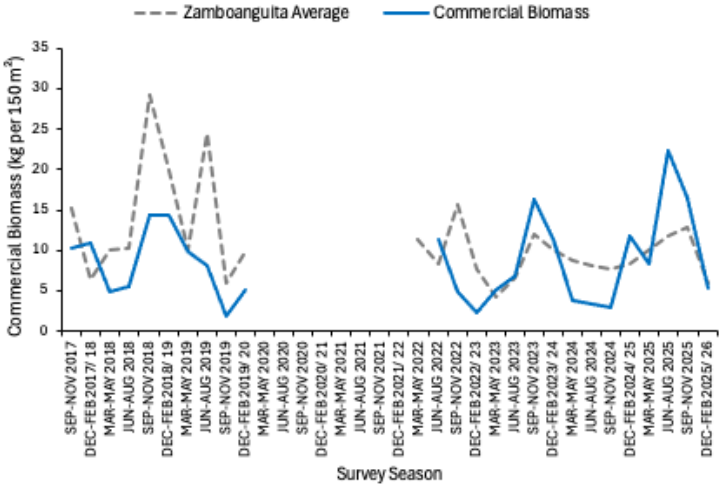


Figure 29. Temporal trends in commercial fish biomass (kg per 150m^2) at Guinsuan MPA (2017-2026). Biomass values represent the estimated weight of commercially important reef fish, providing an indicator of food security potential and MPA effectiveness.

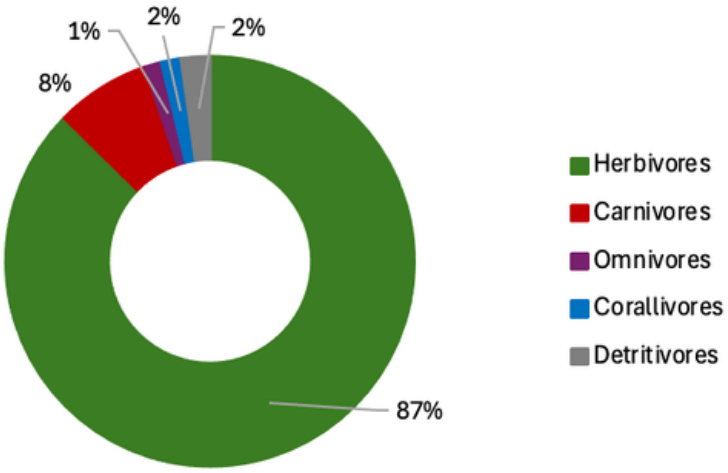


Figure 30. Proportional contribution (%) of dietary groups to total fish density at Guinsuan MPA during Sep–Feb 2025/26. Data include both commercial and non-commercial species, highlighting the ecological importance of abundant herbivores in supporting algal–coral balance.

Dietary structure:

The fish community at Guinsuan is strongly dominated by herbivores (~87%), followed by carnivores (~8%), with omnivores, corallivores, and detritivores making up the remaining ~5% (Figure 30). This indicates a strongly herbivore-dominated reef fish community typical of productive reef systems.

Fusilier	17.47	**Unicornfish**	1.05
Bream	9.48	**Parrotfish**	1.01
Goatfish	7.45	**Triggerfish**	0.69
Snapper	2.41	**Grouper**	0.44
Surgeonfish	2.07	**Big Eye**	0.23

Table 9. Mean biomass (kg per 150m^2) of the ten most abundant commercial fish groups at Guinsuan MPA during Sep–Feb 2025/26. Values represent average biomass per survey and highlight the dominant contributors to the commercial fish community.

Commercial Groups:

At Guinsuan, fusiliers are the most abundant commercial group, followed by bream and goatfish. Snappers and surgeonfish contribute smaller amounts to biomass, while groupers and triggerfish are present in low numbers (Table 9). The commercial fish composition at Guinsuan suggests a functioning reef system with a mix of trophic levels, but with biomass still largely driven by mid-trophic species rather than top predators. Continued protection may allow more high-value predatory species such as groupers and snappers to increase in abundance and size over time, further increasing commercial biomass.

Long-term context:
Long-term data from Guinsuan show that fish density and commercial biomass have fluctuated over time but have generally remained relatively high compared to many other sites in the municipality. In the earlier years of monitoring, fish densities were lower and commercial biomass was more variable, but from around 2022 onwards, there was a noticeable increase in total fish density. In recent years, total fish density has remained consistently high, although commercial biomass has fluctuated between seasons rather than showing a consistent upward trend. This suggests that while the MPA supports a large number of fish, the biomass of commercially important species may be influenced by recruitment variability, growth rates, or movement of fish in and out of the protected area.

The consistently high herbivore density suggests strong grazing pressure, which is beneficial for coral reef health and may help maintain reef resilience. However, the variability in commercial biomass suggests that recovery of large-bodied commercial species may still be ongoing, and long-term protection will be important for continued biomass increases.

Ecological interpretation:
Guinsuan MPA supports a high-density fish community, particularly herbivores, which contribute to reef resilience through grazing. However, despite high fish abundance, commercial biomass is only moderate, suggesting the fish community may be dominated by smaller-bodied fish rather than large individuals. The recent decline in biomass and density may reflect natural variability, recruitment pulses followed by mortality, or fishing pressure outside the MPA affecting fish movement. Continued protection is important to allow fish to grow to larger sizes and increase biomass, particularly among commercially important predator species.

GUINSUAN MPA

Reef Health And Resilience

Current status:

In September–February 2025/26, Guinsuan recorded an **average hard coral cover of ~14.2%, fleshy macroalgae of ~16.3%**, and **rubble of ~10%**. The broader substrate composition indicates that sand (~22%) and sessile invertebrates (~20%) dominate the benthic community, followed by fleshy macroalgae and hard coral (Figure 31). Notably, seagrass makes up a significant share (~11%), providing additional habitat complexity. Bleaching levels remained low during this monitoring period (<4%), suggesting limited visible thermal stress across the reef (32). The reef community at Guinsuan is characterised by moderate macroalgal cover, relatively low coral cover, and a substantial portion of unconsolidated substrate, indicating a structurally mixed benthic habitat.

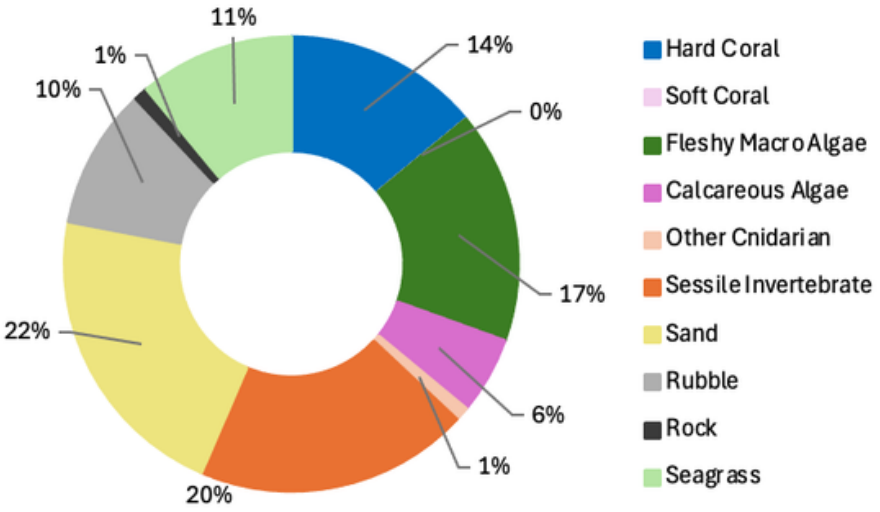


Figure 31. Average benthic substrate composition at Guinsuan MPA (September-February 2025/26). Values represent the proportional contribution (%) of different benthic categories pooled across all surveys.

Recent change:

Since the last report, hard coral cover at Guinsuan increased slightly (13.2% → 14.2%), suggesting modest coral growth or seasonal recovery across the site (Figure 33). Fleshy macroalgae also increased (14.7% → 16.3%), indicating a moderate rise in algal presence on the reef. Rubble increased slightly (9.2% → 10%), suggesting relatively stable but still moderately disturbed substrate conditions. Overall, Guinsuan experienced small increases in both coral and macroalgae, while rubble remained relatively stable. These changes indicate a benthic community that remains dynamic but without major structural shifts during the most recent monitoring period.

Structural implications:

The relatively low coral cover combined with moderate macroalgae suggests that coral currently occupies a limited proportion of the available reef substrate. The high proportion of sand and sessile invertebrates indicates that much of the habitat is composed of non-coral benthic categories. While sessile invertebrates contribute to reef biodiversity and structural complexity, they may also compete with corals for space. Rubble levels around 10% indicate some degree of substrate instability, which can reduce coral recruitment if rubble fragments remain mobile. However, rubble levels remain lower than those observed at several other monitoring sites. Guinsuan appears to support a heterogeneous benthic community with limited coral dominance, where multiple substrate types share available habitat space.

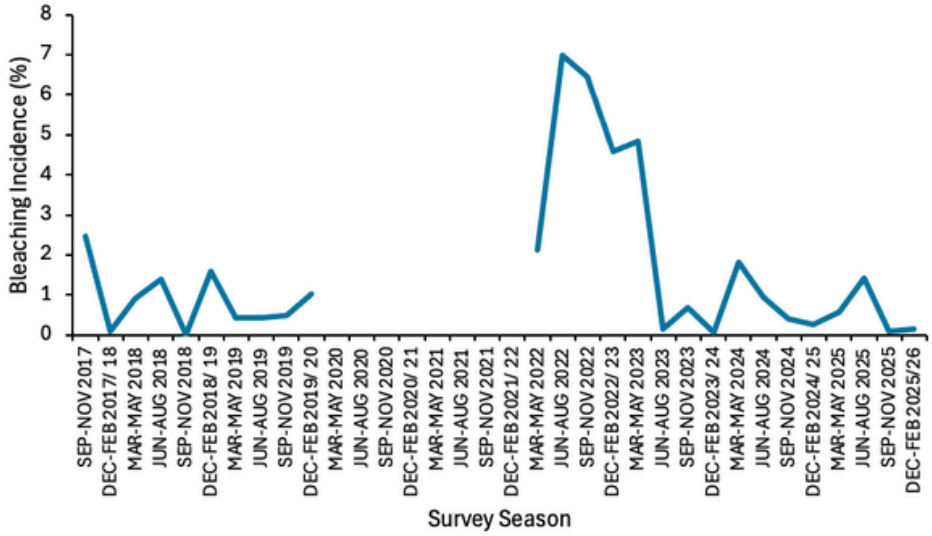


Figure 32. Seasonal bleaching incidence at Guinsuan MPA (2017–2026), shown as average percentage of colonies observed with visible bleaching (either partially or fully bleached) per survey season.

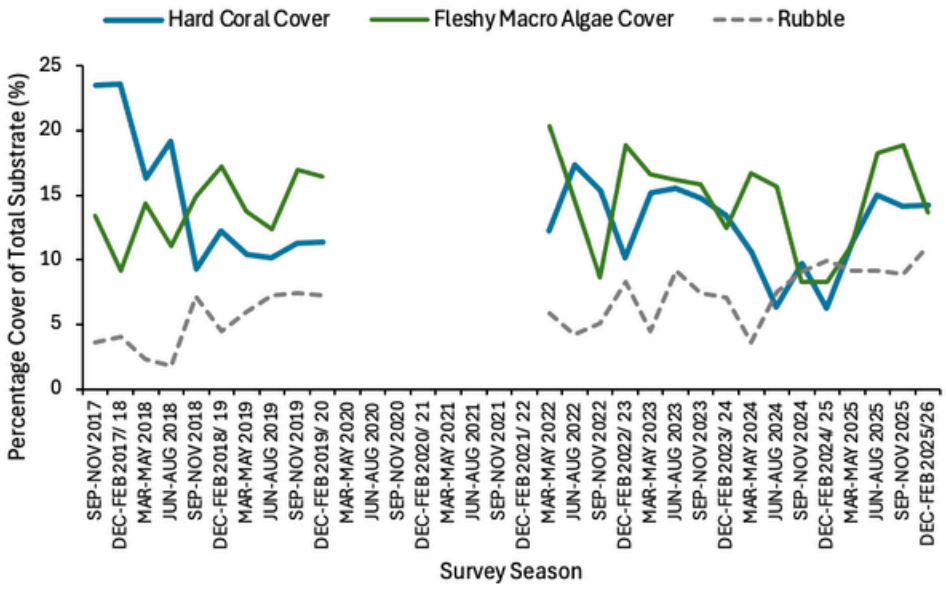


Figure 33. Temporal trends in hard coral cover, fleshy macroalgae cover, and rubble at Guinsuan MPA (2017–2026). Data is expressed as average percentage cover per survey season.

Long-term context:
Historical monitoring data indicate that coral cover at Guinsuan has remained relatively low throughout the monitoring record, generally ranging between 10-23% since surveys began in 2017. Coral cover declined notably after 2018-2019, when values exceeded 20%, and has since stabilised within the 10-16% range. Macroalgae have fluctuated moderately across the monitoring period but typically remain between 10-20% cover. Rubble levels have remained consistently present throughout the monitoring record, typically ranging from 5-10%, suggesting persistent low-level disturbance or slow consolidation of reef structure. Recent monitoring periods show generally low bleaching levels, indicating that thermal stress has been limited in the most recent survey cycles.

Ecological interpretation:
Guinsuan's benthic community appears to represent a low coral, mixed substrate reef system where coral cover remains relatively limited but stable over time. The moderate presence of macroalgae and rubble suggests that competition for space and substrate instability may constrain coral expansion. Additionally, the high proportion of sand and sessile invertebrates indicates that large areas of the reef are not currently dominated by reef-building corals. Despite these limitations, coral cover has shown a slight recent improvement, and the continued absence of significant bleaching pressure may provide favourable conditions for gradual coral recovery. Maintaining strong MPA protection and herbivore populations will be important to prevent macroalgal expansion and support future coral recruitment. With stable environmental conditions, Guinsuan may slowly increase coral cover, although recovery is likely to remain gradual.

GUINSUAN MPA

Invertebrate Status

The invertebrate community at Guinsuan was characterised by moderate invertebrate density but relatively low species richness compared to other sites in the Zamboanguita municipality. Average invertebrate density ranged from ~15.46 to 22.31 individuals per survey, while species richness was ~1.7 species per survey, indicating a community with relatively low diversity.

Commercially important invertebrates were present at moderate densities (16%), while indicator (sensitive) species were recorded at moderate to high densities (37%) (Figure 34). Ecosystem engineers occupied 29%, and benthic-associated species occupied 11%, suggesting a fairly balanced functional group composition. Charismatic species density remained relatively low but consistent (6%).

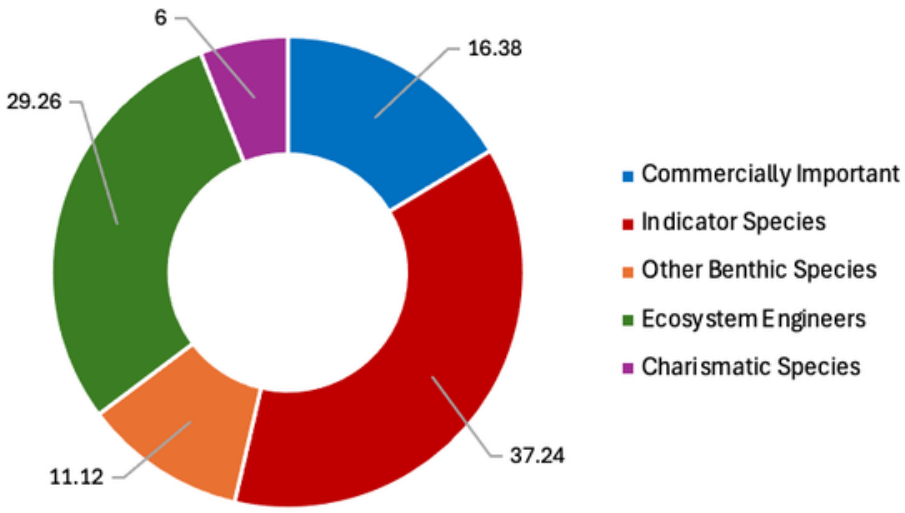


Figure 34. Proportional contribution (%) of invertebrate functional groups at Guinsuan MPA during Sep–Feb 2025/26.

Ecological Interpretation:

Ecologically, Guinsuan appears to support a moderate but relatively low density invertebrate community, with a community structure shared between sea urchins and sea cucumbers, rather than being dominated by a single group. The presence of mid-sized sea cucumbers suggests that the site may provide suitable habitat for sea cucumber growth and survival, although the lack of small individuals may indicate low recruitment, cryptic juveniles, or previous fishing pressure removing smaller size classes.

Sea Urchins - Diadema	1.92
Sea Cucumbers - Pinkfish	1.39
Bivalves - Other	0.43
Gastropods - Other Shell	0.32
Bivalves - Pearl Oyster	0.26
Gastropods - Cone	0.24
Gastropods - Scorpion Spider Conch	0.17
Gastropods - Tiger Cowrie	0.14

Table 10. Most abundant commercial invertebrates at Guinsuan MPA during Sep–Feb 2025/26. Values represent average density per survey and highlight the dominant contributors to the commercial benthic community.

The dominance of small Diadema sea urchins indicate ongoing recruitment and grazing pressure, which may play an important role in controlling algal growth on the reef (Table 10). However, as with other sites, a population dominated by small individuals may indicate environmental pressure, predation, or harvesting of larger individuals.

Overall, Guinsuan represents a site with moderate invertebrate density, low species richness, a stable sea cucumber population, and a juvenile-dominated sea urchin population, with no giant clams present. The site appears to support commercially important invertebrates but at lower densities than the most productive sites in the municipality, and continued monitoring will be important to determine whether sea cucumber recruitment increases and whether species richness improves over time.

