

GOVERNMENT OF KARNATAKA



NETRANI ISLAND – A UNIQUE CORAL ECOSYSTEM

SURVEY REPORT



KARNATAKA BIODIVERSITY BOARD

**SPONSORED BY KARNATAKA URBAN INFRASTRUCTURE
DEVELOPMENT & FINANCIAL CORPORATION (KUIDFC),
BANGALORE**

**SURVEY CONDUCTED BY CENTRAL MARINE FISHERIES
RESEARCH INSTITUTE (CMFRI), COCHIN.**

2007

INDEX

Sl No	Contents	Page No
1	Netrani Island – A Unique Coral Ecosystem	1
	Introduction	1
A	Coral Ecosystem of Netrani Island	2
B	Need for Preservation	9
	Tables	
1	List of corals, sponge and nudibranch species reported from Netrani Island.	5
2	List of gastropod and bivalve species reported from Netrani Island.	5
3	List of coral associated fish fauna reported from Netrani Island.	7
	Figures	
1	Fig. Map showing the Netrani Island of Murdeshwara along with Karnataka Coast.	4

Highlights of the Netrani Island

1. The 27 species and 4 genus were the new record from the Indian Coast
2. The two species of fish viz *Cheilinus undulates* (endangered and Rhincodon typus (vulnerable) are included in the IUCN red data book.
3. The small giant clams, (Tridacna maxing protected under India Wildlife (protection) Act and included in the IUCN invertebrate Red data book.
4. Biodiversity is under threat due to over fishing and other human activities

Recommendation:

In view of the above, the rich fringing coral reef ecosystem surrounding the Netrani Island may be declared as Biodiversity Heritage Site as per the provisions of Biological Diversity Act 2002 and Karnataka Biological Rules 2005

NETRANI ISLAND – A UNIQUE CORAL ECOSYSTEM

India with a land area of 2.2% of the Earth harbours over 1.2 lakh or more than 7.5% of the world's known species. As compared to the terrestrial biodiversity, less information is available on marine biota. Marine life consists of a large number of species belonging to various habitats. Various ecosystems are threatened because of developmental activities like mining, dredging, reclamation, which resulted in disappearance of several marine organisms. Only a fraction of the damage is known to science.

India has an 8,129 km long coastline and a continental shelf area of about 0.5 million km² and possesses rich and diverse marine biodiversity. Marine biodiversity in India has drawn greater attention from the 18th century onwards. India is one among the 12 mega-biodiversity countries and 34 hotspots of the richest and highly endangered eco-regions of the world (Myers et al. 2000).

Coastal areas are some of the most productive and important habitats of the biosphere including estuaries, backwaters and coastal wetlands. Over 11,000 faunal (10,400 invertebrates and 625 vertebrates) and over 800 floral (624 algae, 50 mangroves, 32 angiosperms, 71 fungi, 14 lichens, 12 sea grass) species have been identified from Indian coastal areas (Untawale et al, 2000, Anon, 2002, Venkataraman and Wafar, 2005).

The Karnataka state is situated between 11° 31' and 18° 45' N latitude and 74° 12' and 78° 40' E longitude and lies in the west-central part of the peninsular India. The state is wedged between the Western Ghats in the east and the Arabian Sea in the west. More than a dozen rivers originating in the Western Ghats open into the Arabian Sea in the three coastal districts, viz., Dakshina Kannada, Udupi and Uttara Kannada, rendering the inshore waters rich in nutrients and plankton. Netravati, Gurupur, Sitanadi, Gangoli, Sharavati, Aghanasini

and Kali are the important rivers. The estuaries formed by these rivers are important from the ecological and biological points of view. The state is well forested and characterised by rich floral and faunal diversity. The weather is hot and humid in most part of the year. The average annual rainfall is about 4000 mm with 80% being received during June-September.

The state of Karnataka is a part of the highly biodiversity rich regions of India. It boasts of a great diversity of climate, topography, soils and has a long seacoast with rich mangrove flora at the mouths of estuaries. The shelf of Karnataka has an average width of 80 km and the depth of shelf break is 90 to 120 m. It has one major port at Mangalore, one medium at Karwar and eight minor ports at Belikund, Tadri, Honavar, Bhatkal, Kundapura, Hungarkatta, Malpe and Old Mangalore port. There are 110 fish landing centres and 150 fishing villages in the State.

