

Implications for Conservation of Coral Reefs in the Andaman and Nicobar Islands, India

R. Jeyabaskaran¹, K. Venkataraman² and J.R.B. Alfred¹

Abstract

The Andaman and Nicobar Islands comprised of 306 Islands and 226 rocks covering about 948.8 km² coral reefs and 762 km² mangrove areas. There are 106 protected areas in these Islands, 96 designated as wildlife sanctuaries, 9 national parks and one biosphere reserve. Among the 9 national parks, 2 are marine national parks which have not yet inventoried thoroughly. There are about 6540 species of fauna, 2500 species of flora reported from these islands. About 4% of marine species are endemic. Natural and human impacts on coral reefs have been increasing in recent years. The Indian Ocean *tsunami* on December 26, 2004 caused severe damage to coral reefs of these Islands. About 4000 ha of North Andaman, 1211 ha of South Andaman and 3500 ha of Nicobar Island reefs were damaged due to *tsunami*. All corals and important associated animals are protected under Indian Wildlife Act, 1972 and Biodiversity Act, 2002. The tribal people of Nicobar Islands are exempted from the wildlife act and it cause extensive damage to coral reef associated fauna. Nowadays poaching and tourism developments are the major threats to reefs. There are 1,10,000 tourists are visiting the islands during the calm weather season from October to February. Paddy field of these Islands covers about 10,517 ha with the usage of 32 kg fertilizers per hectare. Fertilizers discharges into sea cause algal over growth on reefs. Most of the coral reefs monitoring works are restricted to South Andaman reefs only. There is an urgent need for establishment of permanent monitoring site in each reef, increase of awareness campaign, sea patrolling and strict enforcement of law. The conservation strategies for coral reefs of these Islands are discussed in the paper in detail.

Natural Disturbances

Coral Bleaching: The Andaman and Nicobar Islands reefs were not been affected by the May 1998 bleaching event except reefs in Little Andaman Island reef which was severely affected and the live coral coverage was only 12.0% (Jeyabaskaran, 1999). Widespread bleaching was observed in Nicobar group of Islands due to stress caused by Tsunami.

Earthquake, Tsunami & Volcanic eruptions: It has been found that the area had moved southwestward about 4-5 metres at North Andaman (Diglipur), about 4.5 metres at Middle Andaman and about 3-4.5 metre at South Andaman. In addition to this the North Andaman landmass was lifted up by 0.60-0.90 cm resulting in a fall in the water level. Due to this, almost all reef flats of about 4000 ha area and mangroves on the western side of northern group of Islands were exposed and dried up. Almost all corals in the reef flats and other associated fauna seemed dead beyond regeneration level appearing like graveyards of corals. But the corals in reef slopes were not affected by tsunami and the live coral percentage was 55-60%. In contrast, South Andaman had subsided by 1-2 metre and seawater inundated especially the agriculture fields and

¹ National Coral Reef Research Institute, Zoological Survey of India, Port Blair- 744102, Andaman, India. Email: andamanjb@yahoo.com

² Marine Biological Station, Zoological Survey of India, 130 Santhome High Road, Chennai- 600 028, Tamil Nadu, India

coastal mangrove swamps had died. Heavy load of sediments were deposited over the reef flats of Nicobar group of Islands and it led to mass mortality of corals. Nearly 2 km² mangrove areas were completely submerged in these Islands. A mud volcano erupted on June 7, 2005 at the tiny (6.8 km²) island of Narcondam, which was lying dormant for nearly a century. The Barren Island which is the only active volcano in the country erupted once again on May 28, 2005 after remaining silent for a decade and again erupted on April 5, 2006. The impacts of this eruption are yet to be studied.

Outbreaks of crown of thorns starfish: The coral eating crown of thorns starfish (COTS) *Acanthaster planci* causes extensive damage to reefs. In Andaman, outbreaks were noticed in Mahatma Gandhi Marine National Park and Outram island of Rani Janshi Marine National Park.

Diseases: Five species of corals *Porites lutea*, *P. lichen*, *Montipora tuberculosa*, *Goniopora* sp., *Goniastrea* sp of corals from the Andaman Islands had been regularly found to have single or multiple necrotic patches. Recent survey results by the author showed the presence of White pox, White band and Black band diseases in the North Bay, Snake Island and New Wandoor reef corals.

Anthropogenic Disturbances

Tourism: Tourist's number has been increasing in every year and their interest is towards the Islands with clean beaches and healthy corals. About 1,10,000 tourists are visiting the Islands including nearly 5,000 foreigners during the period of calm weather season from October to February. The coral reefs of Jolly Buoy, Redskin and North Bay Islands of Andaman have severely been damaged by the tourists. As foreign tourists not many, the current problems arising out of uncontrolled tourism in the Islands pertained to Indian tourists. As ship fares were highly subsidized, the influx of tourists did not contribute much towards overall revenues and causing damage to the environment. The Islands are facing the lack of water problem to cater to the needs of large groups of tourists. The "sister city" agreement (June 2005) between Phuket (Thailand) and Port Blair has already been made and implementation will cause extensive damage to the coral reef ecosystem.