GUINSUAN MPA

Tourism Value

Barracudas	4.55	**Scorpaenidae**	55.58
Cephalopods	2.73	**Sharks**	0
Cowries	29.06	**Shrimps**	45.42
Eels and Snakes	50.79	**Slugs**	35.14
Frogfish	10.44	**Stingrays**	0
Giant Clams	6.27	**Syngnathidae and Pegasidae**	2.76
Porcupinefish and Pufferfish	87.56	**Turtles**	55.68

Table 11. Mean encounter rates (%) of selected indicator and charismatic taxa recorded at Guinsuan MPA from September - February 2025/26. Values represent the percentage of dives in which each group was observed, providing an indication of their relative tourism and ecological value.

The presence of extensive seagrass beds at Guinsuan makes it a relatively good location to see turtles. Whilst the relatively high incidence of nudibranchs and cleaner shrimps does suggest some potential for dive tourism, the densest part of the reef is a relatively long distance away from shore and requires a considerable swim. The reef is also relatively small and can experience strong currents, so it is a site best accessed with boat support.

Guinsuan offers high tourism value, with robust encounter rates for porcupinefish and pufferfish (87.56%), turtles (55.7%), and scorpaenidae (55.6%), making it appealing to both macro and megafauna-oriented divers (Table 11). Slugs (35.1%), shrimps (45.4%), and eels and snakes (50.8%) are also abundant, reinforcing its status as a biodiverse dive site. Frogfish (10.4%) add niche interest. By contrast, giant clams (6.3%), cowries (29.1%), and syngnathids (28%) are less prominent, and sharks and stingrays are absent.

Overall, Guinsuan combines reliable macro sightings with some of the highest turtle encounter rates in the municipality, giving it a strong all-round tourism appeal.

LATASON MPA

Latason MPA has an area of 1.9 ha and consists of shallow and medium coral reefs surrounded by sand flats and seagrass. The depth of the reef ranges from 1 to 13 m. Due to its location, the reef is relatively protected from prevailing winds, which generally limit longshore currents and wave action. The site is subject to a relatively large amount of boat traffic, as the southern part of the site is used as a mooring ground by local fishing vessels. MCP began monitoring Latason in 2022, the year it received MPA status.

MPA demarcation based on DENR coordinates

LATASON MPA

Food Security

Current Status:

In September–February 2025/26, Latason recorded an **average total fish density of ~417 individuals** per 150 m^2, with commercial species contributing ~76 individuals per 150 m^2. **Commercial biomass was modest at ~3.27 kg per 150m^2 (~216 kg/ha)** , placing Latason among the lower-performing MPAs in Zamboanguita (Figure 35). Herbivores dominated the assemblage (~351 individuals per 150m^2), followed by carnivores (~40), while omnivores (~10), corallivores (~8), and detritivores (~8) were present in smaller numbers.

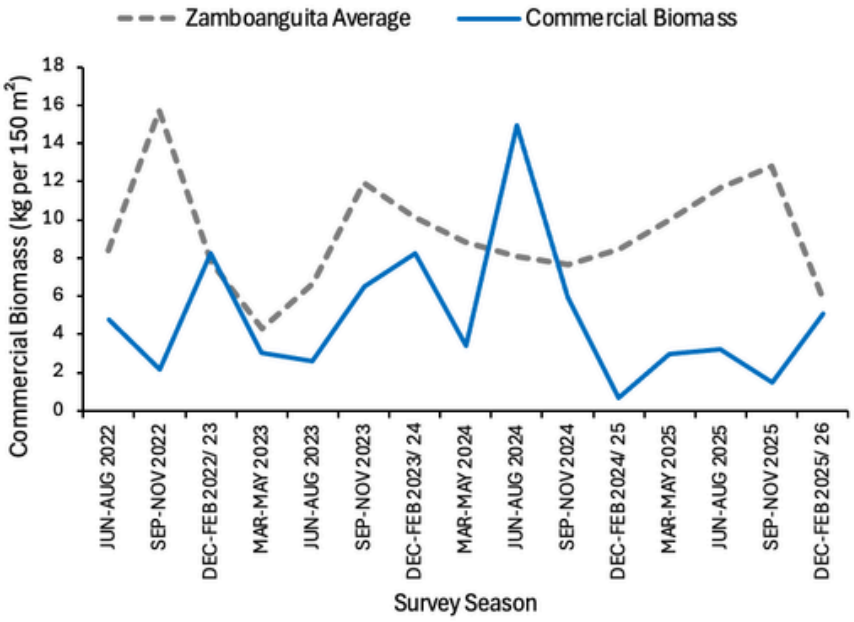


Figure 35. Temporal trends in commercial fish biomass (kg per 150m^2) at Latason MPA (2022-2026). Biomass values represent the estimated weight of commercially important reef fish, providing an indicator of food security potential and MPA effectiveness.

Recent Change:

Compared with the last reporting period, Latason's total fish density remained relatively stable (406 → 417 ind.), indicating little overall change in fish abundance. However, commercial density increased substantially (41 → 76 individuals), suggesting a recent rise in the number of target species within the MPA (Figure 36). Commercial biomass showed only a slight increase 3.12 → 3.27 kg), indicating that although more commercial fish are present, they are still relatively small in size. Herbivore density increased slightly (324 → 351 ind.), while carnivores increased slightly (40 → 45 ind.), and other functional groups remained relatively stable. This pattern suggests early signs of recovery in commercial fish numbers, but not yet in biomass, highlighting a lag between recruitment and growth to larger size classes.

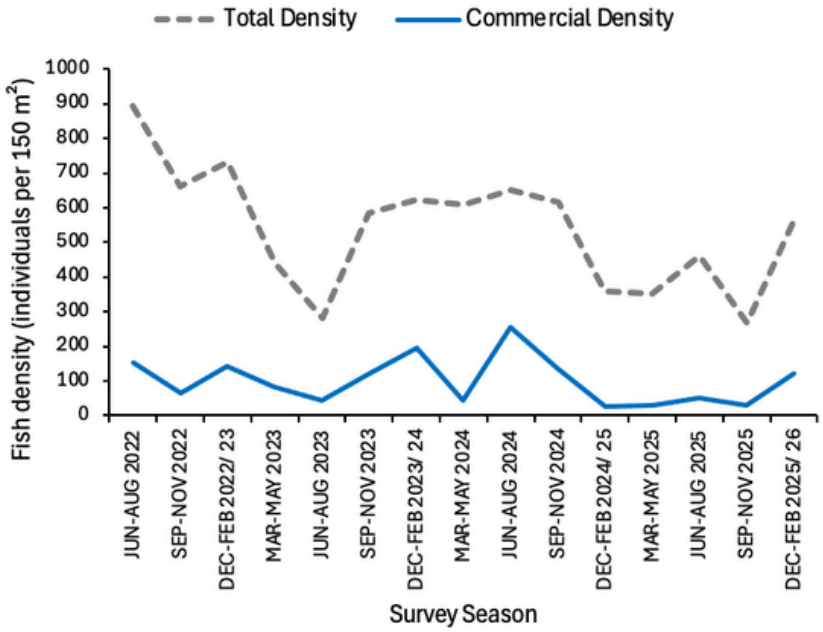


Figure 36. Temporal trends in total fish density and commercial fish density at Latason MPA (2022-2026). Values represent average individuals per 150m² recorded during seasonal surveys.

Dietary structure:

The fish community at Latason remains strongly dominated by herbivores, which account for approximately ~84% of total fish density. Carnivores make up around ~10%, while omnivores, corallivores, and detritivores together contribute the remaining ~6% (Figure 37). This trophic structure indicates a reef system where grazing processes are likely well maintained, helping to control algal growth and support coral health. However, the relatively low proportion of carnivores suggests limited predation presence, which may reduce top-down control within the ecosystem.

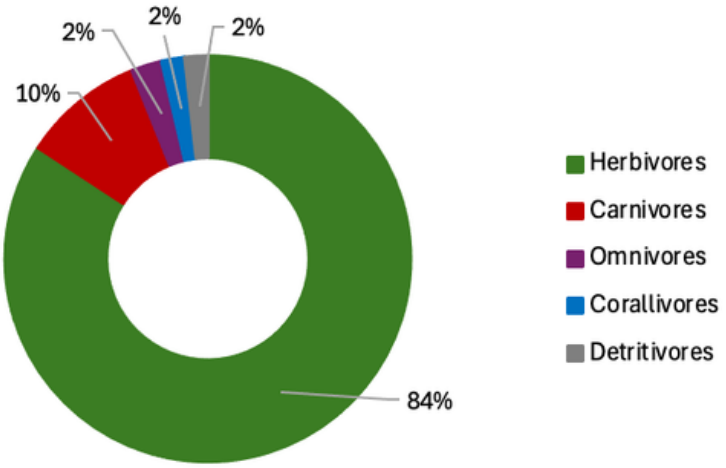


Figure 37. Proportional contribution (%) of dietary groups to total fish density at Latason MPA during Sep–Feb 2025/26. Data include both commercial and non-commercial species, highlighting the ecological importance of abundant herbivores in supporting algal–coral balance.

Fusilier	45.62	**Parrotfish**	0.82
Barracuda	4.60	**Triggerfish**	0.79
Goatfish	3.37	**Grouper**	0.59
Unicornfish	2.13	**Surgeonfish**	0.53
Bream	1.64	**Rabbitfish**	0.47

Table 12. Mean biomass (kg per 150m^2) of the ten most abundant commercial fish groups at Latason MPA during Sep–Feb 2025/26. Values represent average biomass per survey and highlight the dominant contributors to the commercial fish community.

Commercial Groups:
Fusiliers dominate the commercial fish community at Latason, contributing the majority of both density and biomass. Secondary contributions come from barracuda and goatfish, while unicornfish, bream, and groupers are present in smaller numbers (Table 12). The presence of some higher torphic level species such as barracuda, is encouraging; however, the low abundance of groupers and other large-bodied predators indicates that the commercial fish assemblage is still skewed toward smaller or mid-sized species, limiting overall biomass.

Long-term context:
Long-term trends at Latason indicate that while fish density has remained relatively moderate over time, commercial biomass has fluctuated and generally remained lower than at stronger MPA sites such as Basak. This suggests that although the reef consistently supports fish populations, it has not yet developed high standing biomass of commercially important species.

Ecological interpretation:
Latason MPA supports a moderately abundant fish community, but relatively low commercial biomass compared to other MPAs in Zamboanguita. The dominance of herbivores is a positive sign for reef resilience, as it promotes coral recovery and prevents algal growth. However, the low biomass and limited abundance of large predators suggest that the MPA is not yet fully effective in rebuilding higher trophic levels or larger commercial fish populations. This may reflect factors such as fishing pressure around the MPA, enforcement limitations, or habitat differences. The recent increase in commercial density is encouraging and may indicate early-stage recovery, but continued protection and effective management will. be necessary to allow fish to grow to larger sizes and increase overall biomass. The lack of data prior to its designation as an MPA in 2022 makes it impossible to determine how it performed in terms of commercial fish production in the past.

LATASON MPA

Reef Health And Resilience

Considering monitoring only started at Latason MPA in 2022, the same year it was established as a protected area, it's challenging to identify any long-term trends. The reef within the MPA is typically shallow, with most parts reaching a maximum depth of only around 14 meters.

Current status:

In September–February 2025/26, Latason MPA recorded an **average hard coral cover of ~21.8%**, **fleshy macroalgae of ~25.8%**, and **rubble of ~5.4%**. The broader substrate composition indicates that fleshy macroalgae and hard coral are the dominant benthic components, followed by sand (~14%) and seagrass (~11%), with additional contributions from soft corals (~8%) and sessile invertebrates (~7%) (Figure 38). Bleaching levels remain low overall, averaging ~1.3%, suggesting minimal visible thermal stress during the monitoring period. The reef at Latason therefore supports a mixed coral-algal community, where reef-building corals remain a major structural component but coexist with relatively high algal cover.

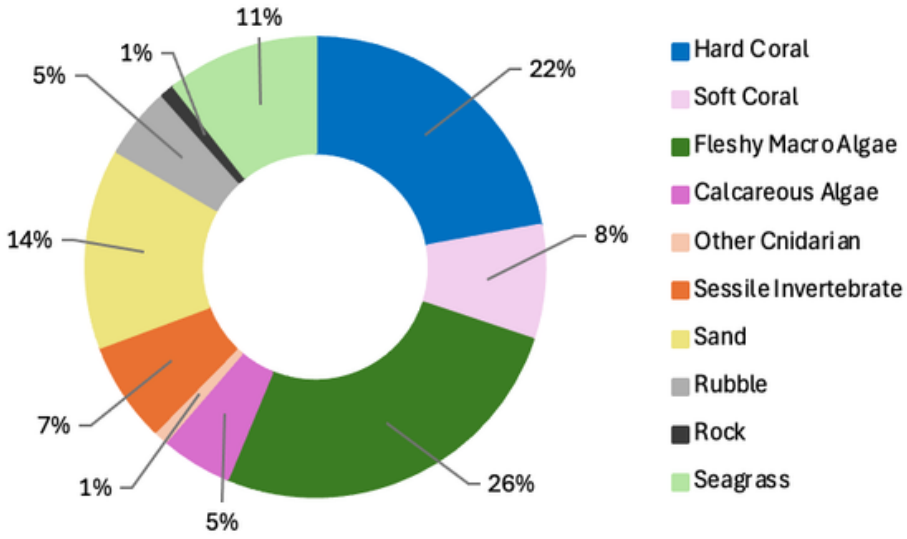


Figure 38. Average benthic substrate composition at Latason MPA (September-February 2025/26). Values represent the proportional contribution (%) of different benthic categories pooled across all surveys.

Recent change:

Since the last report, **hard coral cover at Latason decreased slightly (23.5% → 21.8%), indicating a modest reduction in coral presence across the site.** Fleshy macroalgae increased substantially (18.8% → 25.8%), representing the most notable benthic change during this reporting period. In contrast, rubble declined considerably (9.2% → 5.4%) (Figure 39).

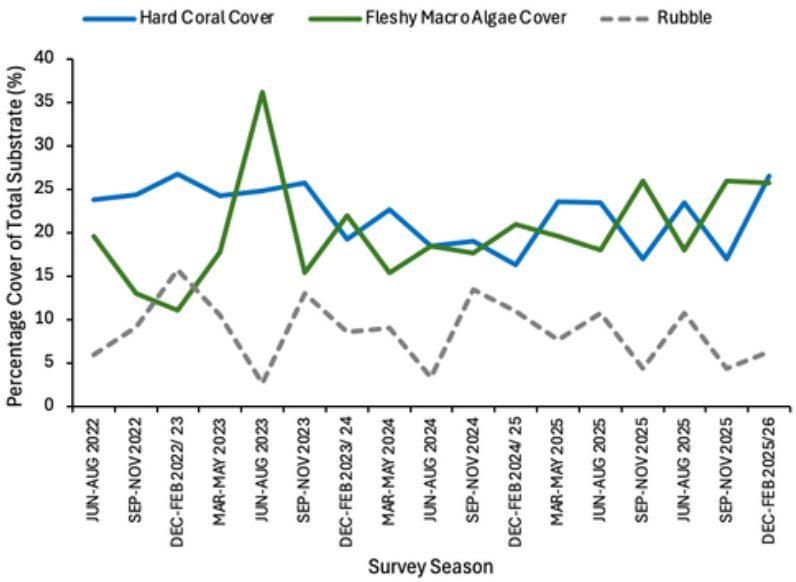


Figure 39. Temporal trends in hard coral cover, fleshy macroalgae cover, and rubble at Latason MPA (2022–2026). Data is expressed as average percentage cover per survey season.

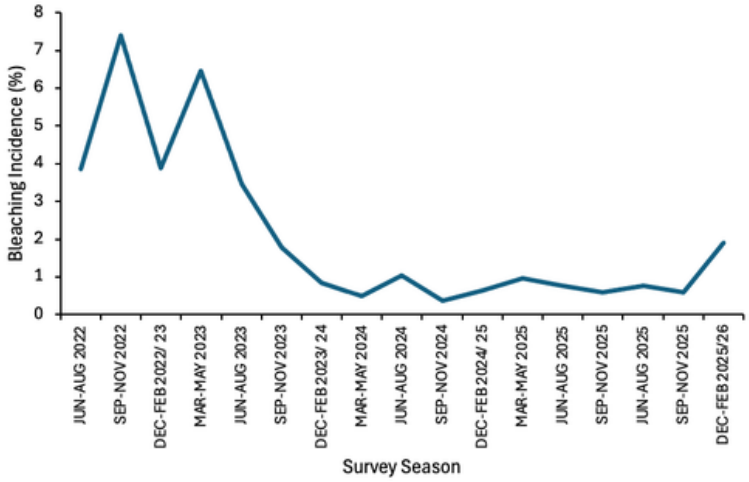


Figure 40. Seasonal bleaching incidence at Latason MPA (2022–2026), shown as average percentage of colonies observed with visible bleaching (either partially or fully bleached) per survey season.

Bleaching increased slightly (0.9% → 1.3%), although levels remain low and do not currently indicate significant thermal stress (Figure 40). Overall, Latason experienced declining coral cover alongside a notable increase in macroalgae, while reductions in rubble suggest improved consolidation of the reef substrate.

Structural implications:

The combination of moderate coral cover and relatively high macroalgal cover indicates that Latason's benthic community is shaped by strong competition for space between corals and algae. The reduction in rubble to relatively low levels (~5%) suggests that much of the reef substrate is stable, which generally supports coral recruitment and long-term reef development. However, the increased presence of macroalgae may limit coral settlement if algal growth begins to occupy available substrate. The presence of seagrass (~11%) and sand (~14%) also highlights the heterogeneous nature of the habitat, with a mixture of reef and soft substrate environments contributing to overall ecosystem diversity.