Several organizations such as CMFRI, FSI, DOD, NIO, IISc, College of Fisheries-Mangalore, Mangalore University, Karnataka University etc, have carried out studies on different aspects of marine and coastal aquatic biodiversity in the coastal districts of Karnataka. Research Centres of CMFRI situated at Mangalore and Karwar are continuously monitoring the marine fishery resources of Karnataka coast on temporal and spatial scale.

A. Coral Ecosystem of Netrani Island

The Netrani Island is located nearly 19 km away from the main land off Murdeshwar (Fig. 1). Sea depth surrounding this island is 6 to 40 m with water visibility of 15-30 m. The CMFRI survey team has carried out a detailed biodiversity survey in the sea surrounding this island. The diving support for the study was given by the professional divers, M/s. Barracuda Diving Services, Goa. During September-October 2002, a survey has been conducted on the abundance and distribution of the fish Humphead wrasse (*Cheilinus undulatus*) from this island (Sluka and Lazarus, 2005). The present survey is the first detailed scientific investigation on the marine biodiversity of Netrani Island.

The survey has revealed the existence of a rich fringing coral reef ecosystem surrounding this island. The coral ecosystem is very rich in biodiversity with nudibranch, schools of blue trigger fish, fusiliers, groupers, parrot fish, gobies, lion fish and scorpion fish. A total of 89 coral associated fishes were recorded from the area in which 27 species and 4 Genera were the new records from the Indian coast (Table 1). Out of the fishes studied, four fish Genus were reported for the first time from Indian coast. Out of the nine grouper fish species identified from this island, two species such as *Cheilinus undulatus* (endangered) and *Rhincodon typus* (vulnerable) are included in the IUCN red list.

We have identified 14 coral species and 4 sponge species from this island (Table-1). The survey identified 15 species of bivalves, 48 species of gastropods and 8 species of nudibranchs from this island.(Table-2). Small giant clams (*Tridacna maxima*) which is protected under the Indian Wildlife (Protection) Act and included in the IUCN Invertebrate Red Data Book as ‘Lower Risk: Conservation Dependent’ species, was observed from this area. Two species of Palinurid lobsters *Panulirus polyphagus* and *P. versicolor* and one species of shrimp, *Rhynchocinetes durbanensis*, belonging to family Rhynchocinetidae were recorded from the area.

The occurrence of Humphead wrasse at Netrani is very significant. This is in the CITES endangered species list as it has a low recruitment rate and is heavily exploited. This is one of the largest coral reef fish and largest in the family Labridae and most highly sought after fish. This specie is occurring in areas of high coral cover (Sadovy et al., 2003) and larger specimens occur in areas of low coral cover. This is widely distributed throughout Indo-Pacific but at low densities. The distribution of this species along the west coast of India was first studied by Sluka and Lazarus (2005) when they observed five specimens at Vizhinjam-Muttom. The present record is the first one north of Vizhinjam. Live reef fish trade has been the reason for decline in the population of this species in areas of the Indo-

Pacific and the biological and ecological characteristics make it vulnerable. The fish grows up to 2.3 m in length.

