

STATUS OF CORAL REEFS IN MARINE NATIONAL PARKS OF ANDAMAN ISLANDS, INDIA

R. Raghuraman* and C. Raghunathan

Zoological Survey of India, Andaman and Nicobar Regional Centre, Port Blair– 744102, Andaman & Nicobar Islands

*Corresponding author Email: *rtrp_26@yahoo.co.in*

ABSTRACT

The study was conducted to assess the present status of coral reefs diversity in Mahatma Gandhi Marine National Park, South Andaman and Rani Jhansi Marine National Park, Ritchie's Archipelago. Line intercept transects were laid in 6 islands at the different depths. There is a significant variation in live coral cover and dead coral cover between the study areas, whereas not much variation recorded in other benthic categories like sponge, soft coral, algae, sand, rubble etc. The live coral cover of the MGMNP estimated to be 33%. Wherein, RJMNP it was 40.21%. Diversity Index proves that, there is no much variation in coral diversity and evenness. The results of this study may serve to be a base line data for the management of corals in Marine National Parks.

Keywords: Andaman, coral, diversity, Marine National Park

INTRODUCTION

The Andaman and Nicobar Islands are having remarkable marine biodiversity and more than 30 percentage endemism (Savant, 2009), located at Bay of Bengal between latitudes 6° 45' S and Longitudes 92° 12' and 93° 57'E. These Islands lined with fringing reefs, which host a rich marine biodiversity and also most diverse as well as extensive reef among Indian subcontinent reef areas (Pillai, 1983). In this archipelago a total of 7171 Km² falls under protected area as per Wild Life (Protection) Act, 1972, which includes 9 National Parks and 96 Wild Life Sanctuaries and one Biosphere. Among the six National Parks two are Marine National Parks, viz. Mahatma Gandhi Marine National Park and Rani Jhansi Marine National Park. All the National Parks are located at Andaman Islands, while 3 sanctuaries and Great Nicobar Biosphere reserve located at Nicobar Islands (Dorairaj and Soundararajan, 1987).

The marine ecosystems of the Andaman and Nicobar Islands are unique in having very high degree of biodiversity and endemism in fauna and flora. They not only protect the coastline against sea erosions but also harbour host of animal communities like fishes, molluscs, sponges, echinoderms and other organisms. Commercial fisheries often indirectly depend on coral reefs. It is serving as

nursery grounds for juveniles. The coral reefs have also come under heavy pressure due to uncoordinated and inconsistent developmental activities on coastal land leading to deforestation, mangrove habitat destruction, and degradation of marine ecosystems.

There is little report about the assessment of live coral cover in Andaman and Nicobar region and other places. Pillai (1977, 1978 and 1983); Scheer and Pillai, 1974 published a series of account on corals of Andaman and Nicobar Islands. Jayabaskaran, 1999, 2002, Turner *et al.* 2001, Venkataraman *et al.*, 2003; Kulkarani, 2005; Gulf of Mannar (Patterson Edward, 2005). The total area of coral reefs in India is estimated to be 2,379 sq km (MWRD, 2000).

In the recent years taxonomic investigation of corals started in Andaman and Nicobar region by many workers. Rajkumar *et al.* (2010) reported nine corals from South Andaman region; following this Raghuraman *et al.* (2010) recorded 26 scleractinian species from Pongibalu reef, which is located at periphery of Mahatma Gandhi Marine National Park. Later 2010, 55 new hard corals reported by Madhan *et al.* (2010) and Mondalet *et al.* (2010a, b, c, d and e) from Middle and North Andaman reefs. Followed by these reports, Ramakrishna *et al.* (2010) reported 82 species from all over the Andaman and Nicobar reefs. In

2011, Mondalet *et al.*, (2011a, b, c, d, e, f & g) contributed 44 new records from Rutland, Rani Jhansi Marine National Park, Havelock Island and Neil Islands and these reports increased the species number to a notable amount.