Long-term context:
Since monitoring began in 2022, coral cover at Latason has remained relatively consistent, generally ranging between (18–26%). This indicates a moderately stable coral community, although levels remain lower than those typically associated with highly coral-dominated reefs. Macroalgae have fluctuated more strongly over time, occasionally exceeding 30% cover, suggesting periodic shifts in algal abundance across the reef. Rubble has also varied considerably, ranging from ~2% to 15%, reflecting intermittent disturbance and substrate instability. Bleaching levels peaked in 2022-2023, reaching 7-8%, but have since declined substantially and now remain low in recent monitoring periods.

Ecological interpretation:
Latason appears to support a moderately coral-dominated but highly dynamic benthic community, where coral cover remains relatively stable but algal abundance fluctuates considerably. The recent reduction in rubble is encouraging, as stable substrate conditions generally favour coral recruitment and reef consolidation. However, the simultaneous increase in macroalgae suggests that algal competition may become a key constraint on coral expansion if grazing pressure declines. Bleaching pressure is currently minimal, reducing immediate climate-related stress on the reef. If herbivore populations remain strong and macroalgal expansion is controlled, Latason has the potential to maintain or gradually increase coral cover over time.

LATASON MPA

Invertebrate Status

The invertebrate community at Latason showed moderate invertebrate density and moderate species richness compared to other sites in the Zamboanguita municipality. Average invertebrate density ranged from ~17.36 to 23.23 individuals per survey, while species richness was ~2.4 species per survey, indicating a moderately diverse invertebrate community.

Commercially important invertebrates were present at moderate densities (30%), while indicator (sensitive) species were also recorded at moderate densities (36%) (Figure 41). Ecosystem engineer density occupied 19%, largely driven by sea urchins, while benthic-associated species were present at relatively low densities (5%). Charismatic species density occupied 11%, indicating occasional presence of visually notable species such as cowries and larger gastropods.

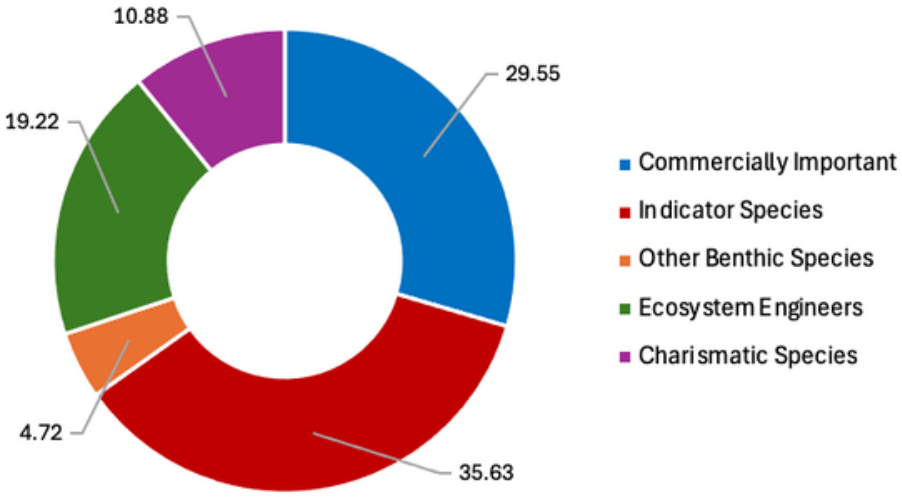


Figure 41. Proportional contribution (%) of invertebrate functional groups at Latasan MPA during Sep–Feb 2025/26.

Ecological Interpretation:
Ecologically, Latason appears to support a moderately abundant and moderately diverse invertebrate community, with a community structure influenced primarily by sea urchins, which contribute significantly to ecosystem engineer and indicator species densities (Table 13). The dominance of juvenile sea urchins suggests ongoing recruitment and active grazing pressure, which may help control algal growth but may also indicate ecological imbalance if predator populations are low.

Sea Urchins - Diadema	4.73
Gastropods - Cone	0.91
Gastropods - Other Shell	0.89
Bivalves - Other	0.74
Bivalves - Pearl Oyster	0.73
Sea Cucumbers - Pinkfish	0.38
Gastropods - Scorpion Spider Conch	0.30
Gastropods - Tiger Cowrie	0.30

Table 13. Most abundant commercial invertebrates at Latason MPA during Sep–Feb 2025/26. Values represent average density per survey and highlight the dominant contributors to the commercial benthic community.

The presence of adult sea cucumbers but few juveniles suggests that while the habitat can support sea cucumber survival, recruitment may be limited, which could lead to population declines over time if not monitored. The presence of juvenile boring giant clams suggests some recruitment is occurring, but the absence of larger clams indicates that long-term survival may be limited.

Overall, Latason represents a moderately productive reef for commercially important invertebrates, particularly sea urchins and gastropods, but with low sea cucumber densities and very low giant clam abundance. Continued monitoring is recommended to assess whether juvenile clams survive to larger size classes and whether sea cucumber recruitment improves over time.

LATASON MPA

Tourism Value

Barracudas	15.56	**Scorpaenidae**	40.12
Cephalopods	11.08	**Sharks**	9.61
Cowries	36.02	**Shrimps**	62.90
Eels and Snakes	37.11	**Slugs**	65.53
Frogfish	15.18	**Stingrays**	2.64
Giant Clams	22.54	**Syngnathidae and Pegasidae**	13.17
Porcupinefish and Pufferfish	76.99	**Turtles**	14.02

Table 14. Mean encounter rates (%) of selected indicator and charismatic taxa recorded at Andulay MPA from September - February 2025/26. Values represent the percentage of dives in which each group was observed, providing an indication of their relative tourism and ecological value.

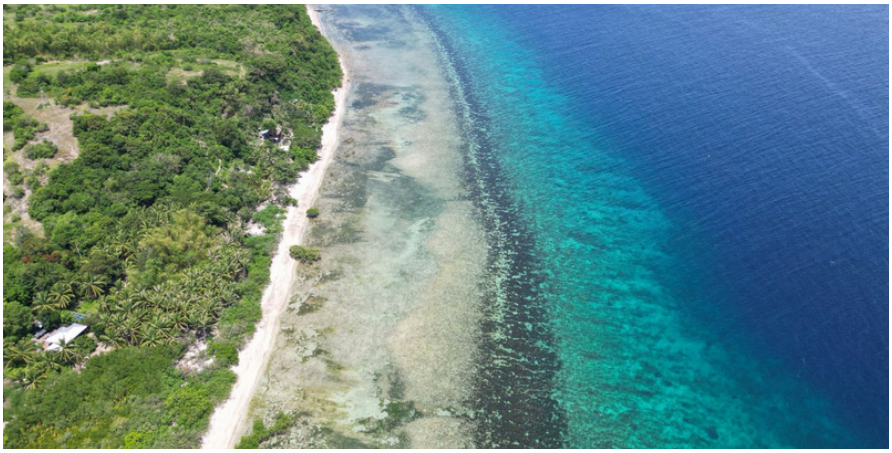
Latason is not particularly well known as a dive site, and it doesn't host the most abundant numbers of charismatic species. However, the expansive seagrass beds and shallow, colourful corals can make it an enjoyable dive site. It can be pretty good for nudibranchs and sea slugs, and **some rarer species, such as flamboyant cuttlefish and blue-ring octopi,** have been observed there, although this is not captured in the data.

Latason demonstrates strong tourism potential, with very high encounter rates for porcupinefish and pufferfish (77%), slugs (65.5%), and shrimps 62.9%), all of which are well above municipal averages (Table 14). Cowries (36%) are also common, adding to the site's appeal for macro enthusiasts. Eels and snakes (37.1%), scorpaenids (40.1%), and syngnathids (13.2%) provide additional diversity, while frogfish (15.2%) offer niche photographic interest.

Larger fauna are present but limited, with only occasional turtles 14%) and a number of shark sightings (9.6%), and no stingrays. **Two resident bamboo sharks** have been observed since the previous reporting period, whose location is known, providing a rare but notable sighting of megafauna that elevates Latason's tourist profile.

Overall, Latason is a high-value macro and invertebrate site, with particularly strong mollusc and fish diversity; its megafauna presence is modest compared to other sites.

LUTOBAN GAC-ANG MPA



Lutoban MPA has an area of 15.1 ha and is the largest MPA in the southern part of Negros. Due to its size, two sites are monitored at Lutoban, which are then combined to obtain a representative average for the whole site. It consists of shallow to deep coral reefs ranging from 1 to 25 m. Extensive seagrass beds are present between the shoreline and the reef slope. The reef is relatively protected from prevailing winds, though it is occasionally affected by longshore current and wave action.

MPA demarcation based on DENR coordinates

LUTOBAN GAC-ANG MPA

Food Security

- It should be noted that, due to the large size of Lutoban MPA (15.1 hectares), we surveyed at two separate sub-sites (termed Lutoban North and Lutoban South) to obtain a more representative view of the MPA as a whole. All values for Lutoban MPA are taken as the average (mean) value of the two sub-sites.

Anecdotal reports of illegal fishing at Lutoban, if correct, presumably impact the fish biomass, at this, the largest and oldest MPA in Zamboanguita.

Current Status:

In September–February 2025/26, Lutoban MPA recorded an average total fish density of ~527 individuals per 150 m^2, with commercial species contributing around 67 individuals per 150 m^2. **Commercial biomass was ~5.49 kg per 150m^2 (~362 kg/ha)** (Figure 42). Herbivores dominated the assemblage (~441 individuals per 150 m^2), followed by carnivores (~58), omnivores (~9), corallivores (~9), and detritivores (~9). Overall, Lutoban supports moderate fish density and a moderate commercial biomass, suggesting that the MPA is supporting fish populations but not at the same biomass levels as the strongest MPAs in the area.

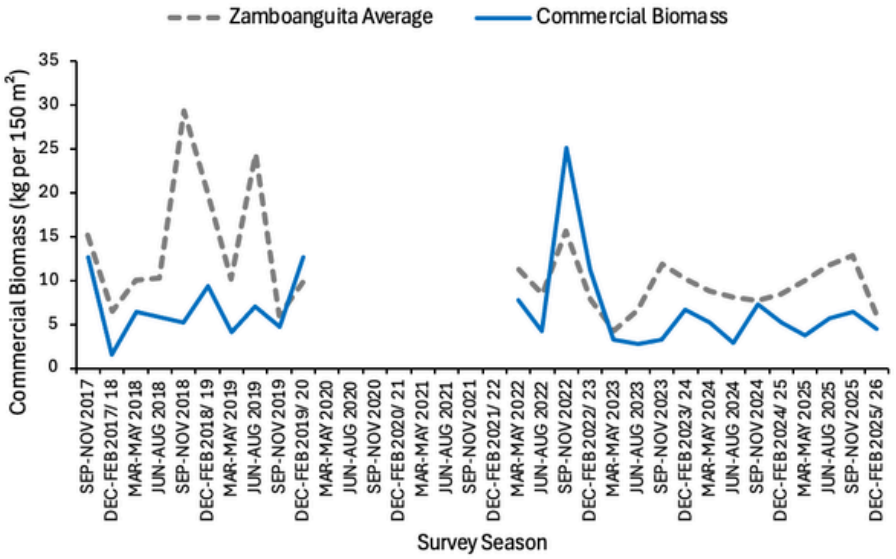


Figure 42. Temporal trends in commercial fish biomass (kg per 150m^2) at Lutoban MPA (2017-2026). Biomass values represent the estimated weight of commercially important reef fish, providing an indicator of food security potential and MPA effectiveness.

Recent Change:

Compared with the last reporting period, Lutoban total fish density decreased slightly (529 → 527 individuals; overall relatively stable), while commercial density increased slightly (57 → 67 individuals) (Figure 43). Commercial biomass also increased slightly from 4.76 → 5.49 kg per 150m^2, indicating a small increase in commercially important fish biomass.

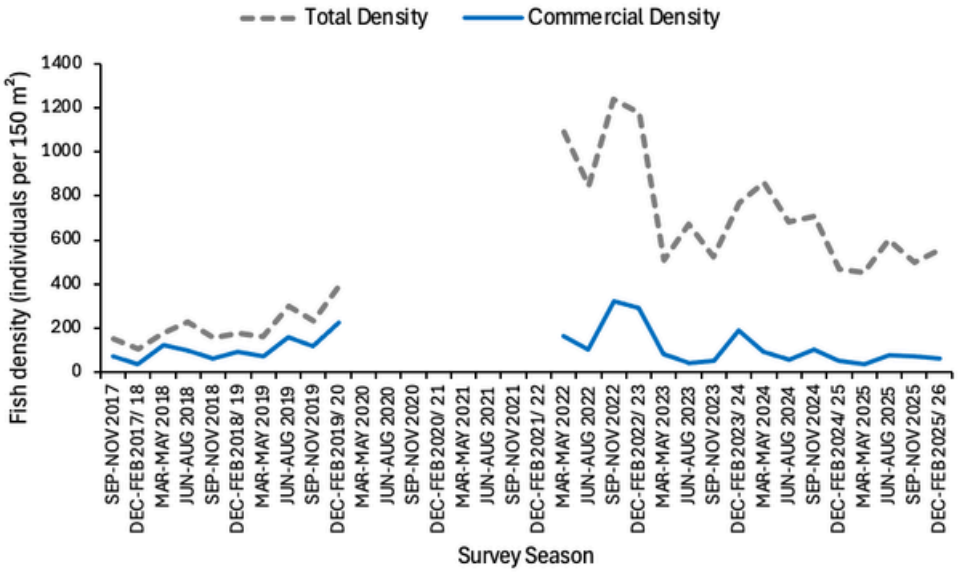


Figure 43. Temporal trends in total fish density and commercial fish density at Lutoban MPA (2017-2026). Values represent average individuals per 150m² recorded during seasonal surveys.

Herbivore density decreased slightly (451 → 441 ind.), along with carnivores (63 → 58 ind.), and omnivores, corallivores, and detrivores remained relatively stable. These results suggest that the Lutoban fish community has remained relatively stable over the past year, with only small fluctuations in density and biomass. The slight increase in commercial biomass suggests that some commercially important fish may be increasing in size or abundance, although the changes are relatively small.

Dietary structure:

The fish assemblage remains strongly herbivore-dominated (84%), a positive sign for maintaining algal control and coral recovery (Figure 44). Carnivores are present in moderate densities (11%), helping support the trophic balance. Omnivores, corallivores, and detritivores together make up the remaining ~5% of the fish community. This structure indicates that herbivory is the dominant ecological function on this reef, which is important for controlling algal growth and maintaining coral reef health. The presence of carnivores indicates some level of trophic balance, although predator abundance is still relatively low compared to herbivores.

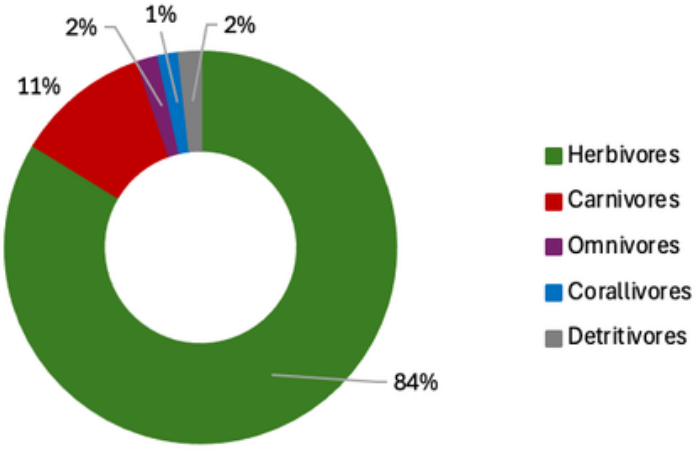


Figure 44. Proportional contribution (%) of trophic group densities to the total fish density at Lutoban MPA during Sep–Feb 2025/26. Values include both commercial and non-commercial species, ensuring that the role of abundant herbivores in maintaining algal–coral balance is represented.

Fusilier	19.85	**Grouper**	1.28
Goatfish	3.51	**Parrotfish**	1.08
Bream	2.67	**Triggerfish**	0.97
Soldierfish	2.10	**Surgeonfish**	0.48
Unicornfish	1.66	**Snapper**	0.33

Table 15. Mean biomass (kg per 150m^2) of the ten most abundant commercial fish groups at Lutoban MPA during Sep–Feb 2025/26. Values represent average biomass per survey and highlight the dominant contributors to the commercial fish community.

Commercial Groups:
At Lutoban MPA, the commercial fish community is dominated by fusiliers, which contribute the largest proportion of commercial biomass (Table 15). Other important commercial groups include goatfish, bream, and soldierfish, with smaller contributions from groupers, parrotfish, triggerfish, surgeonfish, unicornfish, and snapper. The presence of groupers and snappers indicates that some high-value predatory species are present within the MPA, although their abundance is relativley low compared to fusiliers and other mid-sized commercial species. This suggests that while the MPA is supporting commercially important fish species, large predatory fish are still relatively limited in abundance, which may explain the moderate commercial biomass recorded at the site.

Long-term context:
Long-term data from Lutoban shows a clear increase in fish density over time. Commercial biomass has fluctuated over time, but has generally remained moderate, with occasional peaks (e.g. 2019-2020 and 2022-2023). In recent years, commercial biomass has remained relatively stable at moderate levels rather than showing a strong increasing trend. These long-term trends suggest that fish abundance at Lutoban has increased over time, likely reflecting the positive effects of protection, particularly for herbivorous fish. However, the more moderate and variable commercial biomass suggests that recovery of large commercially valuable species is slower and may still be ongoing.

Ecological interpretation:
Lutoban MPA supports moderate fish density and moderate commercial biomass, with a fish community strongly dominated by herbivores. The long-term increase in fish density suggests that the MPA is having a positive effect on fish abundance, particularly for herbivorous species that play an important role in reef health and resilience. However, the relatively moderate commercial biomass and low abundance of large predatory fish suggests that the MPA has not yet reached the biomass levels seen in the strongest MPAs in the municipality. This may reflect differences in MPA size, habitat structure, age or enforcement effectiveness. Overall, Lutoban appears to be a moderately effective MPA, supporting stable fish populations and moderate commercial biomass, but with potential for further recovery of large commercially important fish species over time.