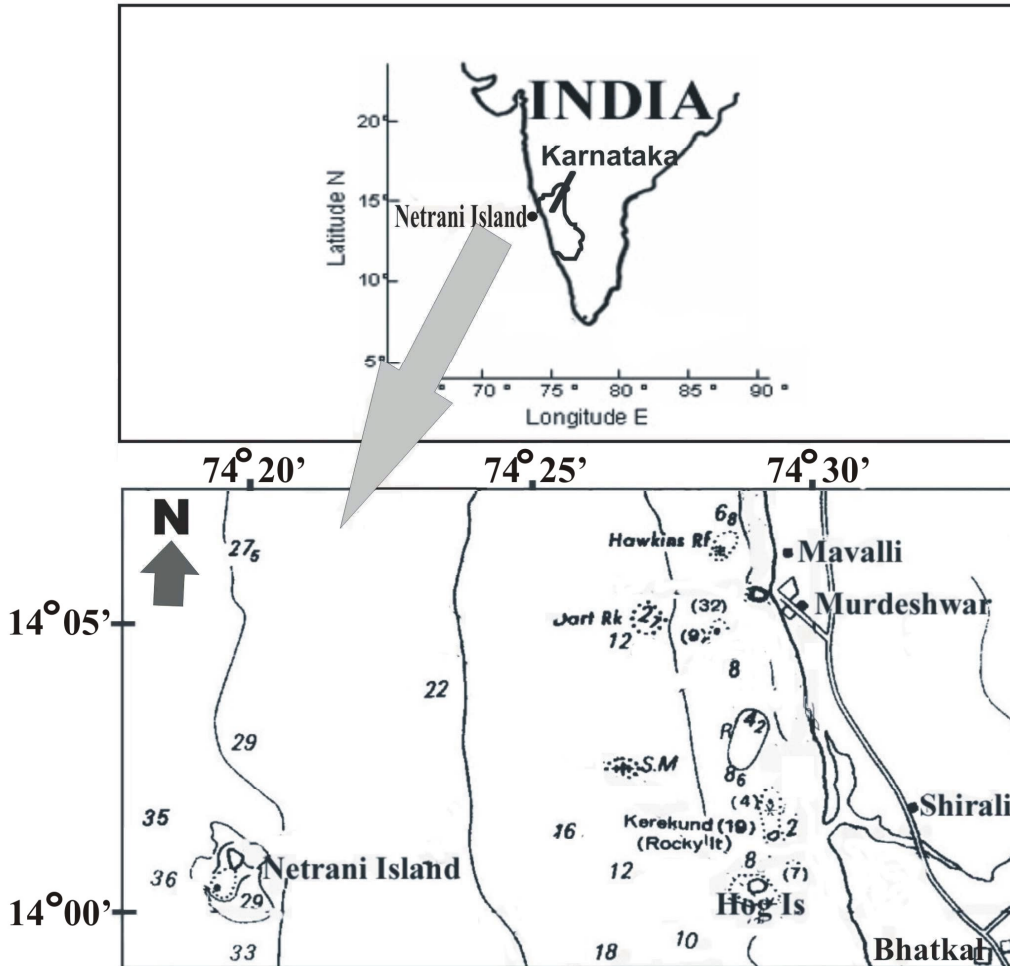


Fig. Map showing the Netrani Island off Murdeshwar along the Karnataka coast.

Table 1. List of corals, sponge and nudibranch species reported from Netrani Island.

Sl.no	
Coral species	
1	<i>Dendrophyllia</i> sp.
2	<i>Turbinaria</i> sp.
3	<i>Goniastrea pectinata</i>
4	<i>Goniastrea retiformis</i>
5	<i>Plesiastrea versipora</i>
6	<i>Leptastrea</i> sp.
7	<i>Favia favius</i>
8	<i>Sympylla</i> sp.
9	<i>Pocillopora verrucosa</i>
10	<i>Pocillopora</i> sp.
11	<i>Porite</i> sp.
12	<i>Goniopora</i> sp.
13	<i>Sagartia</i> sp.
14	<i>Coscinarea monile</i>
Sponge species	
1	<i>Axinyrsia flabelliformes</i>
2	<i>Acanthella elongata</i>
3	<i>Echinodictylum longistylum</i>
4	<i>Raspailia hornelli</i>
Nudibranchs	
1	<i>Chromodoris</i> sp
2	<i>Chromodoris</i> sp
3	<i>Glossodoris</i> sp
4	<i>Phyllidia varicosa</i>
5	<i>Phyllidiella zeylancia</i>
6	<i>Thorunna australis</i>
7	<i>Elysia ornata</i>
8	<i>Pseudobiceros</i> sp

Table 2. List of gastropod and bivalve species reported from Netrani Island.

