

Coral reef biodiversity of selected sites in Andaman & Nicobar Islands

P. Laxmilatha¹, S. Jasmine², Jose Kingsly², Shijin Ameri and K. A. Labeeb

¹ICAR-Central Marine Fisheries Research Institute, Kochi-682 018, Kerala

²Vizhinjam Regional Centre of ICAR-Central Marine Fisheries Research Institute, Vizhinjam P.O., Thiruvananthapuram – 695 521, Kerala

E-mail: laxmilatha.p@icar.gov.in

Abstract

SCUBA assisted under water surveys were carried out during 2018-2019 in selected coral reefs sites of the Andaman & Nicobar Islands. Biodiversity of Havelock Island (Nemo, Elephant and Turtles beaches), Neil Island (Lakshmanpur1), Northern Bay and Wandoor were documented. The diverse species of corals, coral reef fishes, sponges, sea urchins, holothurians, gastropods and giant clams were recorded during the surveys. It included 124 species of reef building corals, 82 species of reef fishes and four species of giant clams, besides holothurians and sea urchins.

Keywords: Coral reef, Biodiversity, Giant clams, Andaman Nicobar Islands

The Andaman and Nicobar Islands, situated along the northeast Indian Ocean is an Archipelago of India in the Bay of Bengal. There are nearly 300 islands bestowed with the rich coral reefs, dominated by fringing reefs and few barrier reefs, harboring rich diversity of corals, gorgonids, ornamental fish, giant clams, echinoderms and rare marine species. Under water survey of Coral reef sites of Andaman's & Nicobar Islands was carried out in the Andaman Islands during October 2018 at different sites in Havelock Island (Nemo, Elephant and Turtles beaches), Neil Island (Lakshmanpur1) and Northern Bay. Under water photographs and video recordings was done to study the resilience of coral reefs. In November, 2019, two sites in Havelock Island, Elephant Beach and Havelock and one site in Wandoor, Port Blair were also surveyed (Fig.1).

Hard corals were identified tentatively from the images and videos taken during underwater surveys. The objective of the coral survey was to provide an inventory of the coral species growing on reefs. Heavy sedimentation was observed in most of the sites with large scale mortality. A total of 124 species under 37 genera belonging to 15

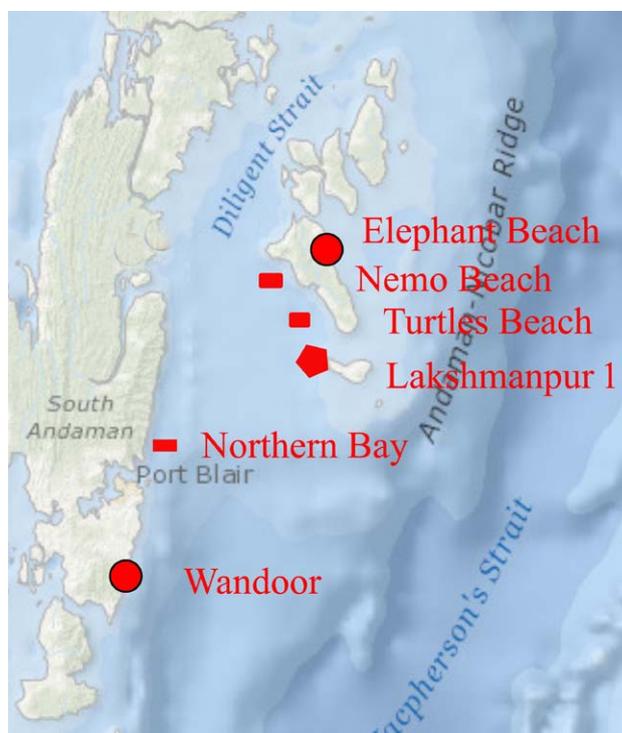


Fig.1. Underwater survey sites in Andamans & Nicobar islands



Acropora florida



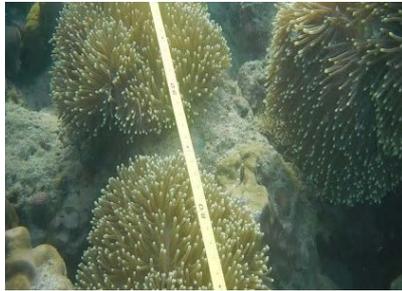
Acropora humilis



Pavona frondifera



Diploastrea heliopora



Euphyllia glabrescens



Goniopora minor



Leptastrea purpurea



Lobophyllia hataii



Montipora tuberculosa



Psammacora obtusangura



Pachyseris gemmae



Pachyseris rugosa



Pachyseris speciosa



Physogyra licensteini



Pterogyra sinuosa



Ctenactis crassa



Platygyra lamellina



Verrucella cerasina



Acropora microphthalmalms



Acropora cytherea



Symphyllia recta

Fig.2. Diversity of coral and gorgonid species identified during the underwater survey