LUTOBAN GAC-ANG MPA

Reef Health And Resilience

Current status:

In September–February 2025/26, Lutoban MPA recorded an **average hard coral cover of ~19.7%**, **fleshy macroalgae of ~18.4%**, and **rubble of ~12.5%**. The broader substrate composition indicates that hard coral and macroalgae are among the dominant benthic components, alongside sand (~15%) and rubble, with additional contributions from soft corals (‘11%) and seagrass (~9%) (Figure 45). Bleaching levels remained low during this monitoring period, averaging ~1.3%, indicating minimal visible thermal stress across coral colonies. Overall, Lutoban supports a mixed benthic community, where reef-building corals contribute substantially to reef structure but coexist with notable algal cover and a persistent rubble fraction.

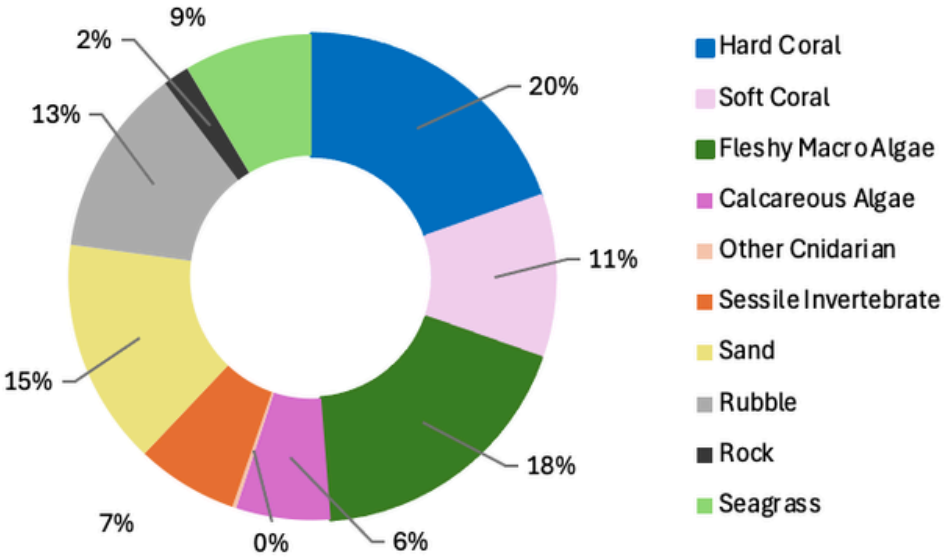


Figure 45. Average benthic substrate composition at Lutoban MPA (September-February 2025/26). Values represent the proportional contribution (%) of different benthic categories pooled across all surveys.

Recent change:

Since the last report, **hard coral cover at Lutoban MPA has increased modestly (17.3% → 19.7%)**, suggesting gradual recovery or seasonal coral growth across the site (Figure 46). Fleshy macroalgae also increased (13.9% → 18.4%), indicating greater algal presence during the most recent monitoring period. In contrast, rubble declined from 16.1 → 12.5%), representing a noticeable reduction in unconsolidated substrate. Bleaching levels remained low overall, with a slight decrease observed between reporting periods (47). Taken together, these changes suggest improving structural stability through reduced rubble, although increasing macroalgae may introduce additional competition for available substrate.

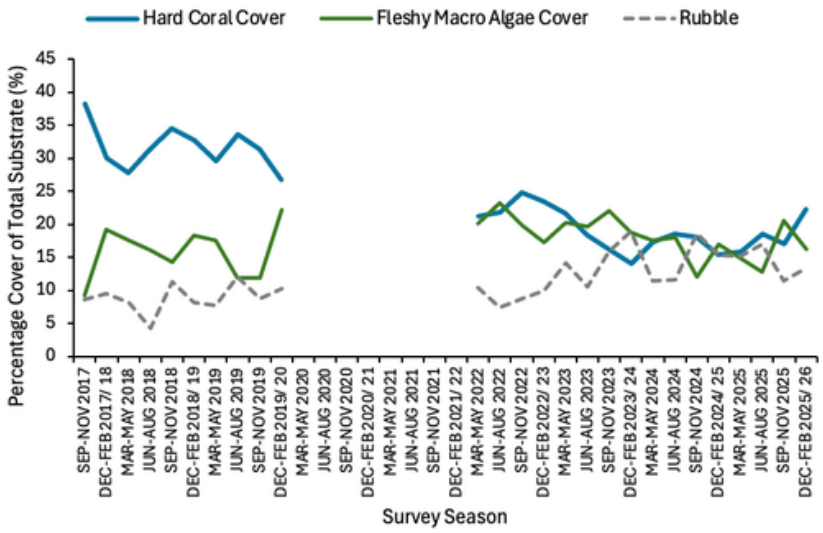


Figure 46. Temporal trends in hard coral cover, fleshy macroalgae cover, and rubble at Lutotban MPA (2017–2026). Data is expressed as average percentage cover per survey season.

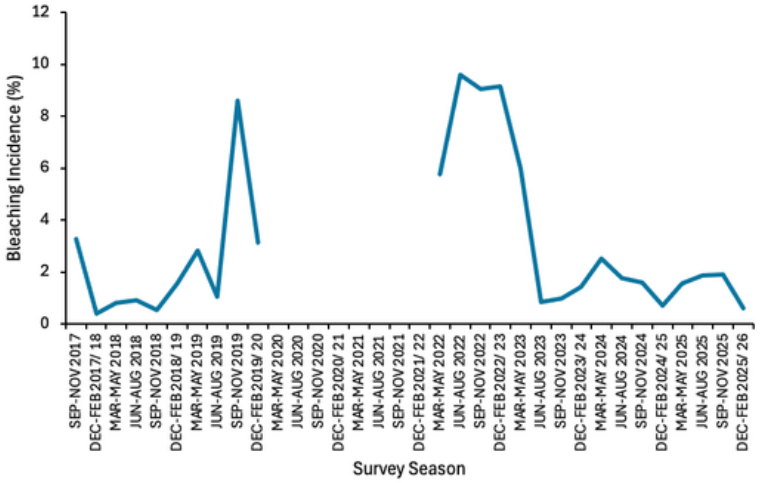


Figure 47. Seasonal bleaching incidence at Lutoban MPA (2017–2026), shown as average percentage of colonies observed with visible bleaching (either partially or fully bleached) per survey season.

Structural implications:

The decline in rubble suggests that substrate conditions may be gradually stabilising, which can support coral recruitment and reef consolidation over time. However, the simultaneous increase in fleshy macroalgae indicates that algal competition for space may intensify if grazing pressure is insufficient to control algal growth. The presence of soft corals (~11%) and sessile invertebrates (~7%) contributes to habitat complexity and biodiversity but may also compete with reef-building corals for available substrate. Overall Lutoban, appears to maintain a structurally diverse reef environment, with multiple benthic groups sharing available habitat space.

Long-term context:

Historical monitoring data indicate that Lutoban previously supported higher coral cover, frequently exceeding 30% between 2017 and 2019. Coral cover has gradually declined over the monitoring record, stabilising more recently within the 15-22% range. Macroalgae have fluctuated moderately through time but generally remain between 12-22% cover, indicating a consistent but not dominant algal presence. Rubble levels have increased periodically during the monitoring record, reaching >18% in some recent surveys, suggesting disturbance events or structural breakdown of reef framework.

However, the recent decline in rubble during the current reporting period may indicate gradual substrate consolidation. Bleaching levels peaked during 2022-2023, reaching ~9%, but have since declined substantially and remain relatively low in recent surveys.

Ecological interpretation:
Lutoban's benthic community appears to be in a phase of partial recovery following declines in coral cover and elevated disturbance levels. The recent increase in coral cover combined with declining rubble suggests that reef structure may be gradually stabilising, potentially creating favourable conditions for coral recruitment. However, the concurrent increase in macroalgae indicates that algal competition remains an important factor that could influence future coral recovery. Bleaching pressure is currently minimal, reducing immediate thermal stress on the reef ecosystem. If herbivore populations remain strong and macroalgal growth is controlled, Lutoban has the potential to slowly rebuild coral dominance over time. Continued monitoring will be important to determine whether. The recent increases in coral cover represent the beginning of a sustained recovery trend.

Lutoban has been vulnerable to high levels of Crown of Thorns sea stars in the past, so it is essential to keep monitoring for the presence of this potentially damaging organism, which can eat a large amount of coral if left unchecked.

LUTOBAN GAC-ANG MPA

Invertebrate Status

The invertebrate community at Lutoban MPA was characterised by high invertebrate density and low species richness, indicating a community dominated by a small number of highly abundant species. Average invertebrate density ranged from ~38.46 to 40.80 individuals per survey, while species richness remained low at ~2 species per survey.

Commercially important invertebrates were present at high densities (29%), and indicator (sensitive) species were also recorded at very high densities (34%) (Figure 48). Ecosystem engineer density was similarly high (29%), largely driven by sea urchins. In contrast, benthic-associated species were present at low densities (3%), and charismatic species were present at relatively low but consistent densities (6%).

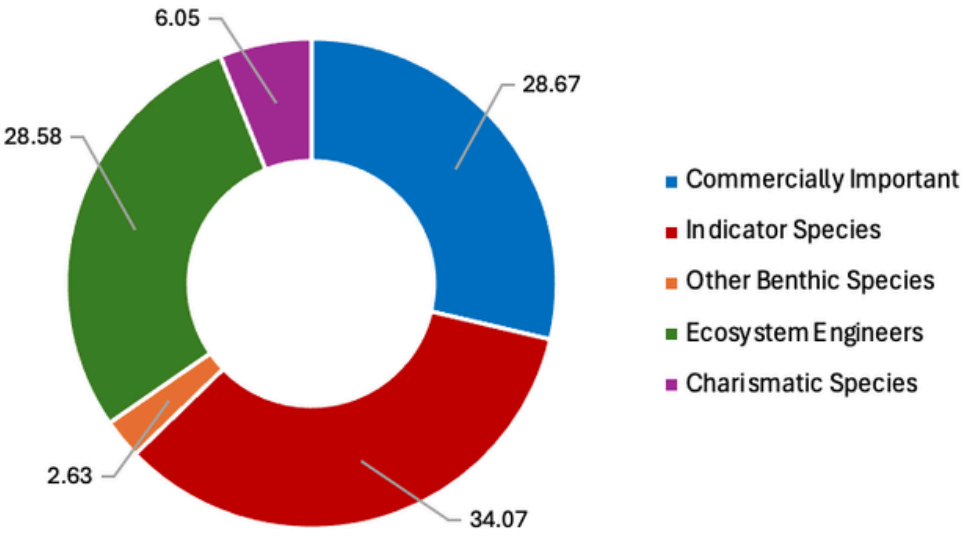


Figure 48. Proportional contribution (%) of invertebrate functional groups at Lutoban MPA during Sep–Feb 2025/26.

Ecological Interpretation:
Ecologically, Lutoban appears to be a sea urchin-dominated reef, with very high densities of Diadema sea urchins driving overall invertebrate density (Table 16). The overwhelming dominance of small size classes indicates very high recruitment and/or low predation pressure, which may be linked to previous overfishing of sea urchin predators or environmental conditions that favour sea urchin survival.

High densities of Diadema can play an important ecological role by grazing algae and maintaining substrate for coral recruitment. However, extremely high densities may also indicate ecosystem imbalance, particularly if the reef is dominated by a single functional group and species richness is low.

Sea Urchins - Diadema	18.98
Bivalves - Other	1.42
Gastropods - Other Shell	0.77
Sea Urchins - Rock Boring	0.61
Gastropods - Cone	0.60
Gastropods - Scorpion Spider Conch	0.53
Sea Cucumbers - Black Spotted	0.39
Sea Urchins - Other	0.33

Table 16. Most abundant commercial invertebrates at Lutoban MPA during Sep–Feb 2025/26. Values represent average density per survey and highlight the dominant contributors to the commercial benthic community.

Sea cucumber populations at Lutoban appear to consist mostly of adult individuals in mid to large size classes, but at low overall densities, which may indicate fishing pressure, as sea cucumbers are commercially harvested species. The presence of large individuals indicated that the habitat can support sea cucumber survival and growth, but low densities suggest that the population may be below optimal levels.

The presence of only juvenile giant clams and no larger adult clams suggests that recruitment is occurring but survival to adulthood is limited, possibly due to harvesting, predation, or environmental stress.

Overall, Lutoban represents a site with very high invertebrate density but low species diversity, strongly dominated by juvenile sea urchins, with low sea cucumber densities and very low giant clam abundance. Continued monitoring is recommended to assess whether sea urchin densities remain high and whetehr giant clams and sea cucumbers increase in abundance over time.

LUTOBAN GAC-ANG MPA

Tourism Value

Barracudas	17.18	**Scorpaenidae**	55.24
Cephalopods	10.04	**Sharks**	0.48
Cowries	32.44	**Shrimps**	58.12
Eels and Snakes	43.84	**Slugs**	78.34
Frogfish	7.29	**Stingrays**	0.96
Giant Clams	25.60	**Syngnathidae and Pegasidae**	10.34
Porcupinefish and Pufferfish	81.05	**Turtles**	23.78

Table 17. Mean encounter rates (%) of selected indicator and charismatic taxa recorded at Lutoban MPA from September - February 2025/26. Values represent the percentage of dives in which each group was observed, providing an indication of their relative tourism and ecological value.

Despite underperforming as an MPA, Lutoban is excellent for invertebrates and other charismatic species. The expansive seagrass beds in the shallows provide a habitat for turtles, and sightings are relatively common. Nudibranchs and other sea slugs are also abundant. Although underrepresented in the data, **rarer species such as the flamboyant cuttlefish and blue-ring octopus** have also been observed here.

Lutoban MPA offers high tourism value, with consistently strong sightings of slugs (78.3%), shrimps (58.1%), and porcupinefish and pufferfish (81%), making it particularly attractive to macro-focused divers (Table 17). Eels and snakes (43.8%), scorpaenids (55.2%), and cowries (32.4%) add further diversity, while cephalopods (10%) and frogfish (7.3%) contribute niche appeal.

Larger fauna are present but less common, with turtles (23.8%) providing occasional encounters with megafauna, and only minimal records of stingrays, although a spotted eagle ray was seen in September (1%). A bamboo shark was also sighted in January.

Overall, Lutoban MPA represents a well-rounded dive site, combining reliable macro sightings with moderate encounters of turtles. However, it lacks the more substantial presence of megafauna seen at other sites.

Lutoban Pier

Lutoban Pier does not have protected status and, as such, functions as a non-MPA control site. It is situated to the north of Lutoban Gac-Ang MPA, and is separated from it by a deep sandy basin. The reef ranges from 1 to 25 m deep. It consists of an expansive area of shallow reef that develops extensively from the shore, as well as relatively steep slopes characterised by large fields of uniform coral growth forms.

LUTOBAN PIER

Food Security

Current Status:

In September–February 2025/26, Lutoban Pier recorded an **average total fish density of ~710 individuals** per 150 m^2, with commercial species contributing around 120 individuals per 150 m^2, which is relatively high compared to many of the MPA sites in Zamboanguita (Figure 49). **Commercial biomass was ~8.69 kg per 150m^2 (~579 kg/ha)** (Figure 50), indicating a moderate to high level of commercially important fish biomass despite the site not being protected. The assemblage was strongly herbivore-dominated (~593 individuals per 150 m^2), followed by carnivores (~90), while omnivores (~13), corallivores (~8), and detritivores (~7) were present in smaller numbers. The dominane of herbivores suggests that grazing remains an important ecological function at this site, although the relativley high number of carnivores compared to some MPAs is notable.

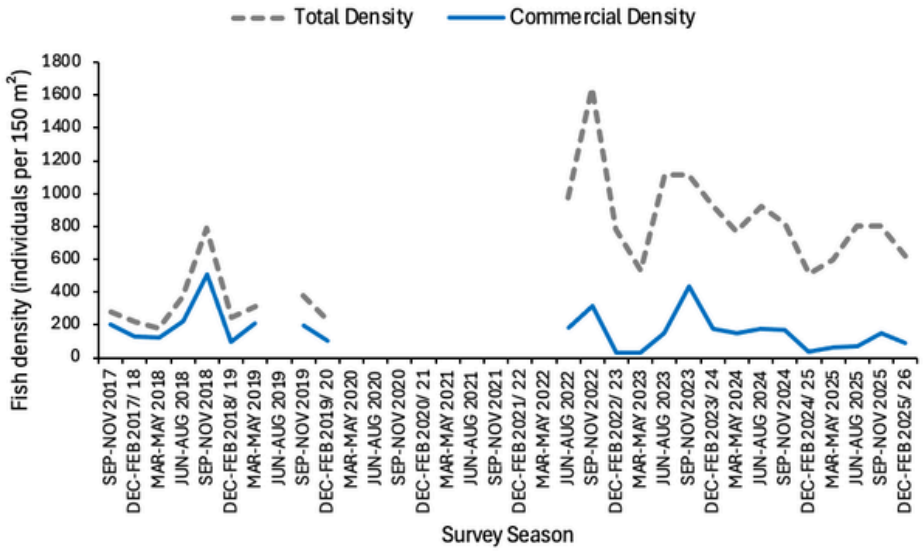


Figure 49. Temporal trends in total fish density and commercial fish density at Lutoban Pier (2017-2026). Values represent average individuals per 150m^2 recorded during seasonal surveys.