Sl.No.	Gastropods	No.	Bivalves
1	<i>Bursa spinosa</i>	1	<i>Anadara antiquata</i>
2	<i>Bursa tuberculata</i>	2	<i>Donax scortum</i>
3	<i>Cerithium morus</i>	3	<i>Mactra (Mactra) achatina</i>
4	<i>Cerithium rubus</i>	4	<i>Mactra (Mactra) turgida</i>
5	<i>Cerithidea cingulata</i>	5	<i>Mactra violacea</i>
6	<i>Terebra tenera</i>	6	<i>Brachidontes striatulus</i>
7	<i>Conus capitaneus</i>	7	<i>Perna viridis</i>
8	<i>Cymatium aquatile</i>	8	<i>Crassostrea madrasensis</i>
9	<i>Cymatium cingulatum</i>	9	<i>Saccostrea cucullata</i>
10	<i>Distortio reticulata</i>	10	<i>Atrina (Atrina) vexillum</i>
11	<i>Monetaria moneta</i>	11	<i>Tridacna crocea</i>

12	<i>Drupa contracta</i>	12	<i>Tridacna maxima</i>
13	<i>Ergalatax margariticola</i>	13	<i>Tridacna sp</i>
14	<i>Drupa tuberculata</i>	14	<i>Dosinia cretacea</i>
15	<i>Drupa xuthedra</i>	15	<i>Gafrarium divaricata</i>
16	<i>Mancinella bufo</i>		
17	<i>Murex malabaricus</i>		
18	<i>Thais carinifera</i>		
19	<i>Thais tissoti</i>		
20	<i>Bullia melanoides</i>		
21	<i>Natica didyma</i>		
22	<i>Natica maculosa</i>		
23	<i>Natica picta</i>		
24	<i>Natica rufa</i>		
25	<i>Nerita albicilla</i>		
26	<i>Nerita oryzae</i>		
27	<i>Nerita polita</i>		
28	<i>Nerita squamulata</i>		
29	<i>Retina costata</i>		
30	<i>Oliva gibbosa</i>		
31	<i>Oliva (Oliva) amethystina nebulosa</i>		
32	<i>Oliva (Oliva) mantichora intricata</i>		
33	<i>Cellana cernica</i>		
34	<i>Cellana radiata</i>		
35	<i>Cellana testudinaria</i>		
36	<i>Clypidina notata</i>		
37	<i>Planaxis similis</i>		
38	<i>Planaxis sulcatus</i>		
39	<i>Lambis Chiragra</i>		
40	<i>Trochus erythraeus</i>		
41	<i>Trochus radiatus</i>		
42	<i>Trochus stellatus</i>		
43	<i>Turbo brunneus</i>		
44	<i>Turbo coronatus</i>		
45	<i>Turritella duplicata</i>		
46	<i>Turritella terebra</i>		
47	<i>Turritella terebra cerea</i>		
48	<i>Xancus pyrum</i>		

Table 3. List of coral associated fish fauna reported from Netrani Island.

Sl. no.	Scientific name	Common Name	1st Record	IUCN status
1	<i>Acanthurus xanthopterus</i>	Yellowfin surgeonfish		
2	<i>Zebrasoma desjardini</i>	Surgeonfish	F	
3	<i>Apogon aureus</i>	Ringtailed cardinalfish	F	
4	<i>Balistoides viridescens</i>	Titan triggerfish		
5	<i>Odonus niger</i>	Redtoothed trigger fish		
6	<i>Sufflamen fraenatum</i>	Masked triggerfish		
7	<i>Caesio teres</i>	Yellow and blueback fusilier		
8	<i>Carangoides chrysophrys.</i>	Longnose trevally		
9	<i>Caranx melampygus</i>	Bluefin trevally		
10	<i>Elagatis bipinnulata</i>	Rainbow runner		
11	<i>Megalaspis cordyla</i>	Torpedo scad		
12	<i>Scomberoides tol.</i>	Needlescaled queenfish		
13	<i>Trachinotus bailloni</i>	Smallspotted dart		
14	<i>Chaetodon auriga</i>	Threadfin butterflyfish		
15	<i>Chaetodon collare</i>	Redtail butterflyfish		
16	<i>Chaetodon decussatus</i>	Indian vagabond butterflyfish		
17	<i>Chaetodon dolosus</i>	African butterflyfish	F	
18	<i>Chaetodon plebeius</i>	Bluespot butterflyfish		
19	<i>Heniochus diphreutes</i>	False moorishidol	F	
20	<i>Heniochus monocerrus</i>	Masked Bannerfish		
21	<i>Himanthura imbricata</i>	Scaly whipray		
22	<i>Diodon holocanthus</i>	long-spine porcupine fish		
23	<i>Diodon liturosus</i>	Blackblotched porcupinefish	F	
24	<i>Echeneis naucrates</i>	Live sharksucker		
25	<i>Amblyeleotris fasciata</i>	Red banded prawn goby	F	
26	<i>Amblyeleotris guttata</i>	Spotted prawn goby	F	
27	<i>Amblyeleotris periophthalma</i>	Periophthalma prawn goby	F	
28	<i>Amblyeleotris triguttata</i>	Triple spot shrimp goby	F	
29	<i>Amblyeleotris wheeleri</i>	Gorgeous prawn goby	F	
30	<i>Elacatinus genie</i>	Cleaner Goby	F	
31	<i>Valenciennea Sexguttata</i>	Sixspot goby		
32	<i>Valenciennea strigata</i>	Blueband goby		
33	<i>Plectorhinchus chubbi</i>	Dusky rubberlip		
34	<i>Plectorhinchus vittatus</i>	Indian ocean oriental sweet lips	F	
35	<i>Sargocentron rubrum</i>	Redcoat squirrelfish		
36	<i>Cheilinus undulatus</i>	Humphead Wrasse		Endangered
37	<i>Coris aygula</i>	Clown coris		
38	<i>Coris formosa</i>	Queen coris		
39	<i>Labroides dimidiatus</i>	Bluestreak cleaner wrasse		
40	<i>Thalassoma lunare</i>	Moon wrasse	F	