Poaching: Poaching is peculiar and a serious problem in the Andaman & Nicobar Islands. About 184 fishing boats were apprehended during the last one decade. There are two basic types of poaching activities prevailing in the A & N region i.e. poachers coming from neighboring countries mainly from Myanmar in small dinghies (boats) to the coast for collecting marine wealth and poaching by modern mechanized trawlers of neighboring countries particularly from Thailand and Indonesia in the Exclusive Economic Zones (EEZ). The poachers enter into the Island creeks clandestinely and camp in the deep jungle for poaching crocodiles, sharks, dolphins, turtles, sea cucumbers, corals, shells and other banned species under wildlife protection act. The EEZ around Andaman and Nicobar Islands are 5, 95,217 square kilometers. During the last one year, 19 vessels of 7 foreign littoral nations were apprehended which carried 118 foreign personnel, who were actively engaged in transnational piracy in Indian EEZ. The Andaman Nicobar Command has booked 5 Indian owned and Indian registered fishing boats manned by 134 foreigners and Indian mixed crew operating in the EEZ of India surrounding Andaman & Nicobar Islands without license. Nowadays the poaching activities are increasing in alarming rate. The tally of foreigners apprehended by Coast

Guard on the charges of poaching & illegal immigration in the month of February 2006 has risen to sixty nine. Of these, sixty one are Myanmarese and eight Indonesians. The influence of poachers from foreign countries upsets the local customs, and breaks the ethnic identity of the society. About 301 cases of HIV positive (AIDS) have been detected from 1992 to 30th November, 2005 of which 170 are foreign poachers of Myanmar and Thailand and 131 are Indian nationals (Sadasivan, 2006). Intensive patrolling is needed to control the poaching menace in these Islands.

Pollution: The Andaman and Nicobar Islands are not been much affected by the pollution except the Port Blair in south Andaman. Port Blair Town is the capital of these Islands and has an area of 17.74 square kilometers, with a population of about 1,25,000 and it was 7789 persons in 1951. The untreated sewage generated from the hotels, restaurants and household garbage are discharged into the sea, which seriously affects the coral reefs of North Bay, Minnie Bay, Snake Island and Navy Bay. The solid waste/garbage from the hotels and houses are the major source of pollution. The coastal marine waters of Port Blair and its vicinity were reported to be generally contaminated with organochlorine pesticides viz., γ BHC (lindane) and p, p'-DDT.

Sedimentation: Widespread sediment discharge associated with heavy rainfall caused high turbidity and damaged the reefs in New Wandoor, Snake Island and Minnie Bay. Sand mining is the major activity that leads to destruction of coral reefs in many Islands of Andaman and Nicobar. Construction of jetties, road and buildings need a lot of sand material. Approximately 223,937 m³ of sand was officially extracted from the beaches of the Islands in the three years 1998-2001. A total of 72 beaches around the Islands were used for extraction. In addition, it is alleged by local people that there is illegal extraction of sand in considerable quantities. Between 1981 and 2000, 21 marine turtle nesting beaches in ANI have been completely destroyed due to sand mining. Sand mining is the major activity that leads to destruction of coral reefs in many Islands of Andaman and Nicobar. Construction of jetties, road and buildings need a lot of sand material. Approximately 223,937 m³ of sand was officially extracted from the beaches of the Islands in the three years 1998-2001. A total of 72 beaches around the Islands were used for extraction. In addition, it is alleged by local people that there is illegal extraction of sand in considerable quantities.

Conclusion and Recommendations

The coral reefs of Andaman and Nicobar Islands are the biodiversity hot spot of India. The increase of population in these Islands at alarming rate will lead to resource depletion and coral reef degradation. There is an urgent need for evolving effective management to protect the coral reefs. For this, the following research activities are needed.

- Permanent monitoring site should be established in each reef to study the patterns of recovery and changes in reef structure.
- Mapping of coral reef resources using remote sensing and GIS techniques.
- Assess the physiological status of coral reefs using molecular biomarker system.
- Nowadays corals are affected by different kind of diseases. Intensive research is needed in this aspect.
- Coral reefs are highly susceptible to pollution. Chemical stresses and eutrophication yet to be measured.
- Monitoring the fish stock assessment on each reef.

- Biological productivity of our reefs not been assessed properly. Regional differences on productivity should be deliberated.
- Long term water quality monitoring programme should be initiated. Due to the inadequate data, we don't know what is happening to our reefs.
- Studies on natural damages i.e. crown of thorn star fish outbreaks, Earthquake & *Tsunami*, Rates of bioerosion on coral reefs should be initiated.
- Reef tourism is increasing at high rate. Mooring Buoy programme should be initiated to minimize the coral damage.
- Biodiversity studies on coral reefs. Available information is restricted on certain reefs or shallow depths.
- Coral growth studies- modest information is available.
- Assessment of socio-economic impacts on reefs.

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Contact Authors: R. Jeyabaskaran
Krishnamoorthy Venkataraman