Recent Change:

Compared with the previous reporting period, Lutoban Pier had a slight increase in total fish density (700 →710 individuals), indicating relativley stable fish abundance. Commercial density increased substantially, nearly doubling (66 → 120 per 150m^2), and commercial biomass also increased (5.56 → 8.69 kg), suggesting a recent increase in commercially important fish at the site. Herbivore density increased (532 → 593 ind.), while carnivore density decreased slightly (109 → 90 ind.), and other trophic groups remained relelativley stable. These results suggest that fish abundance at Lutoban Pier is relatively stable but subject to seasonal fluctuations, particularly in commercial species. The increase in commercial density and biomass in the most recent period may reflect seasonal aggregation of schooling commercial species such as fusiliers and snappers.

Dietary structure:

The fish assemblage remains dominated by herbivores (83% of total fish density), a pattern consistent with previous seasons at Lutoban Pier (Figure 51). This is followed by carnivores at approximately 13%, while omnivores, corallivores, and detritivores together make up the remaining ~4%. This trophic structure is similar to many of the MPA sites. The high abundance of herbivores suggests that grazing pressure is high at this site, which may help prevent algal overgrowth.

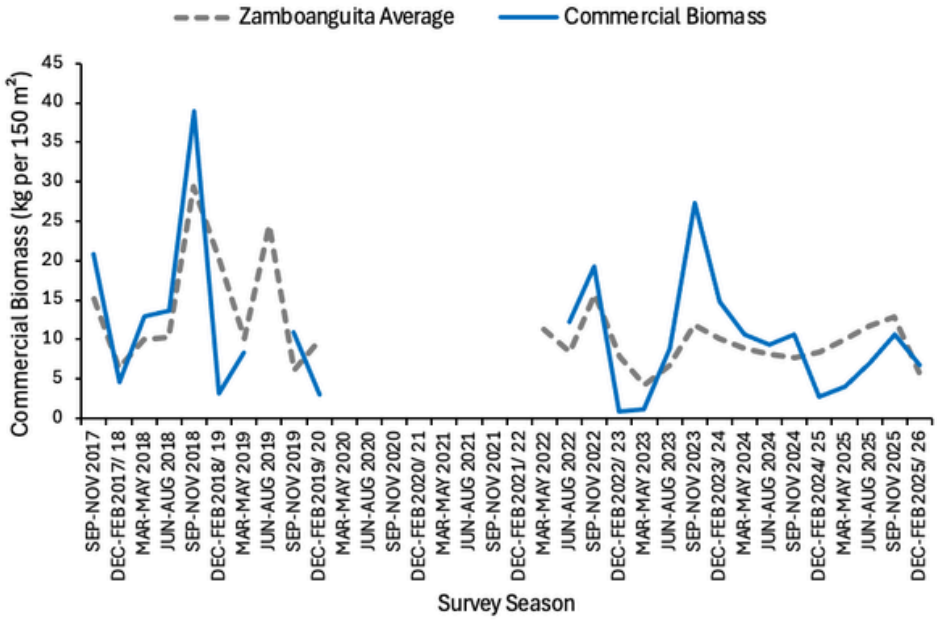


Figure 50. Temporal trends in commercial fish biomass (kg per 150m^2) at Lutoban Pier (2017-2026). Biomass values represent the estimated weight of commercially important reef fish, providing an indicator of food security potential and MPA effectiveness.

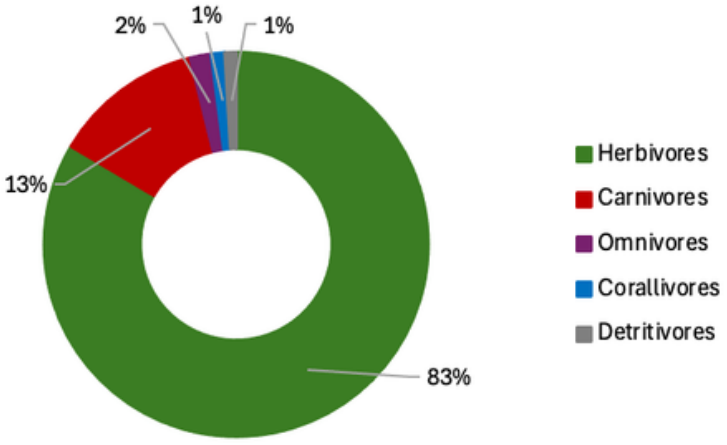


Figure 51. Proportional contribution (%) of trophic group densities to the total fish density at Lutoban Pier during Sep–Feb 2025/26. Values include both commercial and non-commercial species, ensuring that the role of abundant herbivores in maintaining algal–coral balance is represented.

Fusilier	31.12	**Parrotfish**	0.97
Snapper	9.18	**Soldierfish**	0.93
Goatfish	2.38	**Triggerfish**	0.88
Grouper	1.10	**Barracuda**	0.88
Bream	0.98	**Unicornfish**	0.48

Table 18. Mean biomass (kg per 150m^2) of the ten most abundant commercial fish groups at Lutoban Pier during Sep–Feb 2025/26. Values represent average biomass per survey and highlight the dominant contributors to the commercial fish community.

Commercial Groups:
At Lutoban Pier, fusiliers are the dominant commercial group, which contributes the largest proportion of commercial biomass (Table 18). Snappers are the second most important commercial group, followed by goatfish, groupers, bream, parrotfish, soldierfish, triggerfish, barracuda and unicornfish. The relatively high abundance of snappers at this site is notable, as snappers are commercially valuable predatory fish. The presence of groupers and barracuda also indicates that higher trophic level predators are present at the site. However, the commercial fish community is still largely dominated by schooling species such as fusiliers, which can occur in large numbers and strongly influence total density and biomass estimates.

Long-term context:
Long-term data from Lutoban Pier has shown extreme variability in fish density and biomass over the years. Commercial biomass shown peaks above 20–27 kg per 150m^2 (e.g., September–November 2018 and September–November 2023) contrast sharply with lows below 3 kg per 150m^2 (December–February 2018/19 and December–February 2024/25). This variability likely reflects fluctuations in schooling commercial species such as fusiliers and snappers, which can move in and out of the areas seasonally. This pattern highlights sensitivity to seasonal shifts and likely fishing pressure.

Ecological interpretation:
Although Lutoban Pier is not an MPA, it supports high fish density and moderate commercial biomass, likely due to food availability and habitat complexity that attracts fish. However, despite high fish density, the fish community is still dominated by herbivores and schooling commercial species, and the biomass of large predatory fish is still relatively limited compared to well-established MPAs. This suggests that while the site supports many fish, it may not function as a refuge for large commercially important species in the same way MPAs do. Overall, Lutoban Pier appears to function as a high-density aggregation site rather than a high-biomass protected reef, highlighting the difference between fish abundance and fish biomass when comparing non-MPA and MPA sites.

LUTOBAN PIER

Reef Health And Resilience

Current status:

In Septemeber - February 2025/26, Lutoban Pier recorded an **average hard coral cover of ~32.8%**, **fleshy macroalgae of ~20.2%**, and **rubble of ~12.2%**. The broader substrate composition is dominated by hard coral, followed by macroalgae and rubble, with additional contributions from sessile invertebrates (~11%) and sand (~10%) (Figure 52). Bleaching levels remained low during this monitoring period, ~1.6%, suggesting minimal visible thermal stress across coral colonies. Despite not being an MPA, Lutoban Pier continues to support relatively high coral cover compared with protected sites.

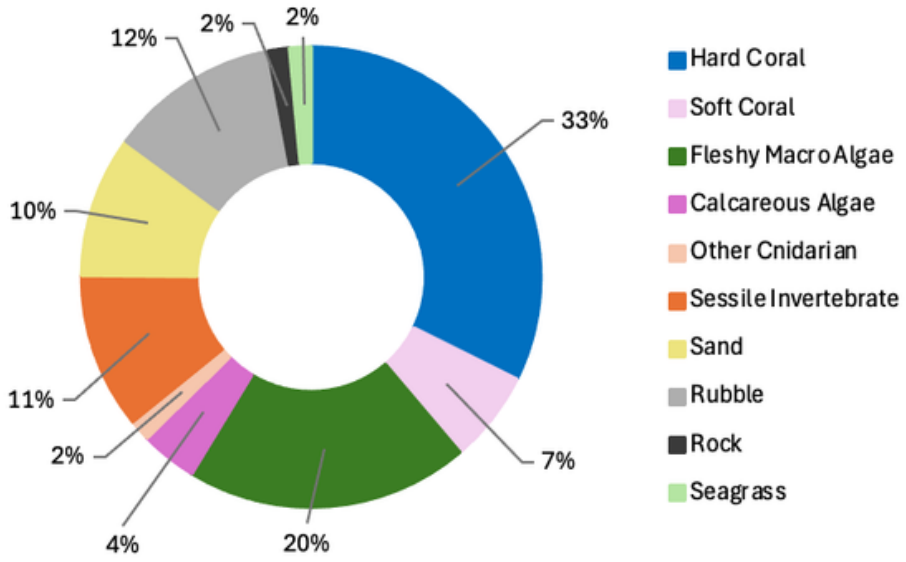


Figure 52. Average benthic substrate composition at Lutoban Pier (September-February 2025/26). Values represent the proportional contribution (%) of different benthic categories pooled across all surveys.

Recent change:

Since the last report, **hard coral cover at Lutoban Pier has remained relatively stable (33.6% → 32.8%)**, indicating minimal overall change in coral dominance at the site (Figure 53). Fleshy macroalgae increased noticeably (15.0% to 20.2%), representing the most significant shift in benthic composition during the current reporting period. Meanwhile, rubble declined slightly (12.6% to 12.2%), suggesting relatively stable substrate conditions. Bleaching levels remained low overall, with only a slight increase observed between reporting periods (Figure 54). Overall, Lutoban Pier experienced stable coral cover but rising macroalgae, indicating increasing algal presence while the underlying reef structure remains largely unchanged.

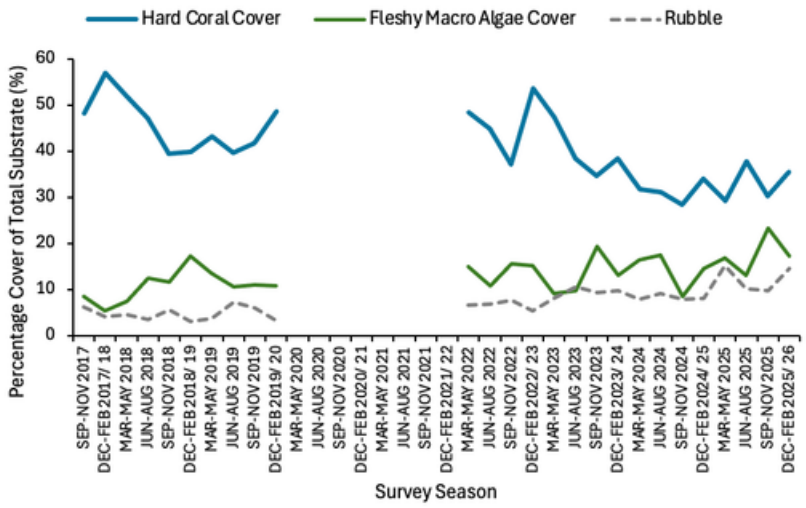


Figure 53. Temporal trends in hard coral cover, fleshy macroalgae cover, and rubble at Lutotban Pier (2017–2026). Data is expressed as average percentage cover per survey season.

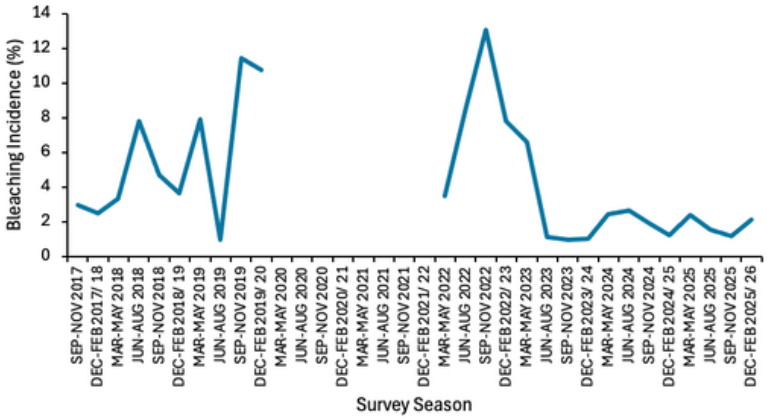


Figure 54. Seasonal bleaching incidence at Lutoban Pier (2017–2026), shown as average percentage of colonies observed with visible bleaching (either partially or fully bleached) per survey season.

Structural implications:

The relatively high coral cover (~33%) suggests that Lutoban Pier continues to provide important reef structure and habitat complexity. However, the recent increase in macroalgae may indicate growing competition for available substrate, particularly if grazing pressure declines. Rubble remains moderate, suggesting that some areas of the reef may still be affected by disturbance or structural breakdown. However, these levels are not currently high enough to significantly limit coral settlement. The presence of sessile invertebrates and soft corals further contributes to habitat complexity, although these groups may also compete with reef-building corals for available space.

Long-term context:

Historically, Lutoban Pier supported very high coral cover, exceeding 50% in several survey periods between 2017 and 2019. Coral cover has gradually declined over time but has remained relatively high compared with many other monitoring sites, generally fluctuating between 30-40% in recent years. Macroalgae have varied considerably throughout the monitoring record, ranging typically between 8-20%, while rubble has generally remained below 15%, indicating moderate but persistent substrate disturbance. Bleaching levels peaked particularly in 2019 and 2022-2023, when it exceeded 10%. However, bleaching has declined significantly in recent years and remains relatively low during the current monitoring period.

Ecological interpretation:

Lutoban Pier represents a relatively coral-dominated reef system, maintaining higher coral cover than nearby sites despite not being an MPA. The recent increase in macroalgae suggests that competition may become more prominent, potentially reflecting local environmental conditions or reduced grazing pressure. However, the stability of coral cover indicates that reef structure remains resilient at present. Given that Lutoban Pier is not protected, the presence of high coral cover highlights the potential importance of local environmental conditions, substrate stability, and herbivore communities in maintaining reef health. Continued monitoring will be important to determine whether the recent rise in macroalgae represents a temporary fluctuation or the beginning of a longer-term shift in benthic community composition.

LUTOBAN PIER

Invertebrate Status

The invertebrate community at Lutoban Pier showed moderate to high invertebrate density but low species richness, indicating a community dominated by a small number of abundant species. Average invertebrate density ranged from ~24.58 to 33.77 individuals per survey, while species richness remained low, ~1.6 species per survey.

Commercially important invertebrates were present at moderate to high densities (29%), while indicator (sensitive) species were recorded at moderate to high densities (34%) (Figure 55). Ecosystem engineer density was also relatively high (29%), again largely driven by sea urchins. Benthic-associated species were present at low densities (3%), and charismatic species were present at low to moderate densities (6%).

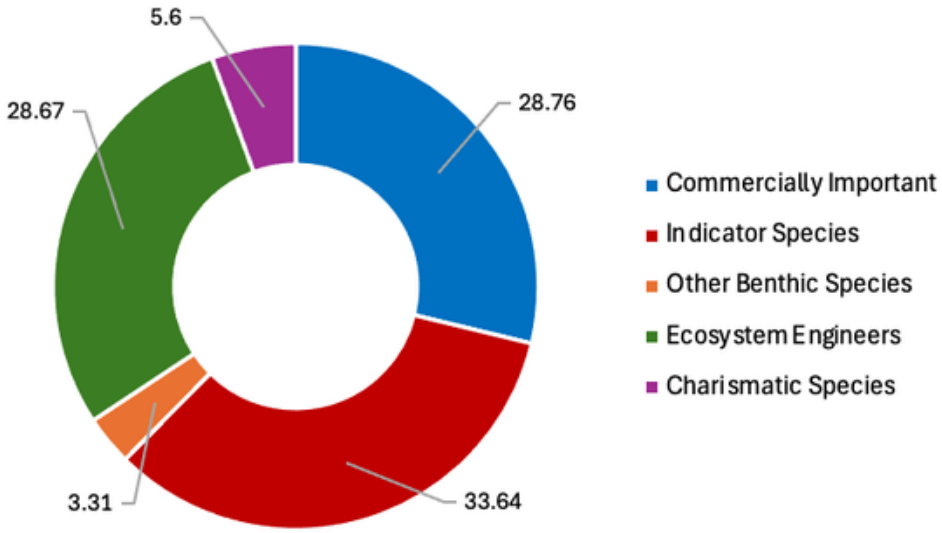


Figure 55. Proportional contribution (%) of invertebrate functional groups at Lutoban Pier during Sep–Feb 2025/26.

Ecological Interpretation:
Ecologically, Lutoban Pier, the only non-MPA site in the Zamboanguita municipality, appears to be dominated by sea urchins, similar to Lutoban MPA, but with lower overall invertebrate density and lower species richness than the protected site. The high abundance of juvenile Diadema sea urchins suggests high recruitment and strong grazing pressure, which may influence benthic community structure.

The presence of adult black-spotted sea cucumbers, but at low densities, may indicate fishing pressure, as sea cucumbers are commercially valuable and are often harvested in non-protected areas. Similarly, giant clams were present but in very low numbers, which may also reflect harvesting pressure or habitat disturbance.

Sea Urchins - Diadema	16.55
Sea Cucumbers - Black Spotted	0.54
Gastropods - Cone	0.46
Sea Urchins - Other	0.38
Gastropods - Tiger Cowrie	0.33
Bivalves - Other	0.28
Gastropods - Other Shell	0.28
Sea Urchins - Rock Boring	0.24
Mantis Shrimp	0.24

Table 19. Most abundant commercial invertebrates at Lutoban Pier during Sep–Feb 2025/26. Values represent average density per survey and highlight the dominant contributors to the commercial benthic community.

Compared to protected sites, non-MPA areas often show lower densities of commercially valuable species such as sea cucumbers and giant clams, and this pattern appears to be reflected at Lutoban Pier, where sea cucumbers and giant clams are present but at low densities, while sea urchins dominate the community (Table 19).

