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# A Checklist and Spatial Distribution of Molluscan Fauna in Minicoy Island, Lakshadweep, India

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**Abstract:** Among the various animal groups represented in the macrobenthic fauna of Minicoy lagoon studied, mollusks were the dominant group. Molluscan fauna were investigated from six selected stations in the sea grass beds and mangroves of the Minicoy lagoon, Lakshadweep during 1999-2001. A total of 70 species of mollusk (52 gastropods, 12 bivalves) and an additionally 7 soft mollusks are reported in the present study. The total density of molluscan fauna varied from 137-604 (no. 0.25m$^2$), while the highest biomass was obtained during postmonsoon season at southern seagrass bed and the least was observed during premonsoon season at northern seagrass bed. Among these *Gafrarium divarticatum*, *Terebralia palustris* are found the most dominant species of Minicoy Island, India.

**Key words:** Bivalve % Gastropods % Mollusk % Seagrass % Mangrove

## INTRODUCTION

The Lakshadweep group of Islands is located off the Southwest coast of India in the Arabian Sea. There are 36 Islands covering an area of 32 Km$^2$. From the Lakshadweep coast, some information is available on the molluscan fauna of seagrass communities [1, 2]. Wood stated seagrass is a complex assemblage that performs multiple functions such as providing micro habitats for animals, substrata for epifauna and epiphyte and an important source of organic detritus [3]. Mangroves, that exists in tropical and subtropical intertidal regions of the world support rich biodiversity and play an important role in the estuarine and coastal food webs [4]. Biotic and abiotic interactions have profound impact on the evolution of most diverse benthic fauna in the tropical mangroves [5]. Baseline information on the distribution and abundance of molluscan fauna helps in assessing the impairment to biota. Based on the structure of molluscan assemblages, pollution induced damage in mangrove forests can be evaluated. Hence this study has been made to update the inventory of mollusks in seagrass bed and mangrove sites.

## MATERIALS AND METHODS

**Study Area:** Minicoy Island located at 08° 17'N and 73° 04'E is the southernmost Island in the Lakshadweep group with a land area of 4.4 km$^2$ and length of 9.5 km, tidal amplitude is approximately 1.75m (Fig.1). The present study covers three sets of stations: Southern seagrass bed, Northern seagrass bed and Mangrove zone. Monthly collections were made from the above stations; study was conducted from September 1999 to August 2001. Of the selected six stations, four were located in the intertidal zone (occupied by seagrasses) and two in the mangrove swamp. Station 1, Southern *Thalassia* bed located on the southern side of the Island and mainly constituted by luxuriant growth of sea grass *Thalassia* spp. Station 2, Southern *Thalassia* - *Halophila* bed was located on the southern side about 100 m away from the high tide mark to the lagoon side. Station 3, Northern *Cymodaceae* bed was located on the northwest side of the Island and had only sparse growth of seagrass (*Cymodaceae* sp.). Station 4, Northern *Syringodium* bed was located on the northwest side of the Island almost 200 m away from the high tide mark into the lagoon and the vegetation was mainly constituted by *Syringodium* sp. of seagrass. Station 5, Mangrove site bordered by *Cereops tagal* was located on the southwestern side of the Island near the helipad. Station 6, Mangrove site bordered by *Avicinnia marina* was located on the southwestern side of the Island, slightly away from the bund and the banks were bordered by *A. marina*.

**Sample Collection:** Triplicate samples were collected every month using a metal quadrat of 25cm ×25cm size up to a depth of 15cm [2]. The benthic organisms in the

