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The effect of tsunami on sea turtle nesting beaches along the coast of India

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ABSTRACT

The devastating earthquake off the west coast of Sumatra and the resultant tsunami on December 26th 2004 has left a marked impact on the Andaman and Nicobar Islands and also along the Indian mainland coast especially along Tamil Nadu province. Transgression of shoreline occurred along many parts of northern Tamil Nadu coast especially in sea turtle nesting beaches. However, turtle nesting has been reported along these beaches after the tsunami event. Andaman and Nicobar Islands are the worst affected in India. Shoreline alteration has occurred in many areas of Andaman and Nicobar Islands. Among the Nicobar group of islands, decrease in the extent of sandy beach of Camorta and Noncowry Islands has been reported. Trinkat Island has almost been split into three pieces. Many turtle nesting beaches have been washed away in Nicobar group of Islands, but new beach formation has occurred. The beaches have been reported as littered with debris, which will certainly have an impact on nesting turtle population.

KEYWORDS: Andaman and Nicobar Islands, tsunami, sea turtle, Tamil Nadu, shoreline change, nesting beach

INTRODUCTION

Olive ridley (*Lepidochelys olivacea*), green (*Chelonia mydas*), hawksbill (*Eretmochelys imbricata*), loggerhead (*Caretta caretta*) and leatherback (*Dermochelys coriacea*) are the five species of sea turtles distributed along the Indian coast. With the exception of loggerhead all other species have been reported to nest along the Indian coast. Olive ridley is the most common and abundant in India and is unique for its mass nesting along the Orissa coast (Karthik Ram, 2000; Kar, 2001). Three olive ridley mass nesting beaches, Gahirmatha, Devi river mouth and Rushikulya are located in the Orissa state on the northeastern coast of India.

NESTING BEACHES ALONG THE INDIAN COAST

Sea turtle nesting has been reported along West Bengal, Orissa, Andhra Pradesh, Tamil Nadu, Kerala, Karnataka, Goa, Maharashtra, Gujarat and Andaman and Nicobar Islands (Murugan, 2003). Tamil Nadu and Andhra Pradesh coasts are considered the migrating pathways of the olive ridleys migrating towards the mass nesting beaches in Orissa. In Tamil Nadu, the coastal stretch between Tranquebar and Pazhayaru, Mamallapuram and Chennai, Point Calimere and Nagapattinam and Kanyakumari and Trichendur have been reported for turtle nesting in Tamil Nadu (Kar and Satish Bhaskar, 1982; Bastian Fernando, 1983).

Andaman group of islands comprise of about 306 islands (Figs 1 and 2). Nicobar group has 22

large and small islands (Ramachandran et al., 2005). Humans inhabit twenty four islands of Andaman group and 12 in Nicobar group. The entire Nicobar group is a tribal reserve. All five species have been reported along Andaman and Nicobar Islands (Bhaskar and Rao, 1992; Andrews et al., 2001; Andrews and Tripathy, 2004; Murugan, 2005). Great Nicobar Island is unique in that all four species occur along its southeast coast (Sivakumar, 2002).

Green turtle is the most common species in Andaman and Nicobar Islands. Thirty seven green turtle nesting sites have been reported in Andamans including Little Andaman and 12 sites in Nicobar group. The main nesting sites include the three nesting sites on the east coast of Baratang Island in Horsford, Rawlen's and Grieve Bays, North of Outram Island, Long and North Passage Islands and Petri and Bluff Islands along West coast, Robert Bay in Middle Andaman Islands and South Sentinel Island (Andrews et al., 2001; Andrews and Tripathy, 2004; Murugan, 2005). Hawksbill turtles are considered as the important population in the northern Indian Ocean area and are the largest in India.

Twenty three leatherback nesting sites have been reported in Andaman and Nicobar islands. The most important hawksbill turtle nesting beaches are South Reef Island in middle Andaman, North Brother and Snark Islands in the South Andaman. Overall, 27 hawksbill nesting sites in 26 islands have been reported in Andaman group, three in Little Andaman and 12 sites in Nicobar group. Nicobar Islands are