Overall, Lutoban Pier represents a moderate-density but low-diversity invertebrate community dominated by sea urchins, with low densities of sea cucumbers and giant clams, which may reflect fishing pressure and the lack of formal protection. This site will be important for comparison with nearby MPA sites when assessing the effectiveness of MPAs in Zamboanguita municipality.

Lutoban Pier

Tourism Value

Barracudas	10.17	**Scorpaenidae**	47.92
Cephalopods	3.08	**Sharks**	0
Cowries	26.36	**Shrimps**	40.99
Eels and Snakes	32.82	**Slugs**	69.96
Frogfish	2.47	**Stingrays**	0.77
Giant Clams	24.51	**Syngnathidae and Pegasidae**	15.10
Porcupinefish and Pufferfish	77.81	**Turtles**	38.38

Table 20. Mean encounter rates (%) of selected indicator and charismatic taxa recorded at Lutoban Pier from September - February 2025/26. Values represent the percentage of dives in which each group was observed, providing an indication of their relative tourism and ecological value.

Lutoban Pier isn't particularly known for its abundance of charismatic species, though turtles are seen fairly commonly here, their presence supported by the seagrass beds present in the shallows. The site is interesting for its substrate composition, which features large, uniform patches of the same coral type, making for some enjoyable dives.

However, there is no reasonable access, and the area lacks infrastructure, limiting its current potential as a dive tourism spot, except by boat.

Lutoban Pier demonstrates high tourism potential, with excellent encounter rates for slugs (70%), porcupinefish and pufferfish (77.8%), and giant clams (24.5%) (Table 20). Turtles (38.4%) provide regular encounters with megafauna, enhancing the site's broad appeal. Macro diversity is also substantial, with reliable sightings of shrimps (41%), cowries (26.4%), scorpaenids (47.9%), and eels and snakes (32.8%). Cephalopods (3.1%), frogfish (2.5%), and syngnathids (15.1%) add niche photographic interest, while larger fauna are limited to low levels of stingrays (0.8%).

Overall, Lutoban Pier is a well-rounded dive site, offering both macro-richness and consistent turtle sightings, making it attractive to a wide range of divers.

MALUAY MALATAPAY MPA

Malatapay MPA has an area of 1.6 ha and was established in 2022. Malatapay consists of shallow to deep coral reefs, surrounded by sand flats and seagrass beds. Our surveys have a maximum depth of 19 m, but a deeper area of mesophotic reef begins at 40 m. As the main port serving Apo Island, Malatapay is subject to considerable boat traffic. The famous Wednesday market also introduces terrestrial pressures to the reef, including animal waste and trash. Malatapay is well-recognised as a dive site and is regularly visited by SCUBA divers.

MPA demarcation based on DENR coordinates

MALUAY MALATAPAY MPA

Food Security

Current Status:

In September–February 2025/26, Malatapay recorded an **average total fish density of ~584 individuals** per 150 m^2 (Figure 56). Commercial species contributed ~228 individuals per 150m^2. **Commercial biomass was ~16.36 kg per 150m^2 (~1,090 kg/ha)**, which is relatively high compared to many other sites in Zamboanguita (Figure 57). Herbivores dominated the assemblage (~419 individuals per 150 m^2), followed by carnivores (~132), with omnivores (~15), corallivores (~8), and detritivores (~10) present in smaller numbers. The relatively high number of carnivores compared to some other MPAs suggests that Mapatapay supports a more balanced trophic structure than sites dominated almost entirely by herbivores.

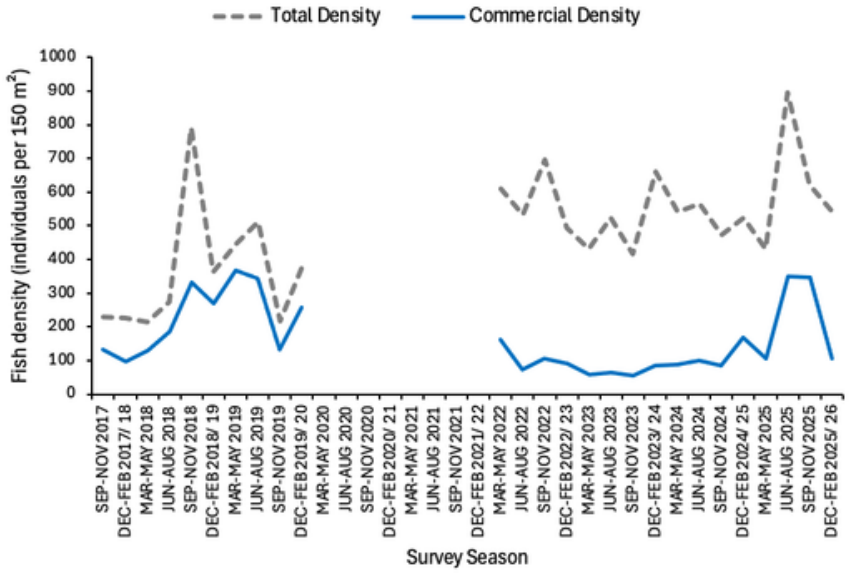


Figure 56. Temporal trends in total fish density and commercial fish density at Malatapay (2017-2026). Values represent average individuals per 150m^2 recorded during seasonal surveys.

Recent Change:

Compared with the last reporting period, Malatapay's total fish density decreased slightly (664 → 584 individuals per 150 m^2). **Commercial biomass decreased from a very high value in June-August 2025 (~34.35 kg) to lower values in the most recent period (~16.36 kg)**. Herbivore density decreased 488 → 419 ind.), while carnivore density increased slightly, and other trophic groups remained relatively stable. The large spike in commercial biomass in June-August 2025 suggests a temporary increase in large commercial fish, possibly due to seasonal aggregation or recruitment of large individuals. The recent data suggest that fish density and biomass at Malatapay can fluctuate considerably between seasons, particularly for commercial species.

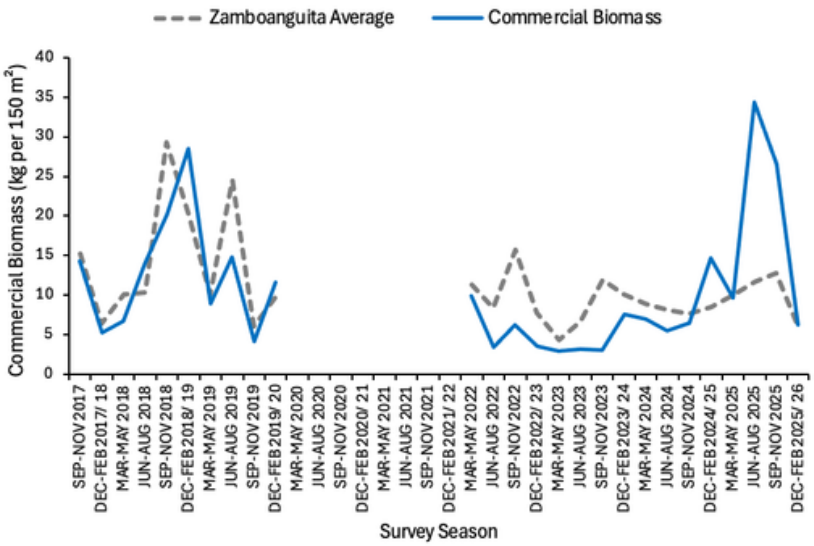
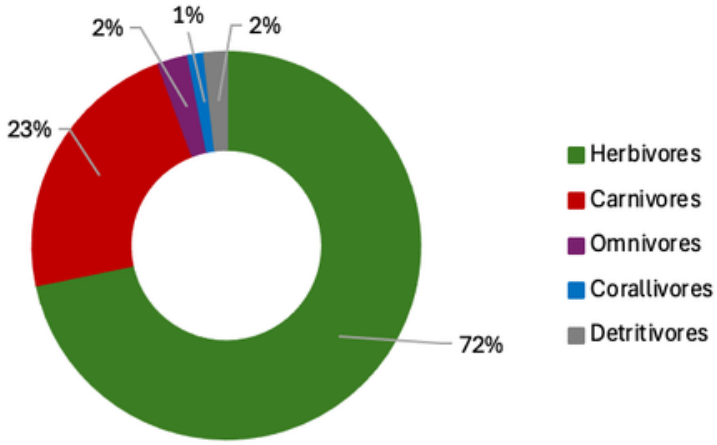


Figure 57. Temporal trends in commercial fish biomass (kg per 150m^2) at Malatapay MPA (2017-2026). Biomass values represent the estimated weight of commercially important reef fish, providing an indicator of food security potential and MPA effectiveness.

Dietary structure:

The fish assemblage at Malatapay is dominated by herbivores, which make up ~72% of the total fish biomass, followed by carnivores at ~23%, while omnivores, corallivores, and detritivores together make up the remaining ~5% (Figure 58). Compared to some other MPAs, Malatapay has a relatively high proportion of carnivorous fish, indicating a more developed trophic structure with more predators present. This is often associated with healthier reef systems and more effective protection, as predatory fish are usually among the first to decline with fishing pressure and among the last to recover.

Figure 58. Proportional contribution (%) of trophic group densities to the total fish density at Malatapay MPA during Sep–Feb 2025/26. Values include both commercial and non-commercial species, ensuring that the role of abundant herbivores in maintaining algal–coral balance is represented.



Commercial Groups:

Malatapay MPA's commercial fish community is dominated by fusliliers and snappers, which together contribute a large proportion of commercial density and biomass. Snappers are particulalry important commercially and are considered high-value predatory fish, so their relatively high abundance at Malatapay, is a positive sign for fisheries value and MPA effectiveness. Other important commercial groups include bream, goatfish, and groupers, with smaller contributions from parrotfish, triggerfish, surgeonfish, rabbitfish and unicornfish. The presence of groupers is particularly important, as they are large-bodied predatory fish that are often heavily targeted by fisheries and tend to icnrease in well-protected MPAs over time.

Fusilier	29.23	**Triggerfish**	1.02
Snapper	18.10	**Surgeonfish**	0.74
Bream	7.65	**Grouper**	0.73
Goatfish	6.55	**Rabbitfish**	0.42
Parrotfish	1.15	**Unicornfish**	0.31

Table 21. Mean biomass (kg per 150m^2) of the ten most abundant commercial fish groups at Malatapay MPA during Sep-Feb 2025/26. Values represent average biomass per survey and highlight the dominant contributors to the commercial fish community.

Overall, the commercial fish composition at Malatapay suggests that the MPA supports a relatively diverse commercial fish community including several high-value predatory species, which likely contributes to the relativley high commercial biomass recorded at this site. The notable rise in fusiliers and snappers helped drive the biomass peak, while the consistent presence of herbivores continues to underpin reef resilience (Table 21). Compared with other sites, Malatapay currently supports one of the strongest commercial assemblages in the municipality.

Long-term context:

Long-term data from Malatapay show that fish density and commercial biomass have fluctuated over time but have generally increased compared to the earlier years of monitoring (2017-2019). In the earlier years, total fish densities were generally below 400 individuals per 150 m^2, whereas in recent years densities have more frequently ranged between 400-700, with occasional peaks much higher than this. Commercial biomass has shown considerable variability over time, with some very high values (2018-2019 and 2025) and some lower periods (2022-2023). This variability likely reflects changes in the abundance of large commercial fish species such as snappers and groupers, which can strongly influence biomass estimates. Overall, the long-term trends suggest that Malatapay supports increasing fish abundance and periodically high commercial biomass, indicating that the site may be functioning as an important areas for commercially valuable fish species.

Ecological interpretation:

Malatapay MPA supports moderate to high fish density, relatively high commercial biomass and a relatively high proportion of carnivorous fish compared to some other MPAs in Zamboanguita. This suggests that the MPA is supporting not only herbivorous fish but also higher trophic level predatory fish, which are important for maintaining ecosystem balance. The presence of high-value commercial species along with relatively high biomass, suggests that Malatapay may be one of the more productive MPAs in the municipality in terms of fish value. However, the large seasonal fluctuations indicate that fish populations may be influenced by sesonal movements, recruitment, or fishing pressure outside the MPA. Overall, Mapatapay appears to function as a moderately strong MPA with a well-developed trophic structure, although fish biomass can vary considerably between seasons.

MALUAY MALATAPAY MPA

Reef Health And Resilience

Current status:

In September–February 2025/26, Malatapay MPA recorded an **average hard coral cover of ~22.3%**, **fleshy macroalgae of ~30.8%**, and **rubble of ~19.7%**. Sand contributes ~11% and alcareous algae contributes (~8% (Figure 59). Bleaching levels remained low (~0.6%), indicating minimal visible stress across coral colonies during this period. The reef at Malatapay is characterised by a macroalgae-dominated benthic community with moderate coral presence and substantial rubble, suggesting a reef system influenced by both algal competition and past disturbance.

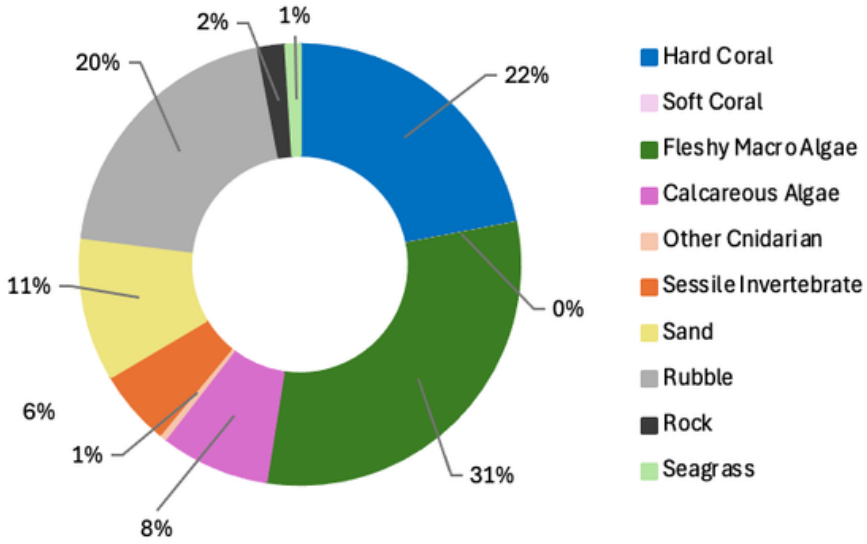


Figure 59. Average benthic substrate composition at Malatapay MPA (September-February 2025/26). Values represent the proportional contribution (%) of different benthic categories pooled across all surveys.

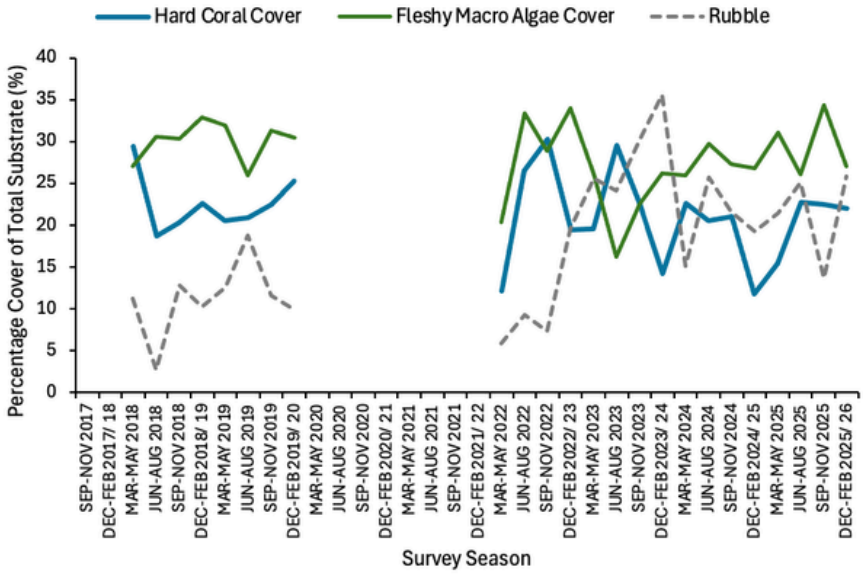


Figure 60. Temporal trends in hard coral cover, fleshy macroalgae cover, and rubble at Malatapay MPA (2017–2026). Data is expressed as average percentage cover per survey season.

Recent change:

Since the last report, **hard coral cover at Malatapay increased moderately (19.1% → 22.3%)**, indicating some improvement in coral presence across the site (Figure 60). Fleshy macroalgae also increased slightly (28.6% → 30.8%), maintaining its position as the dominant benthic group. Rubble declined from 23.3& to 19.7%, suggesting a reduction in unconsolidated substrate and potential stabilisation of the reef surface. Bleaching levels declined (1.8% → 0.6%), indicating reduced coral stress compared with the previous monitoring period (Figure 61). Malatapay experienced modest coral recovery and reduced rubble, although the continued dominance of macroalgae indicates persistent competition for available substrate.

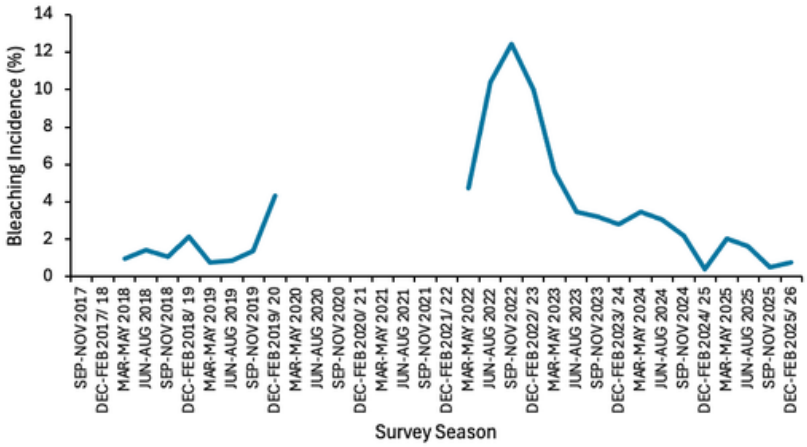


Figure 61. Seasonal bleaching incidence at Malatapay MPA (2017–2026), shown as average percentage of colonies observed with visible bleaching (either partially or fully bleached) per survey season.

