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ASSESSMENT OF RESOURCES OF MANDAPAM, KEEZHAKKARAI, VEMBAR AND TUTICORIN GROUP OF ISLANDS OF GULF OF MANNAR MARINE NATIONAL PARK AT DIFFERENT DEPTH GRADIENTS

Malleshappa, H.[1] and Patterson Edward, J.K.[2*]

[1]Director of Environment, PanagalMaligai (Ground Floor), No.1, Jeenis Road, Saidapet, Chennai.
[2]Suganthi Devadason Marine Research Institute, 44-Beach Road, Tuticorin, Tamil Nadu.
**Corresponding author: edwardjkpatterson@sdmri.in*

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Abstract: The Gulf of Mannar (GoM) is hotspot of biodiversity andharbour one of the most diverse Marine Biosphere Reserves of India. Various anthropogenic pressures have degraded the reef areas to a larger extent. Considering the lacunae in scientific data, the need for baseline information for any management programme is very much essential. In this context assessment of marine biological resources of Mandapam, Keezhakkarai, Vembar and Tuticorin Group of Islands in the Gulf of Mannar Marine Park area at different depth gradient was carried out to document the available resources

Key words: Gulf of Mannar, biodiversity, assessment, management

INTRODUCTION

The Gulf of Mannar (GoM) is known for its biological treasure, including coral reefs and seagrass beds is the storehouse for the livelihood of thousands of people. The pressure from human activities in the last 4-5 decades degraded the reef areas to a larger extent. The human activities such as coral mining, destructive and unsustainable fishing practices, pollution and coastal development are the major factors responsible for the degradation of reef areas in the Gulf of Mannar. In addition, it is also expected that the global warming would inflict considerable damage to coastal ecosystems, including reef areas and associated fishery resources. The impacts on coral reefs would be directly connected to livelihood and food security of the dependent people and the related economy.

These issues need to be addressed through scientifically informed and effective management approaches. Considering the lacunae in scientific data and the need for baseline information for any management programmes, the assessment of available resources is very much essential.In the Gulf of Mannar Marine National Park, the research work is mainly focused around the islands because of the presence of corals, seagrass beds, mangroves and associated resources. Detailed information on coral reefs of Gulf of Mannar (Patterson et al., 2007) is available, which contains comprehensive updated information on the ecological, faunal and floral status of GoM and forms a bench mark for any future monitoring.

The assessment of marine biological resources of Mandapam, Keezhakkarai, Vembar and TuticorinGroup of Islands in the Gulf of Mannar Marine Park area at different depth gradient (500 m interval) from the mainland shore to Island on the seaward side was carried out in order to collect baseline information on the resources and also to suggest effective management strategies, so that the corals and sea grass beds present in the Marine National Park area will be protected and conserved.

MATERIALS AND METHODS

The assessment was carried out during January - March 2009. Straight transects between mainland shore and Island shore (shoreward side) were made with a distance of 500m between each transect. In these transects starting from the mainland shore, sites were fixed with a 500m interval. The number of transects for each island depends on the length of island shore on the shoreward side, while the number of sites in each transect depends upon the distance between mainland shore and island shore on the shoreward side.

The sites were fixed with GPS and details are provided in the full report. Taking the GPS mark as the centre point, 100 sq.marea was assessed on each side. Assessment was carried out with the help of SCUBA unit. In total, eight 30m Line Intercept Transects (LIT) were laid parallel to the shore to assess the benthic community structure in each site by following English *et al*., (1997). In each transect, 2 quadrats (1 X 1m) were laid at every 5m interval (one at each side of transect) to assess the benthic macro fauna. In total, 12 quadrats were put in each transect. The fishes were assessed by visual survey following the Belt Transect Method and the species were identified (English *et al*., 1997).

RESULTS AND DISCUSSION

Mandapam group

In Mandapam group of islands, the resources start from the mainland shore itself; high seagrass cover is available between the mainland shore and Island in Shingle, Krusadai and Pullivasal islands; Sand area is also high in these islands. Corals are found only near the islands. The details of the resource areas are given in the Table 1. Very high cover of sand area was observed in Poomarichan, Manoliputti, Manoli and Hare Islands between the mainland shore and Island. Seagrass cover is low in these islands and are scattered as patches in the sandy area. Corals are found near the islands on the shoreward side. Among the macro fauna, bivalves and gastropods were the dominant categories in all islands. Among the seven islands, Hare Island is having the high amount of benthic macro fauna followed by Poomarichan Island. Among the seven islands, fish abundance was very high in Shingle Island followed by Kurusadai Island. The most common fish species in all the seven islands were *Scarus* sp., *Chaetodon* sp. *Terapon* sp. and *Mugil cephalus*.