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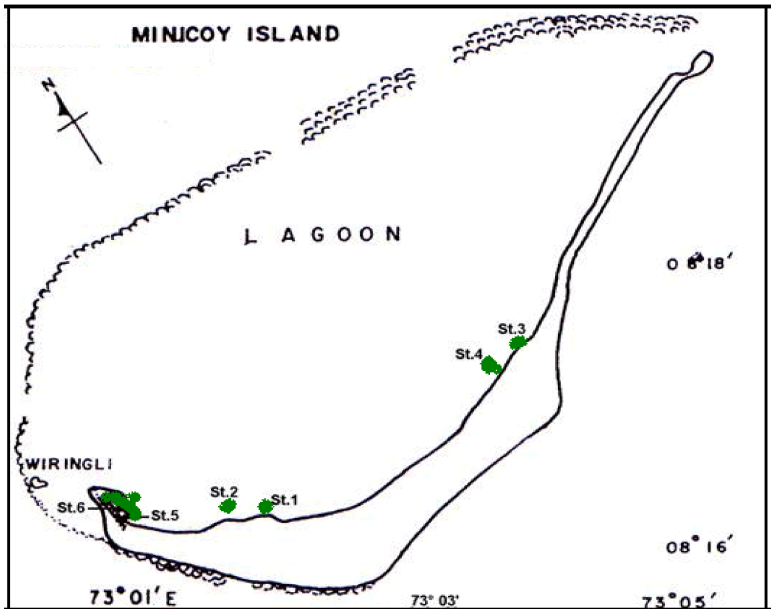


Fig. 1: Location Map of Minicoy Island showing the sampling stations

sediment sample recovered after sieving through 0.5 mm mesh sieve was brought to the laboratory in polythene bottles, transferred to a large white bottomed tray and the animals which were moving or easily recognizable were hand sorted. Fauna were identified to the lowest taxonomic level using standard references [6]. The numerical abundance was extrapolated into 0.25 $m^2$ for easier data comparison.

## RESULTS AND DISCUSSION

A total of 160 macrobenthic species belonging to 8 major groups represented the macrofauna of the Minicoy Island. Of the identified taxa, molluscan fauna contributed by 70 species including 7 species of soft shelled molluscs Table 1. Among molluscs 52 species of gastropods belonging to 27 families and 42 genera were recorded from the selected stations. Of these, 8 species can be considered as rare as they were present in very small numbers in few samples. They were *Mazescala japonica*, *Nassarius distortus*, *Strigatella litterata*, *Agatha virgo*, *A. lepidula*, *Truncatelle pfeifferi*, *Diala lauta* and *Dolabrifera dolabrofera*. Maximum number of Gastropods were recorded from station 2 (49) followed by station 1 (46) and station 4 (22). Stations 5 & 6 had equal number of species (9 spp.). At stations 5 and 6 the most common species was *Littorina undulata*, a mangrove associated type. *Terebralia paluristris*, which was abundantly reported at mangrove stations, were totally absent at other stations.

Altogether 12 species of bivalves were reported, out of which stations 5 and 6 did not show any occurrence of bivalves. Stations 3 and 4 showed the presence of only four species of bivalves and station 1 and 2 showed 12 and 11 species respectively. *Gafrarium divarticatum*, *Tellina palatum* occurred in good numbers at seagrass stations. Among the collected bivalves from the selected stations, the highest percentage of occurrence was shown by *G. divarticatum* (54.9%), *Tellina palatum* (19.4%), *Pinna muricata* (16%) and *Ctena delicatula* (11.8%).

Soft mollusks were of 7 species, which included both opisthobranchs and phanerobranchs. The most common species of soft molluscs was *Dolabella rumphii*, which produces a violet ink when got irritated. *Gymnodoris ceylonica*, a beautiful opisthobranch was frequently seen at stations 1 and 2. While stations 1 and 2 showed the maximum species diversity, stations 5 and 6 showed the least.

**Abundance and Biomass of Molluscs:** Gastropods were showing their maximum average monthly abundance (no.0.25$m^2$) at station 2 (604) followed by station 1 (362), station 6 (250), station 5 (212), station 3 (159) and station 4 (137). The bivalves were distributed only at the seagrass stations and total numerical abundance of bivalves at each seagrass station was 1524 at station 1, 1064 at station 2, 1516 at station 3 and 920 at station 4. The abundant molluscan fauna in the present study of Minicoy is comparable to that reported from other areas of the mainland. In the present study 70 species of