41	<i>Lutjanus argentemaculatus</i>	Mangrove red snapper		
42	<i>Lutjanus bohar</i>	Two-spot red snapper		
43	<i>Lutjanus dodecacanthoides</i>	Sun beam snapper	F	
44	<i>Lutjanus fulvus</i>	Blacktail snapper		
45	<i>Lutjanus lemniscatus</i>	Yellow streaked snapper		
46	<i>Lutjanus rivulatus</i>	Blubberlip snapper		
47	<i>Malacanthus</i> sp.	Blanquillo		
48	<i>Eubalichthys caeruleoguttatus</i>	Blue spotter leather jacket	F	
49	<i>Mugil cephalus</i>	Flathead mullet		
50	<i>Parupeneus indicus</i>	Indian goatfish		
51	<i>Gymnothroax eurostus</i>	Abbotts moray eel	F	
52	<i>Gymnothroax favagineus</i>	Laced moray		
53	<i>Gymnothroax flavimarginatus</i>	yellow-edged moray		
54	<i>Gymnothroax javanicus</i>	Giant moray		
55	<i>Gymnothroax thyrsoideus</i>	Greyface moray		
56	<i>Ostracion cubicus</i>	Yellow boxfish		
57	<i>Platax teira</i>	Tiera batfish		
58	<i>Pomacanthus striatus</i>	Yellow bar angel fish	F	
59	<i>Abudefduf sordidus</i>	Blackspot sergeant	XX	
60	<i>Amphiprion perideraion</i>	Pink anemon fish	F	
61	<i>Dascyllus carneus</i>	Cloudy dascyllus	F	
62	<i>Dascyllus trimaculatus</i>	Threespot dascyllus		
63	<i>Pomacentrus coelestis</i>	Neon damsel fish	F	
64	<i>Pomacentrus philippinus</i>	Phillippine damsel	F	
65	<i>Apolemichthys kingi</i>	Tiger angel fish	F	
66	<i>Ptereleotris evides</i>	Blackfin dartfish		
67	<i>Rachycentron canadum</i>	Cobia		
68	<i>Rhincodon typus</i>	Whale shark		Vulnerable
69	<i>Cetoscarus bicolor</i>	Bicolour parrot fish	F	
70	<i>Chlorurus bleekeri</i>	Bleeker's parrot fish	F	
71	<i>Chlorurus troschelii</i>	Troschel's parrot fish	F	
72	<i>Scarus globiceps</i>	Globehead parrotfish		
73	<i>Scarus hoeferi</i>	Guinian parrot fish	F	
74	<i>Dendrochirus zebra</i>	Zebra turkeyfish		
75	<i>Pterois antennata</i>	Broadbarred firefish		
76	<i>Pterois volitans</i>	Red lionfish		
77	<i>Scorpaenopsis gibbosa</i>	Humpback scorpionfish		
78	<i>Cephalopholis formosa</i>	Bluelined hind		
79	<i>Ephinephelus coeruleopunctatus</i>	White-spotted grouper		
80	<i>Ephinephelus flavocaeruleus</i>	Blue and yellow grouper		
81	<i>Epinephelus merra</i>	Honeycomb grouper		
82	<i>Epinephelus tauvina</i>	Greasy grouper		
83	<i>Siganus javus</i>	Streaked spinefoot		
84	<i>Spyraena jello</i>	Pickhandle barracuda		