Mahatma Gandhi Marine National Park

In 1983 fifteen islands (Alexandra, Red Skin, Boat, Hobday, Tarmugli, Grub, Chester, Snob, Bell, Pluto, Malay, Jolly Boys, Riflemen, Twins and part of Rutland island) and some islets in Wandoor declared as Mahatma Gandhi Marine National Park (Fig.1) under the Wildlife (Protection) Act of 1972 for the protection of marine biodiversity. The

Park is located on the South western coast of South Andaman, in the Bay of Bengal. The park boundary runs along the coasts as well as some time along island within the range of latitudes between 11°22, 06" N and 11° 36 - 34" N and longitudes between 92° 30.00"E and 92° 40.33' E covering a total area of 281.5 sq km. Area of MGMNP includes good diversity of marine fauna such as corals, reef fishes, echinoderms, molluscs etc., and islands covers with dense forest, shores lined with mangroves. To encourage tourism, two islands in the park viz., Jolly Buoy and Red Skin are opened for the tourist to visit during fair seasons.

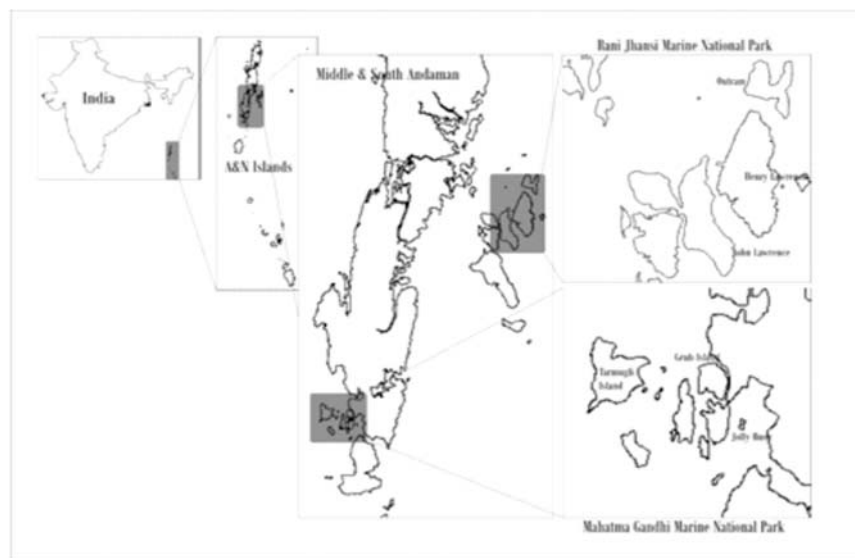


Fig. 1: Map showing study area (Mahatma Gandhi Marine National Park and Rani Jhansi Marine National Park)

Rani Jhansi Marine National Park

In 1996 three islands in Ritchie's archipelago declared as Rani Jhansi Marine National Park (RJMNP) (Fig.1).RGMNP encompassing Henry Lawrence Island (Lat. 12°12.598'N, Long. 93°03.883'E), John Lawrence Island (Lat. 12° 04. 075'N, Long. 93 °00.398'E)and Outram Island (Lat. 12°12.346'N, Long.93 °05.753'E),covers a total of 256.14 sq. Km in the Ritchie's archipelago. The area includes vast stretch of marine waters, bushy vegetated islands, coral reefs, sandy beaches and mangroves.The present study gives detailed accounts on live coral status of two marine National Parks of Andaman Islands.

MATERIALS AND METHODS

Benthic live cover was assessed using Line Intercept Transects (LIT) method (Loya 1972) using a flexible fibreglass measuring tape at selected sites of both the areas (Table 1) during June 2009 to February 2010. Twenty meter transect were laid at three different depths in each sites and the species were identified *in-situ* to illustrate the distribution pattern. In MGMNP, three islands were selected to assess the coral diversity viz. Grub (GB), Tarmugli (TM) and Jolly buoy (JB), while in RJMNP all the islands, John Lawrence (JL), Henry Lawrence (HL) and Outram (OR) were taken into account for the present study.