Table 1: A checklist of molluscan fauna and Species wise contribution (% of numerical abundance) to total abundance

| Species | St.1 | St.2 | St.3 | St.4 | St.5 | St.6 |
|---|---|---|---|---|---|---|
| Gastropods | | | | | | |
| *Punctacteon amakusaensis* | 0.03 | 0.11 | 0.22 | 0.00 | 0.00 | 0.00 |
| *Marania lirata* | 0.14 | 0.09 | 0.00 | 0.00 | 0.00 | 0.00 |
| *Cerithium corallium* | 22.58 | 29.76 | 3.94 | 3.85 | 10.62 | 11.61 |
| *Cerithium alveolum* | 3.63 | 3.12 | 1.22 | 1.67 | 0.00 | 0.00 |
| *Cerithium dialeucum* | 0.31 | 0.60 | 0.50 | 0.29 | 0.00 | 0.00 |
| *Cerithium rarimaculatum* | 0.03 | 0.07 | 0.00 | 0.00 | 0.43 | 0.19 |
| *Cerithium scabridum* | 13.89 | 19.98 | 6.61 | 8.10 | 0.50 | 0.77 |
| *Cerithium rostratum* | 0.39 | 1.60 | 7.05 | 4.37 | 0.00 | 0.00 |
| *Cerithium nesioticum* | 0.82 | 5.79 | 3.00 | 4.02 | 0.00 | 0.00 |
| *Clypeomorus corallium* | 0.06 | 0.02 | 0.00 | 0.00 | 0.00 | 0.00 |
| *Rhinoclavis sinensis* | 0.06 | 0.20 | 0.06 | 0.23 | 0.00 | 0.00 |
| *Pyrene* sp. | 2.25 | 1.87 | 11.83 | 12.70 | 0.93 | 0.38 |
| *Pyrene vulpecula* | 0.65 | 0.47 | 1.50 | 0.46 | 0.00 | 0.00 |
| *Metanachis marquesa* | 0.39 | 0.27 | 1.00 | 3.85 | 0.00 | 0.00 |
| *Conus catus* | 0.14 | 0.38 | 0.50 | 0.06 | 0.00 | 0.00 |
| *Conus ebraeus* | 0.17 | 0.02 | 0.00 | 0.00 | 0.00 | 0.00 |
| *Coralliophila costularis* | 0.51 | 0.80 | 0.17 | 0.23 | 0.00 | 0.00 |
| *Cyprea annulus* | 0.08 | 0.04 | 0.00 | 0.00 | 0.00 | 0.00 |
| *Cyprea arabica* | 0.08 | 0.07 | 0.00 | 0.00 | 0.00 | 0.00 |
| *Cyprea moneta* | 0.51 | 0.27 | 0.33 | 0.00 | 0.00 | 0.00 |
| *Cyprea teres* | 0.11 | 0.04 | 0.00 | 0.00 | 0.00 | 0.00 |
| *Cyprea tigris* | 0.08 | 0.07 | 0.00 | 0.00 | 0.00 | 0.00 |
| *Mazescala japonica* | 0.00 | 0.02 | 0.00 | 0.00 | 0.00 | 0.00 |
| *Niso heizensis* | 0.00 | 0.36 | 1.50 | 0.46 | 0.00 | 0.00 |
| *Persternia pilsbryi* | 0.08 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| *Littorina undulata* | 0.28 | 1.36 | 1.33 | 0.00 | 59.37 | 66.52 |
| *Strigatella litterata* | 0.00 | 0.02 | 0.00 | 0.00 | 0.00 | 0.00 |
| *Drupella* sp. | 0.03 | 0.04 | 0.00 | 0.06 | 0.00 | 0.00 |
| *Nassarius distortus* | 0.00 | 0.02 | 0.00 | 0.00 | 0.00 | 0.00 |
| *Niotha stigmaria* | 0.03 | 0.40 | 0.17 | 0.52 | 0.00 | 0.00 |
| *Zeuxis* sp. | 0.34 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| *Polinices flemengium* | 0.25 | 0.00 | 1.44 | 0.11 | 0.00 | 0.00 |
| *Natica rufa* | 0.06 | 0.07 | 0.00 | 0.00 | 0.00 | 0.00 |
| *Smaragdia viridis* | 2.47 | 2.83 | 5.00 | 2.53 | 0.43 | 0.19 |