families of reef building corals were recorded in the survey. The list includes the non scleractinian blue coral, *Heliopora coerulea*. *Acropora* dominated the recorded hard corals with 28 species followed by *Porites* (09) *Favites* (07), *Montipora* (07), *Dipsastraea* (07) and five each in *Platygyra* and *Lobophyllia*. The major corals identified tentatively from underwater images are *Acropora aspera*, *A. muricata*, *A. grandis*, *A. abrotanoides*, *A. millepora*, *A. florida*, *A. tenuis*, *A. gemmifera*, *A. humilis*, *A. nasuta*, *A. nobilis*, *A. valenciensi*, *A. lamarcki*, *A. monticulosa*, *A. polystoma*, *Ctenactis echinata*, *Fungia fungites*, *Diploastraea heliopora*, *Dipsastraea pallida*, *Dipsastraea favus*, *Favites halicora*, *Goniastrea edwardsi*, *Goniastrea pectinata*, *Coelastrea aspera*, *Leptastrea purpurea*, *Psammacora contigua*, *Psammacora obtusangula*, *Psammacora profundacella*, *Porites lutea*, *Plobata*, *Pmurrayensis*, *Pmonticulosa*, *P. rus*, *P. monticulosa*, *Lobophyllia hemprichi* and *Plerogyra sinuosa*. (Table 1). Lesions following infestations by the sabellid and trematode worms, fish bites and due to exposures were also observed in all the coral reefs. Among soft corals, two species of gorgonids were observed, of which, *Verrucella cerasaria* is recorded as a rare one (Fig.2). Four species of sponges were also recorded (Fig.3).

A healthy fish fauna was found associated with the corals. 82 species of reef fishes under 50 genera belonging to 23 families were identified from the photographs and videos. Pomacentridae with 21 species and Labridae with 13

species dominated the recorded reef fishes. Nemipteridae and Chaetodontidae followed with 05 species each. Acanthuridae, Siganidae, Caesionidae represented by 04 species each followed by Scaridae, Haemulidae, Lutjanidae, and Carangidae (03 spp.). The coral reef fishes recorded include *Halichoerus lunaris*, *Chromis viridis*, *Abudefduf bengalensis*, *Pomacentrus pavo*, *Gnathodentex aurolineatus*, *Chaetodon trifasciatus*, *Scarus gibbus*, *Hemigymnus melapterus*, *Chrysiptera unimaculata*, *Chromis atripectoralis*, *Coris caudimaculata*, *Spratelloides* sp., *Amphiprion sebae*, *A. percula*, *Plectroglyphidodon lacrymatus*, *Stegastes nigricans*, *S. insularis*, *Acantholabrus bollonii*, *Pomacentrus moluccensis* (Table 2).

The significant feature was the very high density of giant clams in all the sites. Four species of giant clams, *Tridacna crocea*, *T. maxima*, *T. gigas* and *T. squamosa* were found to be distributed in all the coral reef sites. These species are protected under Appendix II of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) and listed in the IUCN Red List of Threatened Species. *Tridacna crocea* Lamarck, 1819 the smallest of the giant clams, reaching about 15cm burrows and completely embedded in the rocky reef substrate. It is abundant in the Havelock Island. *Tridacna maxima* (Röding, 1798), grows up to 35 cm, has close set scutes and is partially embedded in the reef substrates. *Tridacna squamosa* Lamarck, 1819, grows

Table 1. Genus wise representation of corals

Family	Genera	No. of Species	Family	Genera	No. of Species
Acroporidae	Acropora	28	Merulinidae	Coelastrea	1
	Astreopora	1		Cyphastrea	1
				Dipsastrea	7
	Isopora	1		Echinopora	1
	Montipora	7		Favites	7
Agariciidae				Goniastrea	4
	Pavona	4		Paragoniastrea	2
	Coeloseris	1		Hydnophora	1
Astrocoeniidae				Paramontastraea	1
	Stylocoeniella	1		Platygyra	5
Coscinaeridae				Merulina	3
			Plerogyridae		
Diploastreidae				Physogyra	1
	Diploastrea	1		Plerogyra	1
	Coscinaeraea	1			
Dendrophyllidae			Pocilloporidae		
	Turbinaria	1		Pocillopora	3
Euphyllidae				Stylophora	1
	Euphyllia	1	Poritidae		
Fungiidae				Goniopora	1
				Porites	9
	Ctenactis	2	Psammocoridae		
	Cycloseris	2		Psammacora	1
	Danafungia	1	Siderastreidae		
	Fungia	1		Siderastrea	1
Lithophyllon	3		Scleractinia incertae sedis		
Lobophyllidae				Leptastrea	3
	Echinophyllia	1		Pachyseris	3
	Lobophyllia	5			
			Helioporidae	Heliopora	1