Table 1: Study areas with GPS co-ordinates

Islands	GPS Co-ordinates
Mahatma Gandhi Marine National Park	
Grub Island	Lat 11° 35. 391’N; Long 92° 35.637’E
Jolly Buoy Island	Lat 11° 30. 251’N; Long 92° 32.591’E
Tarmugli Island	Lat 11° 33. 261’N; Long 92° 36.809’E
Rani Jhansi Marine National Park	
Henry Lawrence Island	Lat 12° 05. 000’N; Long 93° 06.312’E
John Lawrence Island	Lat 12° 04. 075’N; Long 93° 00.398’E
Outram Island	Lat 12° 00. 574’N; Long 92° 56.808’E

Coral species recording was made by extensive video and photography using underwater digital cameras. The images were then analysed for taxonomic identification. Specimens were identified by using standard manuals by Venkataraman (2003) and Veron (2000). A total of 36 transects were laid to record the species occurrence and density and distribution of various marine fauna such as hard corals (=live coral), soft coral, dead coral, sponges, gastropods, bivalves, sea cucumbers, sea stars, sea urchins, crabs, lobsters and sea anemones.

RESULTS AND DISCUSSION

Result of this study brings out a total of 74 scleractinian species from MGMNP, whereas 51 species from RJMNP. Benthic percentage cover among these two MNPs was compared and analysed, significant difference in percent

cover of coral communities was observed between the study areas.

Mahatma Gandhi Marine National Park

Among the 15 islands only three major islands were surveyed. Result of the present study states that, Tarmugli showing highest live coral percentage than other two (Fig. 2). The lowest percent cover recorded at Jolly Buoy Islands where dead coral and sand cover were recorded maximum. Rubbles percent cover recorded high at Grub Island and whereas Jolly Buoy showed minimum, this may be because of reef dominating by branching *Acropora*at former one, and boulder corals dominating in latter. Sand cover is recorded maximum at Jolly Buoy followed by Grub Island due to half of the island shore covers with sandy beach and they are prone to high wave action.

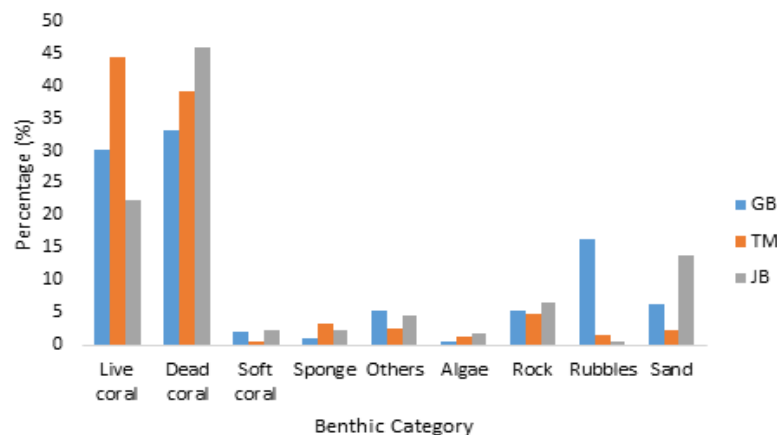


Fig. 2. Island-wise benthic percentage cover of MGMNP

Rani Jhansi Marine National Park

Among three islands, highest liver coral diversity was recorded at Henry Lawrence whereas John Lawrence showing lowest (Fig. 3). Maximum dead coral were recorded at John Lawrence Island and the minimum was

recorded in Outram Island. Rubble percentage cover was significantly high at Outram Island, which sand percent cover was recorded maximum at John Lawrence Island. There is no significant changes in other reef benthic category in this study area, because of all the islands in this MNP located close to one another.