| *Smaragdia soverbiana* | 7.84 | 6.97 | 2.72 | 2.59 | 0.14 | 0.64 |
| *Vittina variegata* | 0.00 | 0.78 | 0.50 | 0.06 | 0.00 | 0.00 |
| *Terebralia palustris* | 0.00 | 0.00 | 0.00 | 0.00 | 18.03 | 14.99 |
| *Agatha virgo* | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| *Agatha lepidule* | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| *Pyrgulina pupula* | 0.00 | 0.09 | 0.72 | 0.23 | 0.00 | 0.00 |
| *Cymatium neobaricum* | 0.00 | 0.04 | 0.11 | 0.00 | 0.00 | 0.00 |
| *Cymatriton nicobaricum* | 0.00 | 0.00 | 0.11 | 0.00 | 0.00 | 0.00 |
| *Cinctiscala* sp. | 0.39 | 0.16 | 0.00 | 0.00 | 0.00 | 0.00 |
| *Decorifer insignis* | 0.11 | 0.07 | 0.00 | 0.00 | 0.00 | 0.00 |
| *Casmeria ponderisai* | 0.00 | 0.07 | 0.00 | 0.06 | 0.00 | 0.00 |
| *Strombus canarium* | 0.20 | 0.02 | 0.17 | 0.00 | 0.00 | 0.00 |
| *Strombus mutabilis* | 0.20 | 0.20 | 0.28 | 0.00 | 0.00 | 0.00 |
| *Cinguloterebra hedleyana* | 0.14 | 0.49 | 0.33 | 0.57 | 0.00 | 0.00 |
| *Margarites helicina* | 0.39 | 0.38 | 0.00 | 0.00 | 0.57 | 0.70 |
| *Truncatella pfeifferi* | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Unidentified 129 | 0.51 | 0.18 | 0.61 | 0.34 | 0.00 | 0.00 |
| SOFT MOLLUSCS | | | | | | |
| *Dolabella rumphii* | 0.34 | 0.22 | 0.00 | 0.00 | 0.00 | 0.00 |
| *Polycera* sp. | 0.08 | 0.09 | 0.00 | 0.00 | 0.00 | 0.00 |
| *Gymnodoris ceylonica* | 0.03 | 0.02 | 0.00 | 0.00 | 0.00 | 0.00 |
| *Elysia* sp. | 0.31 | 0.09 | 0.00 | 0.00 | 0.00 | 0.00 |
| *Smargdinella canaliculata* | 0.20 | 0.13 | 0.00 | 0.00 | 0.00 | 0.00 |
| *diala lauta* | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| *Dolabrifera dolabrifera* | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| BIVALVES | | | | | | |
| *Lunulicardia auricula* | 0.08 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| *Cardium asiaticum* | 0.37 | 0.04 | 0.17 | 0.00 | 0.00 | 0.00 |
| *Corculum impressum* | 0.11 | 0.04 | 0.00 | 0.00 | 0.00 | 0.00 |
| *Ctena delicatula* | 0.42 | 0.33 | 0.44 | 0.00 | 0.00 | 0.00 |
| *Mactra cuneata* | 0.06 | 0.02 | 0.00 | 0.00 | 0.00 | 0.00 |
| *Myadoropsis brevispinious* | 0.17 | 0.20 | 0.00 | 0.17 | 0.00 | 0.00 |
| *Lithophaga nigra* | 0.14 | 0.13 | 0.00 | 0.00 | 0.00 | 0.00 |
| *Modiolus metcalfei* | 0.06 | 0.09 | 0.06 | 0.11 | 0.00 | 0.00 |
| *Pinna muricata* | 0.34 | 0.29 | 0.00 | 0.00 | 0.00 | 0.00 |
| *Tellina palatum* | 0.14 | 0.07 | 1.44 | 1.38 | 0.00 | 0.00 |
| *Gafrarium divarticatum* | 8.74 | 4.43 | 18.93 | 25.92 | 0.00 | 0.00 |
| *Periglypta puerpura* | 0.08 | 0.27 | 0.00 | 0.00 | 0.00 | 0.00 |