Table 2. Genus wise representation of reef fishes

Family	Genera	No. of species	Family	Genera	No. of species
Acanthuridae	Acanthurus	2	Lutjanidae	Lutjanus	3
	Ctenochaetus	1	Mugilidae	Mugil	1
	Zebrosoma	1	Muraenidae	Gymnothorax	1
Apogonidae	Cheilodipterus	1	Mullidae	Upeneus	1
Ballistidae	Pseudoballistes	1		Parupeneus	1
Blennidae	Plagiotremus	1	Nemipteridae	Scolopsis	5
Caesionidae	Caesio	2	Pinguipedidae	Parapercis	1
	Paracaesio	1	Pomacentridae	Abudefduf	2
	Pterocaesio	1		Pomacentrus	3

Family	Genera	No. of species	Family	Genera	No. of species
Carangidae	Carangoides	1		Chromis	3
	Seriolina	1		Neopomacentrus	3
	Gnathonodon	1		Acanthochromis	1
Chaetodontidae	Chaetodon	5		Dischistodus	1
Haemulidae	Plectorhincus	2		Premnas	1
	Diagramma	1		Amphiprion	1
Labridae	Labroides	1		Chrysiptera	3
	Thalassoma	3		Dascyllus	1
	Anampses	1		Stegastes	2
	Hemigymnus	2	Scaridae	Scarus	2
	Diproctacanthus	1		Hipposcarus	1
	Haliochoeres	3	Serranidae	Plectropomus	1
	Cheilineus	1	Scorpaenidae	Pterois	1
	Coris	1	Siganidae	Siganus	3
			Tetrodontidae	Arathron	1
Lethrinidae	Gnathodentex	1	Zanclidae	Zanclus	1
	Lethrinus	1			



Fig. 3. Diversity of sponges recorded during the underwater surveys



Tridacna maxima



Tridacna gigas



Tridacna squamosa

Fig.4. Diversity of giant clams observed in the underwater survey.

up to 40 cm and has large well-spaced scutes. *Tridacna gigas* (Linnaeus, 1758) is the largest of the giant clams, growing up to 1 m. They are elongate and have distinct triangular projections on the upper shell margin and are abundant in Neil Island (Fig.4). While the first three species are listed as lower risk / least concern in IUCN list, the *T. gigas* is considered as vulnerable. In India, also they are protected under wildlife Protection Act (1972). The giant

clams were abundant and formed dense populations in all coral reef ecosystems. The giant clams an important role in the coral reef ecosystems with the shell serving as substrate for colonization by epibionts, the clam tissue serves as food for several predators and scavengers and the discharge of live zooxanthellae, faeces and gametes form food for opportunistic feeders nearby. Bleached and dead clams were also noticed.

The coral reefs of the Andaman Nicobar Islands have been recorded as the Islands with richest coral diversity among the Indian reef zones. A recent survey has reported 418 species of corals from Andaman and Nicobar Islands and a record of 44 mushroom corals (Ramakrishna *et al.*, 2010 a, b). The surveyed sites are all popular tourist spots and therefore characterized by heavy anthropological influences and impacts on the coral reef ecosystems, Bleached and dead clams were also noticed in the sites which also indicates the influence of climatic changes. In 2016, there was a loss of more than 23% corals off the coast of Andaman and Nicobar Islands when the sea-surface temperature rose due to El-Nino effect, which is the irregular periodic warming of the eastern Pacific Ocean that affects the climate in the tropical and sub-tropical regions. In a single year, the reef cover went down from 52.27% of all corals in India, to 39.94%. In 2016, the coral cover estimated at the study sites was analyzed separately to determine the extent of bleaching and coral health. It was found that the percentage of bleached corals (partially bleached, fully bleached but not dead and dead corals) as a component of total estimated data (excluding sand and algae) was maximum at Ross Island (88.7%) followed by Havelock (86.2%), North Bay (84.1%), Chidiyatapu (82.4%), Neil (77.0%) and Jolly Buoy (43.3%). The percentage of healthy corals was maximum at the Jolly Buoy (36.8%) followed by Neil (18.5%), Havelock (13.7%), North Bay (12.2%), Ross (6.5) and Chidiyatapu (5.8%). Bleaching was not only confined to the reef building corals, but also observed in some of the reef community members like the sea anemones and giant clams which have a symbiotic association with the zooxanthellae (Sarkar and Ghosh, 2013).

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