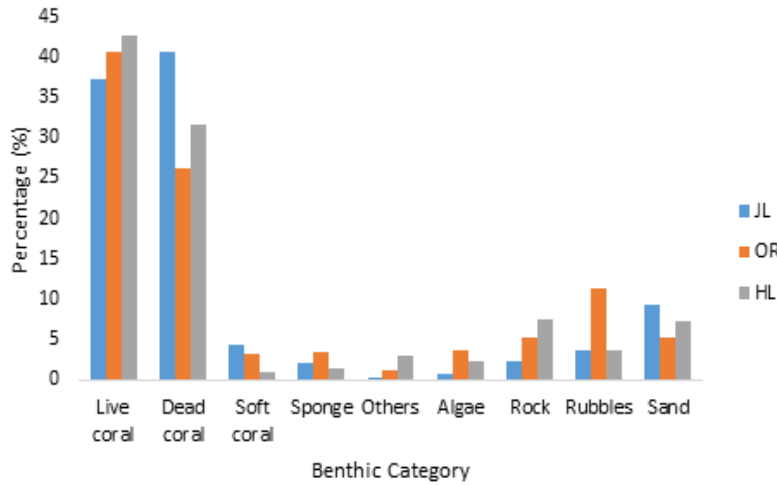


Fig. 3. Island-wise benthic percentage cover of RJMNP

Among these two MNP, the comparatively low live coral cover (32.38 %) and high dead coral cover (39.37) recorded in MGMNP (Fig. 4), may be attributed to causes other than tourism or anthropogenic disturbances; which may include predation by crown of thorns and parrot fishes. Observations by Wood (1989) & James *et al* (1990) support this presumption as they had observed significant and localised damages to corals by crown of thorns and concluded that this is not an “alarming state at present” as

it is well known that some of the reef inhabiting animals like fishes, sea urchins, shrimp, polychaete and molluscs also feeds to a limited extent, on the coral tissues and cause damage to coral colonies. The dominance of massive species indicates that the coral distribution in Andaman& Nicobar Islands is defined by external influences. Andaman& Nicobar Island reefs have the characteristic of displaying varied dominance of species in each reef location (Dorairaj and Soundararajan 1997).

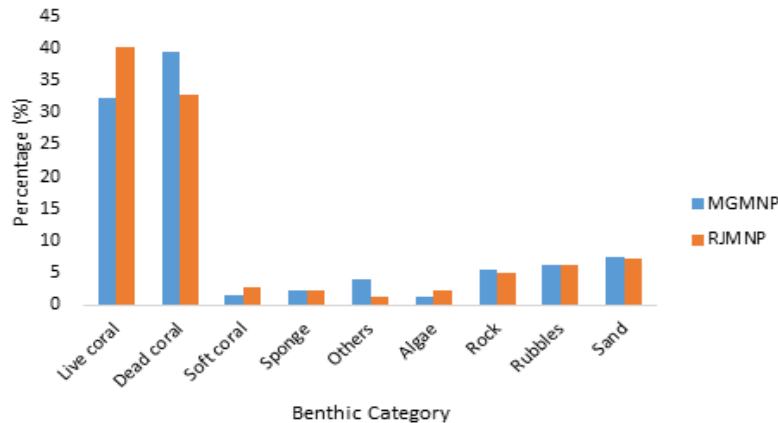


Fig. 4: Over all benthic percentage cover of study areas

The island-wise recordings in the present observation give good species number considering the small area covered is an interesting observation. A total of 87 species have been identified from both the study area, which is a reasonably good number compared to the previous

recording from other locations in Andaman & Nicobar Islands. For example, Dorairaj and Soudararajan (1997) had recorded only 22 species from MGMNP. The present study did not reveal any significant variations in diversity indices and evenness (Table 2).

Table 2: Diversity indices of study areas

	MGMNP	RJMNP
Shannon-Wiener Diversity Index	3.544	3.205667
Simpson Diversity Index	0.956167	0.947333
Evenness	0.703933	0.762767

This study proves that intensive surveys for species diversity by tagging a comparatively smaller reef area reveal more species in a location. It is recommended that intensive surveys should be carried out for a larger reef area in a phased manner (by tagging smaller areas) to obtain a better picture of diversity estimations.

The distribution of species in a reef area is influenced by external forces, like siltation, monsoon effects and wave

action. The dominance of species characteristic of the each reef, shown here by the dominance of massive and sub massive forms in the study area as compared to the dominance of branching and tabular forms shown elsewhere in Andaman reefs. However, absence or the low percent cover of branching species is a concern could be explained by long-term monitoring plans.

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