85	<i>Synodus indicus</i>	Indian Lizardfish		
86	<i>Arothron hispidus</i>	White-spotted puffer		
87	<i>Arothron</i> sp.	Puffer		
88	<i>Triplerygion tripteronotus</i>	Threefin blenny	F	
89	<i>Zanclus cornutus</i>	Moorish idol		

Tridacna clams are the largest living bivalve mollusc. Sessile in adulthood, its mantle acts as a habitat for the symbiotic single celled dinoflagellate algae (zooxanthella). It is included in the IUCN list as vulnerable. Tridacna have so far been reported from Andaman and Lakshadweep islands and the present one is the first report outside these areas. Nudibranchs or sea slugs are the most colourful creatures and soft-bodied snails. They occur world-wide in nature and greatest variation has been seen in shallow tropical waters. They are carnivorous. Some feed on sponges others on hydroids zooxanthella, others on bryozoans and some are cannibals eating other sea slugs.

The present one is the first scientific report of the existence of corals from this area. Coral reefs are one of the most productive shallow water sites in tropical waters. These are rich in biological diversity and act as a reserve or preserving and protecting many valuable species. The coral reefs are under threat world wide, mainly due to causes varying from climate change and anthropogenic activities, which result in their destruction and disappearance. The present threat to the coral ecosystem of Netrani Island is human in origin.

B. Need for Preservation

Presently Netrani Island is under threat by various anthropogenic activities. Since the study team noticed the dead corals lying on the side of the island. This is due to the habitat degradation. It is recommended to protect and conserve the Natrani Island ecosystem as a Marine protected Area (MPA) and as a place for ecotourism where people can watch the fish and marine life in their natural habitat without disturbing the area.

The Indian Biological Diversity Act, which came into force in February 2002, aims to promote conservation, sustainable use and equitable sharing of benefits of India's biodiversity resources.

The Act provides for the declaration of the areas which are unique in biodiversity as Biodiversity Heritage Site (BHS). In view of the above and the threat Coral reef Island is facing, it will be appropriate to declare the Island as Biodiversity Heritage Site and limited tourism may be allowed.

- ❖ Four species of whales, four species of dolphins and one species of porpoise are generally seen along the Karnataka coast. The whale species, which are commonly seen stranded along the coast, are *Balaenoptera edeni*, *Balaenoptera musculus*, *Balaenoptera physalus* and *Physeter macrocephalus* (sperm whale).
- ❖ The survey has revealed the existence of a rich fringing coral reef ecosystem surrounding the Netrani Island located nearly 19 km away from the main land off Murdeshwar. A total of 89 coral associated fishes were recorded from the Netrani Island (Table 3). area in which 27 species and 4 Genera were the new records from the Indian coast. Out of the nine grouper fish species identified from this island, two species viz., *Cheilinus undulatus* (endangered) and *Rhincodon typus* (vulnerable) are included in the IUCN red list.
- ❖ Fourteen coral species and four sponge species have been collected and identified from this island. Small giant clams (*Tridacna maxima*) which are protected under the Indian Wildlife (Protection) Act and included in the IUCN Invertebrate Red Data Book were recorded. The survey conducted by CMFRI has also revealed evidence of anthropogenic threat to the fragile coral ecosystem of Netrani Island. Considering the uniqueness of the Netrani Island in terms of the coral and associated biodiversity, it is strongly recommended to protect and conserve the Netrani Island ecosystem as a Marine Protected Area (MPA) under the Biodiversity Act 2002 as a place for ecotourism where people can watch the fish and marine life in their natural habitat.