St.1 = station 1; St. 2 = station 2; St. 3 = station 3;
St. 4 = station 4; St. 5 = station 5; St. 6 = station 6

Table 2: Station season wise average biomass of mollusks (g/m$^2$)

| | Southern Seagraas | | Northern Seagrass | | Mangrove | |
|---|---|---|---|---|---|---|
| Group | Station 1 | Station 2 | Station 3 | Station 4 | Station 5 | Station 6 |
| Gastropods | 167.93 | 150.29 | 33.89 | 31.96 | 115.48 | 98.53 |
| Bivalves | 11.15 | 13.3 | 42.32 | 22.01 | 0 | 0 |
| Season | Gastropods | Bivalves | Gastropods | Bivalves | Gastropods | Bivalves |
| Pre monsoon | 104.9 | 6.24 | 25.76 | 21.74 | 57.48 | 0 |
| Monsoon | 154.13 | 17.78 | 38.37 | 29.73 | 50.08 | 0 |
| Post monsoon | 218.29 | 12.65 | 34.64 | 45.03 | 53.85 | 0 |

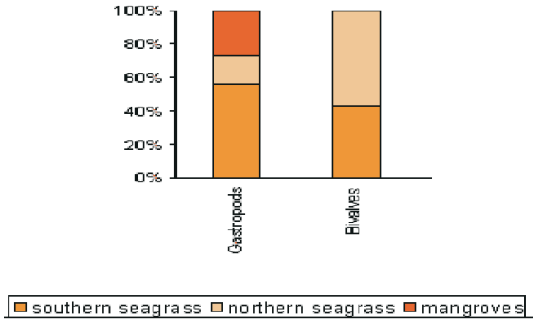


Fig. 2: Area wise shares to the numerical abundance of major groups

mollusks were recorded and an additionally 7 species of soft molluscs were recorded in seagrass bed at Minicoy Island. However in the previous studies in Indian mangroves and seagrass beds along the Indian coast, soft molluscs were not reported so far. It has been suggested that an increased surface area and increased habitat

*Cerithium spp.* *Littorina sp.*

*Smaragdia spp.* *Cyprea moneta*

*Terebralia palustris* *Gafrarium divarticatum*

Fig. 3: Major species of benthic molluscan fauna obtained from the study area

complexity in seagrass ecosystems plus an abundance of food from decaying seagrass and organic sedimentary material support these large and diverse populations of molluscan fauna in such ecosystem [7]. In comparison among the molluscan assemblage from the mangroves of Godavari and Krishna estuarine ecosystems, Raut [8] recorded a total of 95 species of molluscs belonging to 11 genera. Saravanakumar [9] recorded 17 species of gastropods and 16 species of bivalves in the Arid Zone Mangroves of Gulf of Kachchh. A total of 37 species of molluscs were recorded in Pondicherry mangroves [5], among them 16 species of bivalves belonging to 7 families and 12 Genera and 21 species of gastropods belonging to 14 families and 19 Genera, with the *Cereithedia cingulata* being the dominant group.

Distribution and abundance of molluscan fauna were related to the density and biomass of seagrass bed and mangroves site are studied. Station-wise and season wise average biomass of mollusks ($g/m^2$) is given in Table 2; Station 1 showed the highest biomass (Gastropods 167.93 $g/m^2$, Bivalves 11.15 $g/m^2$) while station 4 showed the lowest biomass (Gastropods 31.96 $g/m^2$, Bivalves 22.01 $g/m^2$) Fig. 2. Seasonal variations were observed in the occurrence of bivalves at seagrass beds and they were totally absent at the mangrove sites. Southern seagrass bed showed their highest biomass value 230.94 ($g/m^2$) during post monsoon season and least observed during pre monsoon 47.5 ($g/m^2$) at Northern seagrass bed. A high biomass was observed in the mangrove stations when compared with their less numerical abundance, due to the large sized gastropod flesh of *Terebralia palustris* (Fig. 3). Generally species richness and density increased with increasing plant biomass at the collection sites [2]. The present study corroborates these findings.

The molluscan fauna in the study area showed great diversity in seagrass stations and less diversity in mangrove sites. A total of 77 species of molluscs including 7 species of soft mollusks were recorded from seagrass bed for the first time at Minicoy Island, So far

none of the previous studies from Indian seagrass beds reported any information on soft mollusks. In future investigation the seagrass bed and mangrove areas at Lakshadweep have to be covered intensively to study the disturbance caused by human interference on the benthic community and taxonomical confirmation using molecular tools.

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