Keezhakkarai group

In Keelakarai group of islands, high luxuriant seagrasses cover is available in the area between mainland shore and all seven islands. Sand is also dominant in all islands and most of the sandy area are covered by patch seagrasses. The details are provided in the table 2. In Anaipar Island, patch reef occurs near the mainland shore covering an area of 3.27 km^2 at 3 m depth and it is followed by seagrass beds towards the Island. In all seven islands, corals occupy the area near the Island on the shoreward side.

Among the benthic macro fauna, bivalves and gastropods were the dominant categories in all seven islands. Among the seven islands, Poovarasanpatti and Appa islands were having the higher densities of macro fauna. The abundance of fish was high in Poovarasanpatti and Appa islands. The most abundant fish species in all islands were *Terapon* sp., *Mugil cephalus*, *Upeneus* sp. and *Sardinella* sp.

Vembar and Tuticorin groups

In Vembar and Tuticorin group of islands, resources start from the mainland shore itself. High seagrass cover was observed in Puluvinichalli, Upputhanni, Kariyachalli, Vilanguchalli, Koswari and Vaan islands. High sandy area was observed in all islands and most of the sandy area is covered by seagrass patches. Seagrass cover is poor in Nallathanni Island. The details of the resource areas are given in the table 3. Near shore patch reefs were observed near the mainland towardsKariyachalli, Vilanguchalli and Koswari islands. The continuous patch reef covering an area of 3 km^2 at 2 m depth is common for both Kariyachalli and Vilanguchalli islands, while a patch reef in Koswari island covering an area of 4.2 km^2 is seen at 3 m depth. Except Vaan Island, all the other islands are having corals near the Island on the shoreward side.

Among the benthic macro fauna, bivalves and gastropods were dominant in all seven islands. Koswari Island was having the higher density of macro fauna. Fish abundance was high in Kariyachalli and Vaan islands. The most abundant fish species in Vembar and Tuticorin groups of islands were *Sardinella* sp., *Terapon* sp., *Chaetodon* sp. and *Scarus* sp.

Table 1. The resource details in each Island of the Mandapam group between mainland shore and the Island on the shoreward side

Island	Major benthic forms – Distance from Mainland shore to Island (in km) – distance given for each category	Area coverage for each category (in km2)	Resource status
Shingle	S - 0.39	S - 2.53	High seagrass cover
	S+SG - 0.87	S+SG - 3.25	
	CR - 0.47	CR - 2.75	
Krusadai	S+SG - 2.97	S+SG - 11.07	High seagrass cover
	S - 0.42	S - 1.90	
	CR - 0.45	CR - 5.65	
Pullivasal	S - 0.37	S - 1.8	High seagrass cover
	S+SG - 1.09	S+SG - 4.9	
	S - 0.71	S - 2.82	
	S+SG - 1.20	S+SG - 4.5	
	CR+S - 1.68	CR+S - 4.25	
Poomarichan	S+SG - 0.86	S+SG - 3.4	Poor sea grass cover
	S - 2.70	S - 4.75	Sand dominant
	CR - 1.50	CR - 2.64	
Manoliputti	S - 5.46	S - 11.3	Poor seagrass cover
	CR - 0.70	CR - 2.75	Sand dominant
Manoli	S+SG - 4.29	S+SG - 10.5	Poor seagrass cover
	CR+S - 1.08	CR+S - 3.5	Sand dominant form
Hare	S+SG - 3.70	S+SG - 12.1	Poor seagrass cover
	S - 1.97	S - 10.3	Sand dominant
	SG - 0.63	SG - 7.5	
	CR+S - 0.33	CR+S - 7.4	

(CR - Coral reef; CR+ S - Coral reef + Sand; SG - Seagrass; SG + S -Seagrass + Sand; S – Sand)

Table 2. The resource details in each Island of the Keezhakkaraigroup between mainland shore and the Island on the shoreward side