Structural implications:

The relatively high proportion of fleshy macroalgae suggests that algae occupy a large portion of available reef substrate, which may limit coral recruitment and growth if grazing pressure in insufficient to control algal expansion. Rubble levels remain relatively high, indicating that parts of the reef may still be affected by disturbance or structural breakdown. Mobile rubble can reduce settlement success for coral larvae if fragments remain unstable. The moderate coral cover, however, indicates that reef-building corals continue to contribute significantly to habitat structure, supporting reef complexity and biodiversity. Malatapay appears to support a mixed but algae-leaning benthic community, where coral recovery may be constrained by both algal competition and persistent rubble.

Long-term context:

Historical monitoring data indicate that coral cover at Malatapay was substantially higher during the early monitoring years, exceeding 35% in 2017 before declining in subsequent survey periods. Since 2018, coral cover has generally fluctuated between 18-30%, reflecting moderate but variable coral presence. In contrast, macroalgae have remained consistently high, frequently exceeding 25-30% cover throughout the monitoring record. Rubble levels have increased markedly in recent years, particularly between 2023 and 2024, when rubble exceeded 30%, suggesting periods of significant reef disturbance or structural degradation. Bleaching levels have declined in recent monitoring periods and now remain low following peaks observed in 2022-2023 (>10%).

Ecological interpretation:

Malatapay appears to represent a disturbance-influenced reef system, where coral cover persists but is constrained by high macroalgal abundance and substantial rubble. The recent increase in coral cover combined with declining rubble, suggests early signs of structural stabilisation, which may provide improved conditions for coral recruitment. However, the continued dominance of macroalgae indicates that algal competition remains a key ecological pressure on the reef. Maintaining strong herbivore populations will be important for controlling algal growth and allowing corals to reclaim available substrate. With continued low bleaching pressure and reduced disturbance, Malatapay has the potential to gradually rebuild coral cover, although recovery may be slow given the high levels of macroalgae and rubble present.

MALUAY MALATAPAY MPA

Invertebrate Status

The invertebrate community at Malatapay showed moderate invertebrate density but low species richness, indicating a community composed of relatively few species but with moderate abundances. Invertebrate density ranged from ~20.42 to 24.39 individuals per survey, while species richness was ~1.7 species per survey.

Commercially important invertebrates were present at moderate densities (24%), while indicator (sensitive) species were present at moderate to high densities (35%) (Figure 62). Ecosystem engineer density occupied 21%, again largely driven by sea urchins. Benthic-associated species were present at low to moderate densities (6%), while charismatic species were present at moderate densities (15%).

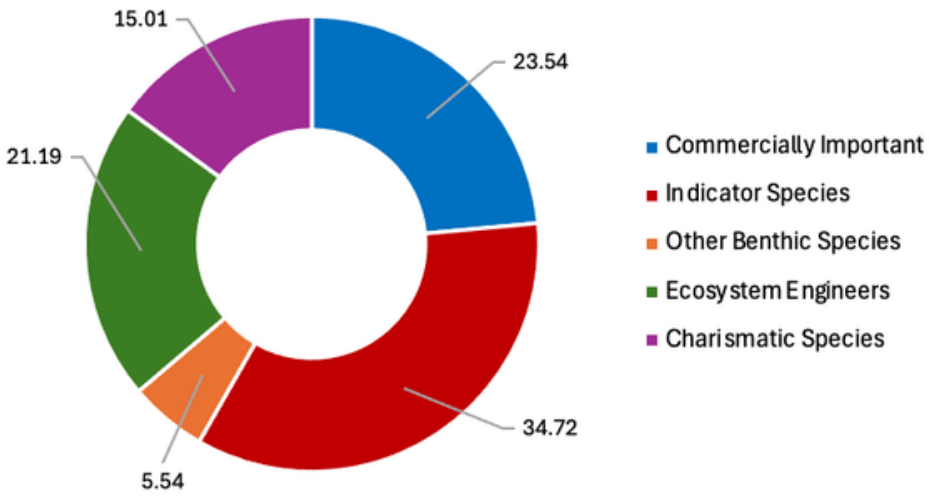


Figure 62. Proportional contribution (%) of invertebrate functional groups at Malatapay MPA during Sep–Feb 2025/26.

Ecological Interpretation:
Ecologically, Malatapay appears to support a moderate-density but low-diversity invertebrate community dominated by sea urchins, particularly juvenile Diadema. The dominance of juvenile sea urchins suggests recent recruitment and potentially high grazing pressure, which may influence benthic substrate composition and coral recruitment.

The presence of multiple sea cucumber species with individuals in adult size classes suggests that the habitat is suitable for sea cucumbers; however, their low densities may indicate fishing pressure, as sea cucumbers are commercially valuable and commonly harvested (Table 22). The absence of giant clams is notable and may indicate historical overharvesting, unsuitable habitat, or low recruitment at this site.

Sea Urchins - Diadema	4.39
Gastropods - Other Shell	0.74
Bivalves - Other	0.56
Gastropods - Cone	0.55
Gastropods - Tiger Cowrie	0.51
Sea Urchins - Rock Boring	0.51
Gastropods - Scorpion Spider Conch	0.47
Gastropods - Other Conch	0.32

Table 22. Most abundant commercial invertebrates at Malatapay MPA during Sep–Feb 2025/26. Values represent average density per survey and highlight the dominant contributors to the commercial benthic community.

Overall, Malatapay represents a modeatetly abundant but low-diversity invertebrate community, with high juvenile sea urchin abundance, low sea cucumber density, and no giant clams, which may indicate fishing pressure and ecological imbalance driven by sea urchin dominance.

MALUAY MALATAPAY MPA

Tourism Value

Barracudas	19.15	**Scorpaenidae**	63.68
Cephalopods	14.06	**Sharks**	0
Cowries	39.47	**Shrimps**	58.64
Eels and Snakes	24.15	**Slugs**	81.86
Frogfish	2.02	**Stingrays**	1
Giant Clams	13.06	**Syngnathidae and Pegasidae**	7.06
Porcupinefish and Pufferfish	87.94	**Turtles**	55.47

Table 23. Mean encounter rates (%) of selected indicator and charismatic taxa recorded at Maluay-Malatapay MPA from September - February 2025/26. Values represent the percentage of dives in which each group was observed, providing an indication of their relative tourism and ecological value.

Maluay-Malatapay is a relatively well-established diving spot with easy access from both sea and land, as well as good local infrastructure and amenities. It has considerable potential tourism value. It is well known for the **rare species often seen there, including the flamboyant cuttlefish, ghost pipefish, and frogfish**.

The presence of both natural and artificial reefs means the diving there is varied, and the **high levels of turtles** could be of interest to snorkellers as well as divers. There is also a deeper reef at depths of up to 50 meters, which provides challenging yet rewarding diving for divers with the appropriate skills, training, and certification.

Malatapay shows very strong tourism potential, with high encounter rates of porcupinefish and pufferfish (87.9%), slugs (81.9%), and Scorpaenidae (63.7%) (Table 23). Turtles are also frequently recorded (55.5%), providing a charismatic appeal that enhances the site's attractiveness to divers.

Cowries (39.5%) and shrimps (58.6%) contribute additional macro interest, while moderate sightings of barracudas (19.2%) and eels and snakes (24.2%) offer further variety. A whale shark was sighted in February during dive training, adding to the site's already high megafauna tourism value alongside frequent turtle encounters. Although giant clams (13.1%) are less common, the consistent presence of multiple high-value taxa makes Malatapay one of the strongest sites for both biodiversity and diver experience.

MOJON MPA

Mojon MPA is the newest MPA in the municipality, having been established in 2024. Monitoring by MCP commenced simultaneously. The MPA has an area of 2.11 ha and consists of three distinct areas of reef interspersed by sand patches. A maximum depth of 15m reduces the scope of the depth strata used for other sites.

MPA demarcation based on DENR coordinates

It should be noted that monitoring at Mojon only began recently. Continued monitoring will therefore be essential to build a more reliable long-term picture of reef condition. Surveys are restricted to a single fixed area of the reef, therefore results may not fully represent the variability and overall status of the site.

MOJON MPA

Food Security

Current Status:

In September - February 2025/26, Mojon recorded an average total fish density of ~944 individuals per 150 m^2, which is one of the highest fish densities recorded among the Zamboanguita sites. Commercial species contribued just around 55 individuals per 150 m^2. **Commercial biomass was relativley low despite the very high fish density, at ~2.24 kg per 150 m^2 (~129 kg/ha)** (Figure 63). The assemblage was dominated by herbivores (~809 individuals per 150 m^2), followed by carnivores (~86), while omnivores (~28), corallivores (~11), and detritivores (~9) were present at much lower densities. The very high herbivore density indicates that grazing is the dominant ecological function at this site. Overall, Mojon supports very high fish density but relatively low commercial biomass, suggesting that the reef is dominated by smaller-bodied fish rather than large commercially valuable species.

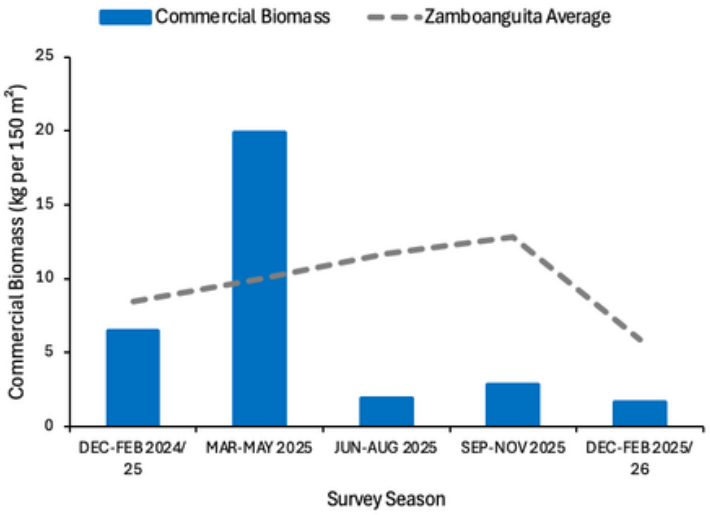


Figure 63. Temporal trends in commercial fish biomass (kg per 150m^2) at Mojon MPA (2024-2026). Biomass values represent the estimated weight of commercially important reef fish, providing an indicator of food security potential and MPA effectiveness.

Recent Change:

Compared with the last reporting period, total fish density remained relatively high but decreased slightly overall (912 → 944 individuals; still very high overall). However, commercial density decreased substantially (145 → 55 ind.), and commercial biomass decreased dramatically (10.91 → 2.24 kg) (Figure 64). Herbivore density increased (686 → 809 ind.), while carnivore density decreased significantly (142 → 86 ind.), and omnivores increased slightly. These results suggest that recent changes in the fish community at Mojon are largely driven by increases in herbivores and decreases in commercial and carnivorous fish. The sharp decline in commercial biomass suggests that large commercial fish present earlier in 2025 may have moved out of the area, been fished outside the MPA, or that the earlier high biomass period represented a temporary aggregation.

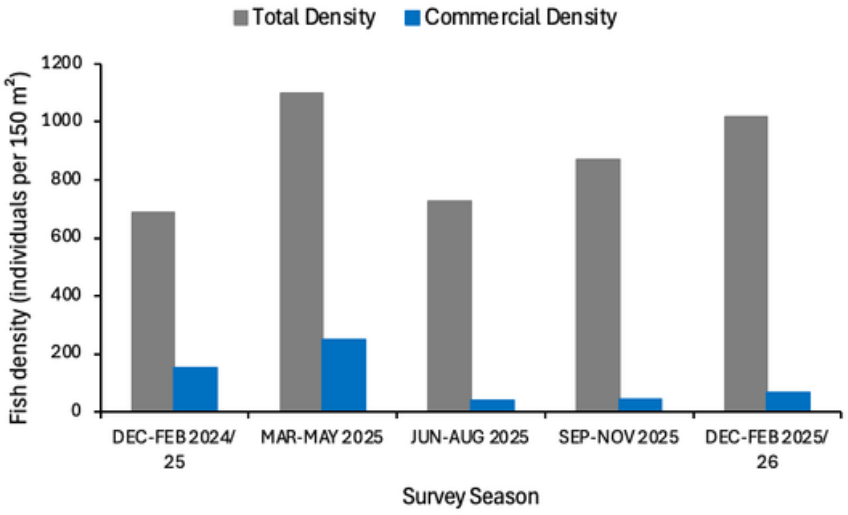


Figure 64. Temporal trends in total fish density and commercial fish density at Mojon MPA (2024-2026). Values represent average individuals per 150m² recorded during seasonal surveys.

Dietary structure:

The assemblage remains heavily herbivore-dominated (86%), followed by carnivores at ~9%, while omnivores, corallivores, and detritivores together make up the remaining ~5% (Figure 65). This trophic structure indicates a reef system strongly dominated by grazing fish, which can be beneficial for coral reef health through algae control. However, the relatively low proportion of carnivores suggests limited predator presence, which may indicate fishing pressure on larger predatory species or that the reef primarily supports smaller-bodied species.

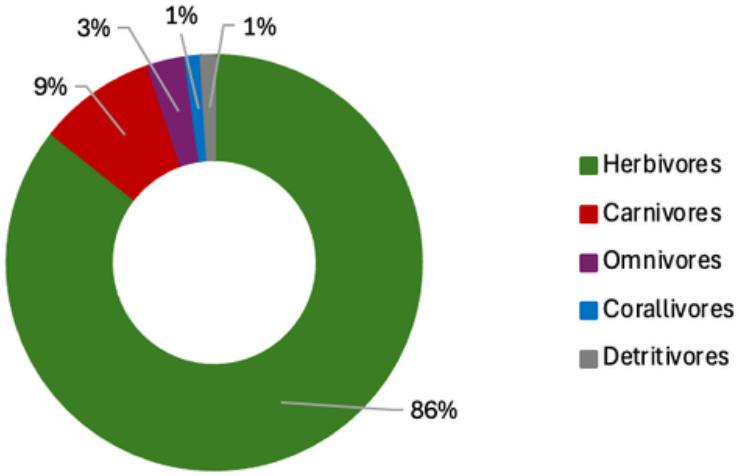


Figure 65. Proportional contribution (%) of trophic group densities to the total fish density at Mojon MPA during Sep–Feb 2025/26. Values include both commercial and non-commercial species, ensuring that the role of abundant herbivores in maintaining algal–coral balance is represented.

Commercial Groups:

The commercial fish community at Mojon is dominated by fusiliers, which contribute the largest proportion of commercial density and biomass. Other commercial groups present include bream, goatfish, parrotfish, triggerfish, soldierfish, groupers, snappers, and surgeonfish, although most of these groups are present in relatively low numbers.

The presence of groupers and snappers indicates that some high-value predatory species are present within the MPA, but their low abundance suggests that large commercially valuable predatory fish are not abundant at this site. Instead, the commercial fish community is dominated by smaller schooling or mid-sized species, which contributes to lower overall biomass despite high fish density (Table 24).

Fusilier	16.38	**Soldierfish**	1.62
Bream	5.33	**Grouper**	1.54
Goatfish	2.92	**Snapper**	1.04
Parrotfish	2.18	**Parrotfish**	0.63
Triggerfish	1.79	**Surgeonfish**	0.48

Table 24. Mean biomass (kg per 150m^2) of the ten most abundant commercial fish groups at Mojon MPA during Sep–Feb 2025/26. Values represent average biomass per survey and highlight the dominant contributors to the commercial fish community.

Long-term context:
Although long-term data for Mojon are limited compared to other sites, the available data from 2024-2025 show consistently very high fish densities, often exceeding 700-1000 individuals per 150 m^2. However, commercial biomass has been highly variable and generally low, with the exception of a peak in early 2025. This pattern suggests that Mojon supports consistently high fish abundance but not consistently high commercial biomass, indicating that the reef may function as an important area for smaller fish and herbivores, but does not consistently support large commercially important fish.

Ecological interpretation:
Mojon MPA supports very high fish density but relatively low commercial biomass, with a fish community strongly dominated by herbivores. This suggests that the MPA is effective at supporting fish abundance, particularly herbivorous fish, which play an important role in maintaining reef health by controlling algae. However, the relatively low biomass of commercially important fish and the low abundance of large predators suggest that the MPA may be less effective at supporting large commercial species compared to stronger MPAs such as Basak, Guinsuan, and Malatapay. Overall, Mojon appears to function as a high-density, herbivore-dominated reef system with relatively low commercial biomass, which may indicate either high fishing pressure on large fish outside the MPA, differences in habitat structure, or that the site primarily supports smaller-bodied fish species.

MOJON MPA

Reef Health And Resilience

Current status:

In September–February 2025/26, Mojon MPA recorded an average **hard coral cover of ~22.4%**, **fleshy macroalgae of ~31.7%,** and **rubble of ~11.9%**. The broader substrate composition (Figure 66) shows that fleshy macroalgae dominate the benthic community, followed by hard coral, with additional contributions from sand (~14%), rubble, and smaller proportions of sessile invertebrates and calcareous algae. Bleaching levels averaged ~5.2%, indicating low to moderate stress, slightly higher than many other sites in this reporting period. Mojon represents an algae-dominated reef system with relatively low coral cover and moderate rubble presence.