Island	Major benthic forms – Distance from Mainland shore to Island (in Km) – distance given for each category	Area coverage for each category (in km2)	Resource status
Mulli	S +SG - 4.55	S +SG -11.25	High seagrass cover
	S - 1.94	S - 6.1	
	SG - 1.10	SG - 4.5	
	CR - 1.25	CR - 2.6	
Valai	S+SG - 2.97	S+SG - 6.2	High seagrass cover
	S - 0.42	S - 3.2	
	S+SG - 1.70	S+SG - 5.2	
	S - 1.88	S - 5.6	
	SG - 0.95	SG - 3.41	
	CR - 0.45	CR - 3.22	
Thalaiyari	S+SG - 1.52	S+SG - 14.6	High seagrass cover
	S - 0.92	S - 4.2	
	S+SG - 1.65	S+SG - 12.55	
	S - 2.86	S - 2.9	
	CR - 0.85	CR - 7.8	
Appa	S+SG - 2.83	S+SG - 10.54	High seagrass cover
	S+SG - 3.67	S+SG - 13.65	
	CR - 1.30	CR - 4.5	
Poovarasanpatti	S+SG - 4.95	S+SG - 8.5	High seagrass cover
	S - 0.86	S - 4.8	
	SG - 0.67	SG - 3.9	
	S - 0.42	S - 1.95	
	CR - 1.55	CR - 2.85	
Valimunai	S+SG - 4.72	S+SG - 10.55	High sea grass cover
	CR - 0.92	CR - 2.15	
Anaipar	SG - 0.62	SG - 1.75	High seagrass cover
	CR - 0.80	CR - 3.27	Near shore patch reef (3.27 km^2) at depth 3 m
	S+SG - 0.93	S+SG - 3.90	
	S - 1.11	S - 4.22	
	SG - 0.84	SG - 3.2	
	CR - 0.46	CR - 4.05	

(CR - Coral reef; CR+ S - Coral reef + Sand; SG - Seagrass; SG + S -Seagrass + Sand; S – Sand)

Table 3. The resource details in each Island of the Vembar and Tuticorin groups between mainland shore and the Island on the shoreward side

Island	Major benthic forms – Distance from Mainland shore to Island (in Km) – distance given for each category	Area coverage for each category (in km²)	Resource status
Nallathanni	S - 1.36	S - 7.28	Poor seagrass cover
	S+SG - 0.98	S+SG - 7.11	
	S - 0.42	S - 4.75	
	CR+S - 0.33	CR+S - 4.25	
Puluvinichalli	S - 2.85	S - 8.25	High seagrass cover
	CR+S - 0.55	CR+S - 2.47	
Upputhanni	S+SG - 0.76	S+SG - 3.8	High seagrass cover
	S - 2.15	S - 8.15	
	S+CR - 0.56	S+CR - 2.75	
Kariyachalli	S+ CR - 0.60	S+ CR - 3.0	High seagrass cover
	S+SG - 2.07	S+SG - 5.44	Near shore patch reef (3 km²) at depth 2 m is common for both Kariyachalli and Vilanguchalli Islands
	CR - 0.44	CR - 2.33	
Vilanguchalli	S+ CR - 0.60	S+ CR - 3.0	
	S+SG - 2.07	S+SG - 5.44	
	CR - 0.44	CR - 2.33	
	SG - 0.34	SG - 1.82	
	CR - 0.35	CR - 1.45	
	S+SG - 0.8	S+SG - 3.18	
	SG - 0.37	SG - 1.11	
	CR - 0.46	CR - 2.82	
Koswari	S+SG - 1.23	S+SG - 3.60	High seagrass cover
	S+CR - 1.21	S+CR - 4.20	Near shore patch reef (4.2 km²) at depth 3 m
	S+SG - 3.05	S+SG - 7.40	
Vaan Island	S+SG - 3.60	S+SG - 8.94	High seagrass cover

(CR - Coral reef; CR+ S - Coral reef + Sand; SG - Seagrass; SG + S -Seagrass + Sand; S – Sand)

CONCLUSIONS

The present study mainly focuses on the data collected from the mainland shore to the 21 Islands in Mandapam, Keezhakkarai, Vembar and Tuticorin Groups of Gulf of Mannar. The collected baseline information on resources will help to understand, monitor and manage the health of the ecologically sensitive habitats and nearby areas, so that effective management and conservation practices can be implemented. The data which contains the comprehensive information on the ecological, faunal and floral status of Gulf of Mannar forms a bench mark for any future monitoring.

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