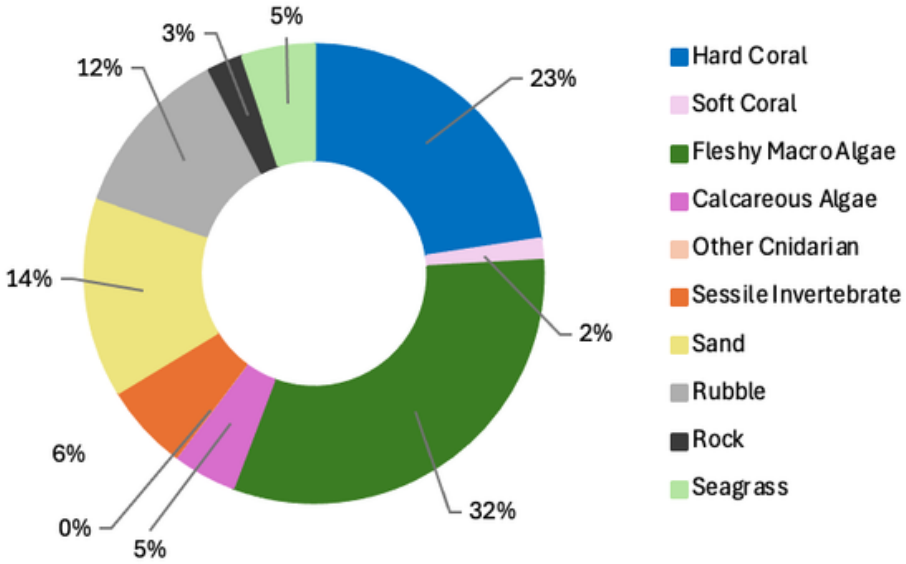


Figure 66. Average benthic substrate composition at Mojon MPA (September - February 2025/26). Values represent the proportional contribution (%) of different benthic categories pooled across all surveys.

Recent change:

Since the last report, **the hard coral cover at Mojon has declined (24.3% → 22.4%), indicating a reduction in coral presence.** At the same time, macroalgae increased substantially (24.6% → 31.7%), marking a clear shift toward algal dominance (Figure 67). In contrast, rubble decreased (17% → 11.9%), suggesting some consolidation of previous unstable substrate. Bleaching increased (1.0% → 5.2%), indicating a rise in coral stress during the most recent surveys. Mojon shows a transition toward stronger algal dominance, despite a reduction in rubble, with increasing bleaching adding further pressure on coral communities.

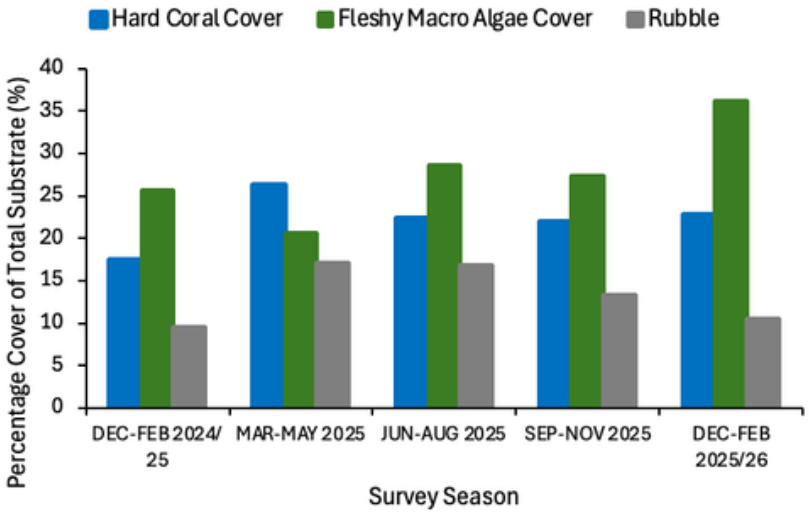


Figure 67. Temporal trends in hard coral cover, fleshy macroalgae cover, and rubble at Mojon MPA (2024–2026). Data is expressed as average percentage cover per survey season.

Structural implications:

The high proportion of macroalgae (~33%) relative to coral (~23%) indicates strong competitive pressure on corals, which may limit recruitment and recovery. Although rubble has decreased, suggesting improved substrate stability, this has not translated into increased coral cover. Instead, macroalgae appear to be occupying available space, potentially outcompeting corals for settlement areas. The moderate presence of sand and other benthic groups further reduces the proportion of substrate available for coral growth. The reef structure suggests that biotic factors - particularly algal competition - are the dominant constraint on coral recovery, rather than physical instability.

Long-term context:

As a newer monitoring site, Mojon has a shorter dataset, but recent trends already indicate notable variability and emerging pressures. Since early 2025, coral cover has fluctuated between ~22-26%, while macroalgae have shown a consistent upward trend, reaching their highest levels in the most recent period (~36%). Rubble was initially high (~17% in early 2025), but has since declined, suggesting some substrate consolidation over time. Bleaching has generally remained low, but the recent increase suggests that thermal stress may be becoming a more important factor at this site.

Ecological interpretation:

Mojon appears to be a reef system under increasing ecological pressure, currently shifting toward macroalgal dominance. Despite improvements in substrate stability (reduced rubble), coral cover has not increased, indicating that algal competition is likely suppressing coral recovery. The concurrent rise in bleaching further compounds this issue, potentially weakening coral resilience. This combination of high macroalgae, declining coral cover, and increasing stress suggests that Mojon may be at risk of transitioning into a more persistently algae-dominantrl state if current trends continue. Targeted management actions - particulalry those supporting herbivore populations and reducing local stressors - will be critical to prevent further decline and support potential coral recovery.

MOJON MPA

Invertebrate Status

The invertebrate community at Mojon exhibited moderate invertebrate density (34.7 individuals per survey) and low to moderate species richness (~4.3 individuals per survey), indicating a community with some diversity but still dominated by a limited number of key taxa. Invertebrate density and species richness values suggest variability between survey periods, but overall patterns remain consistent with other sites in the municipality.

Commercially important invertebrates were present at moderate densities (27%), alongside moderate to high densities of indicator (sensitive) species (31%), suggesting that the site supports ecologically relevant taxa but may still be under some level of pressure (Figure 68). Ecosystem engineers were also present at moderate densities (26%), largely driven by sea urchins, while benthic-associated species remained at low to moderate levels. Charismatic species occurred at low to moderate densities (5%), indicating some presence of visually or ecologically notable taxa but not in high abundance.

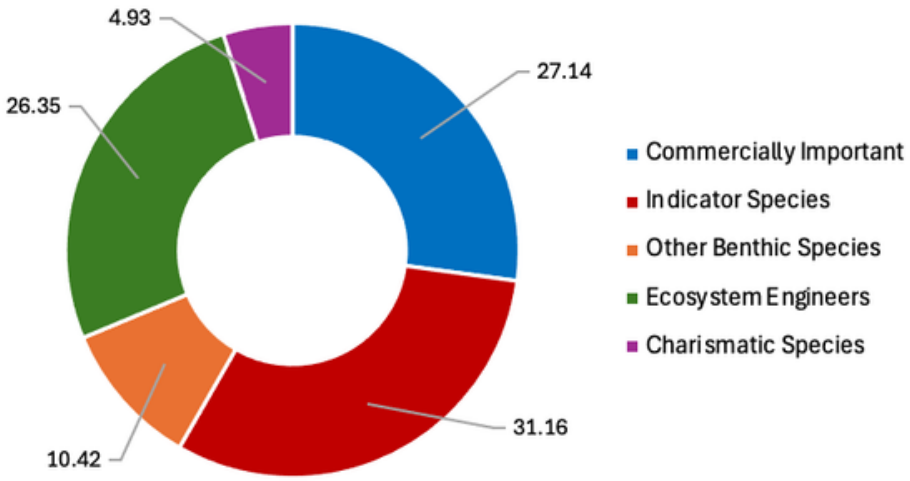


Figure 68. Proportional contribution (%) of invertebrate functional groups at Mojon MPA during Sep–Feb 2025/26.

Ecological Interpretation:
Ecologically, Mojon reflects a pattern seen across much of Zamboanguita, with sea urchin-dominated communities, low species richness, and reduced densities of high-value invertebrates such as sea cucumbers and giant clams. The dominance of Diadema sea urchins suggests strong grazing pressure, which may influence benthic composition and limit coral or algal community development.

Sea Urchins - Diadema	14.40
Bivalves - Other	1.00
Gastropods - Scorpion Spider Conch	0.92
Gastropods - Other Shell	0.59
Sea Cucumbers - Pinkfish	0.50
Gastropods - Cone	0.34
Sea Cucumbers - Volcano	0.33
Gastropods - Tiger Cowrie	0.25
Bivalves - Pearl Oyster	0.25

Table 25. Most abundant commercial invertebrates at Mojon MPA during Sep–Feb 2025/26. Values represent average density per survey and highlight the dominant contributors to the commercial benthic community.

Sea urchin abundance was moderate, reinforcing their role as a dominant functional group at this site. Sea cucumbers were present at low densities, suggesting either limited recruitment or possible harvesting pressure. Giant clams were either absent or extremely rare, indicating a limited contribution to the invertebrate community. Size distribution patterns (where consistent with other sites in the municipality) likely show a dominance of smaller size classes in sea urchins, indicating ongoing recruitment, while sea cucumbers, when present, tend to occur in mid-size classes, suggesting the presence of some adult individuals but limited population size. The low abundance of sea cucumbers and the absence or rarity of giant clams may indicate fishing pressure or historical overexploitation, particularly if this site experiences human activity or lacks strict protection enforcement (Table 25).

Overall, Mojon is characterised as a moderately abundant but low-diversity invertebrate community, with strong sea urchin dominance and limited populations of commercially valuable species. This pattern aligns with broader trends across the municipality.

MOJON MPA

Tourism Value

Barracudas	0	**Scorpaenidae**	82.29
Cephalopods	16.67	**Sharks**	0
Cowries	37.50	**Shrimps**	54.17
Eels and Snakes	54.17	**Slugs**	61.46
Frogfish	3.13	**Stingrays**	0
Giant Clams	8.34	**Syngnathidae and Pegasidae**	46.88
Porcupinefish and Pufferfish	84.38	**Turtles**	33.34

Table 26. Mean encounter rates (%) of selected indicator and charismatic taxa recorded at Mojon MPA from September - February 2025/26. Values represent the percentage of dives in which each group was observed, providing an indication of their relative tourism and ecological value.

Mojon presents a moderate tourism value, driven primarily by very high encounters with porcupinefish and pufferfish (84.4%) and a strong presence of Scorpaenidae (82.3%) (Table 26). Turtles are also regularly observed (33.3%), adding some megafaunal appeal, while eels and snakes (54.2%) provide further interest. Cowries (37.5%) and shrimps (54.2%) occur at moderate levels, and giant clams are scarce (8.3%). Frogfish (3.1%) add niche value for macro-divers, but the absence of barracudas, sharks, and stingrays reduces broader tourism draw.

Overall, Mojon offers reliable sightings of reef fish and select charismatic species but lacks the diversity of megafauna that defines higher-value sites. With the excellent beach access and facilities, this site will continue to be of interest for recreational diving and snorkelling.

Fish Monitoring

Our fish surveys are conducted using a visual census method based on a 30-meter x 5-meter belt transect. This yields an area of 150 square meters per survey. All target fish that enter the survey zone, from the seafloor to the surface, are counted and sized. The transect is left undisturbed for 15 minutes after it has been laid out, allowing fish to return to the survey area. Surveys are timed to last 10 minutes.

The following is our complete fish indicator list (commercial in bold):

- Angelfish - Bicolor
- Angelfish - Keyhole
- Angelfish - Midnight
- Angelfish - Pearl-Scale
- Angelfish - Other
- Anthias
- **Barracuda**
- **Big Eye**
- **Bream**
- Bristletooth
- Brushtail Tang
- Butterflyfish
- Cornetfish
- Damselfish - Other
- Damselfish - Sergeant
- **Emperorfish - Other**
- **Emperorfish - Long Face**
- **Fusilier**
- **Goatfish**
- **Grouper - Barramundi**
- **Grouper - Brown-Marbled**
- **Grouper - Other**
- Long-Jawed Mackerel
- Moorish Idol
- Needlefish
- **Rabbitfish**
- **Parrotfish - Other**
- **Parrotfish - Bumphead**
- **Parrotfish - Raggedtooth**
- **Parrotfish - Stareye**
- **Pufferfish - Other**
- **Pufferfish - White-Spotted**
- Scad
- Sea Rays
- Sea Snakes
- Sharks
- **Snapper**
- **Soldierfish**
- Squid
- Spadefish
- **Surgeonfish - Other**
- **Surgeonfish - Whitetail**
- **Surgeonfish - Yellow Mask**
- **Sweetlips**
- **Trevally - Other**
- **Trevally - Scad**
- **Triggerfish - Other**
- **Triggerfish - Redtooth**
- **Triggerfish - Titan**
- **Tuna**
- Turtles - Green
- Turtles - Hawksbill
- **Unicornfish - Blue-Spine**
- **Uniccornfish - Orangespine**
- **Unicornfish - Other**
- Wrasse - Cleaner
- Wrasse - Humphead
- Wrasse - Other

Substrate Monitoring

Our substrate surveys utilise a Point Intercept Method, based around a transect length of 30 meters. The substrate directly below every 25 cm increment on the line is identified and recorded. This yields a total of 120 data points per survey.

The following is our comprehensive list of substrate indicators.

Hard Coral
- Branching
- Tabulate
- Plate-like
- Encrusting
- Submassive
- Columnar
- Massive
- Solitary

Soft Coral
- Other Soft Coral
- Gorgonian
- Organ Pipe

Other Cnidarians
- Anemone
- Corallimorph
- Hydroid
- Zoanthid

Sessile Invertebrates
- Sponge - Barrel
- Sponge - Encrusting
- Sponge - Irregular
- Ascidian - Regular
- Ascidian - Encrusting
- Bryozoan

Algae
- Coralline
- Halimeda
- Filamentous
- Macro
- Turf

Health and Vulnerability
- Bleaching
- Disease
- Infestation
- Predation - Coralliophila
- Predation - Crown of Thorns
- Predation - Drupella
- Silt

Substrate
- Giant Clam
- Live Coral Fragment
- Rock
- Rubble
- Sand

Invertebrate Monitoring

Our invertebrate surveys are conducted using a visual census method based on a 30-meter x 5-meter belt transect. All target invertebrates present or that enter the survey zone are identified, counted and sized.

The following is our complete invertebrate indicator list.

Echinoderms

- Sea Star
- Cushion Star
- Urchin
  - *Diadema*
  - *Rock Boring*
  - *Collector*
  - *Other*
- Sea Cucumber
  - *Black Spotted*
  - *Leopard*
  - *Pinkfish*
  - *Sandfish*
  - *Volcano*
  - *Amberfish*
  - *Magnum*
  - *Other*

Arthropods

- Cleaner Shrimp
  - *Banded Coral*
  - *Other*
- Harlequin Shrimp
- Other Shrimp
- Mantis Shrimp
- Lobster
- Crab

Gastropods

- Conch
  - *Scorpion Spider*
  - *Other*
- Turban
  - *Giant*
  - *Other*
- Top
  - Nilo
  - Other
- Triton's Trumpet
- Horned Helmet
- Cone Shell
- Cowrie
  - *Tiger*
  - *Common Egg*
  - *Other*
- Other Shell

Bivalves

- Giant Clam
- Giant Boring Clam
- Thorny Oyster
- Pearl Oyster
- Pen Oyster
- Honeycomb Oyster
- Scallop
- Other Bivalve

Slugs

- Nudibranch
- Headshield Slug
- Sapsucking Slug
- Flatworm

Cephalopods

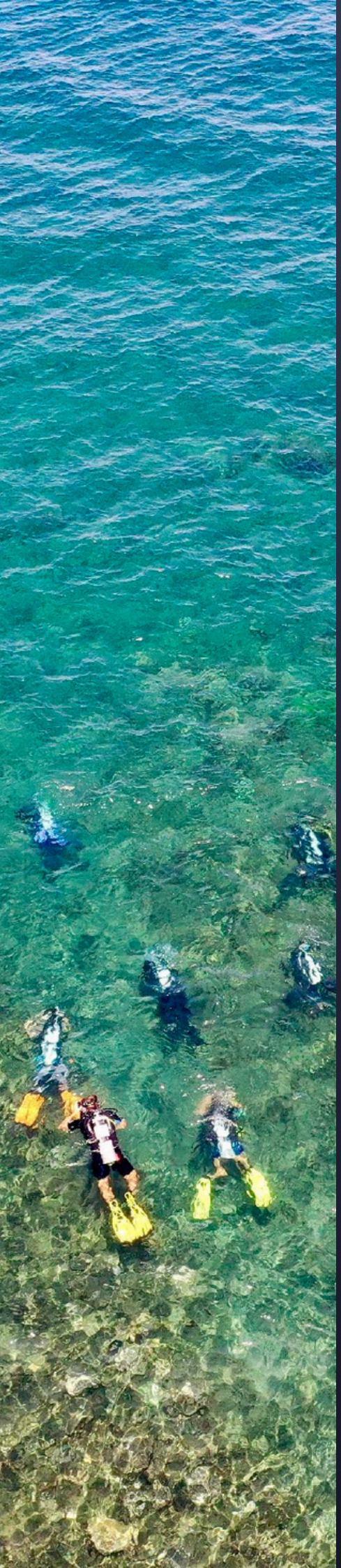
- Blue-ringed Octopus
- Other Octopus
- Cuttlefish
- Flamboyant Cuttlefish

Benthic Fish(Ish)

- Eel
- Ribbon Eel
- Pipefish
- Seahorse
- Frogfish
- Lionfish
- Scorpionfish
- Porcupinefish
- Blue Spotted Singray
- Blue Spotted Ribbontail Ray

Key:

- **Commercially Important Species**
- **Ecosystem Engineers**
- **Indicator Species (Reef Health & Diversity)**
- **Other Benthic Species**
- **Charismatic Species**



Marine Conservation Philippines

Thank You

Please contact us if you would like any additional information, or require assistance with any conservation activities

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