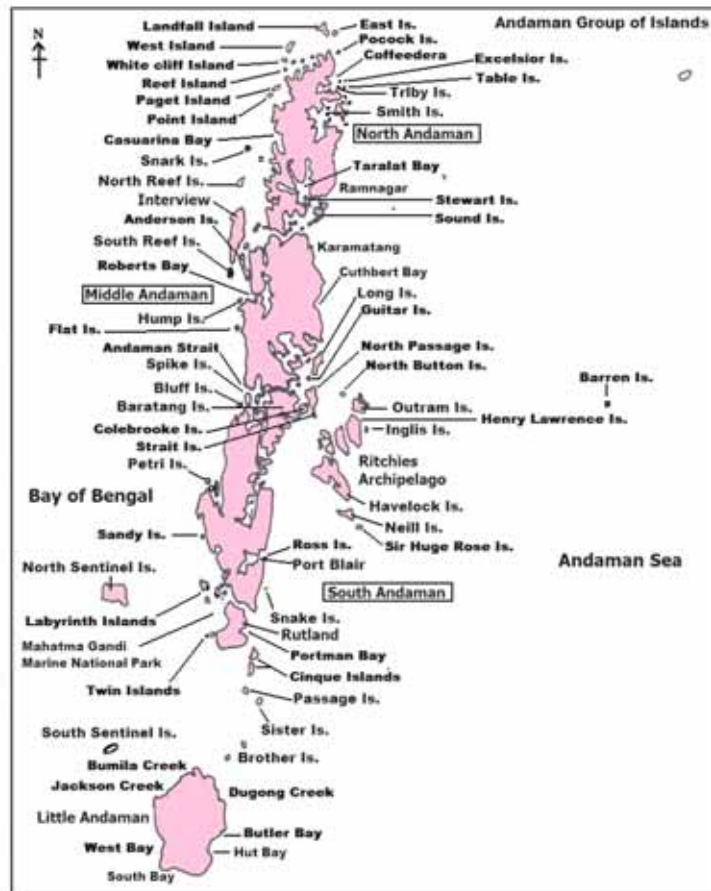


Fig.1. Andaman group of Islands

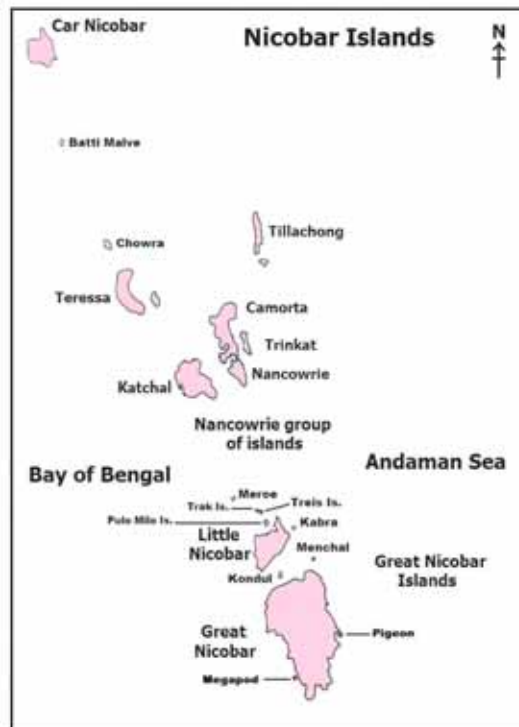


Fig.2. Nicobar Islands

unique in that the nesting leatherback turtle population is one among the four important colonies in the Indo-Pacific region with more than 1000 individuals.

Olive ridley nests only on the east coast of Andaman Islands with 12 sites and that of Nicobar group with three sites. The main sites in Andaman are Madhuban in South Andaman, Cuthbert Bay and Karamatang in Middle Andaman, Ramnagar and Coffeadera beaches in North Andaman; Smith, Trilby and Hump Islands; three beaches on the West coast of Little Andaman Islands. In Nicobar group, the major nesting location is Great Nicobar with four nesting beaches followed by Teressa Island.

INDIAN OCEAN TSUNAMI AND THE AFFECTED TURTLE NESTING PLACES

The devastating earth quake of 9.3 (Ishii et al., 2005) on the Richter scale and the resultant tsunami that originated along the Sumatra coast, affected many sea turtle nesting beaches along the Indian coast especially the Andaman and Nicobar Islands. The impact is less along the mainland coast when compared to the Andaman and Nicobar Islands. Kerala and Andhra Pradesh are the other affected states with turtle nesting beaches. Tamil Nadu state is the worst hit next to Andaman and Nicobar Islands. Though coastline changes have occurred along the northern Tamil Nadu coast, the turtle nesting beaches have not suffered as much alteration as that in Nicobar group of islands. Sporadic turtle nesting have been reported along this stretch after the tsunami. While damages to the coral reefs of Gulf of Mannar were very minimal, the reefs of Andaman and Nicobar Islands suffered extensive damage (Alfred et al., 2006) owing to its proximity to the Sumatra coast.

In Andaman and Nicobar Islands, the tsunami impact was more along the Nicobar and South Andaman Islands. Low lying areas from South Andaman to Nicobar group of islands have submerged by about 1 to 4 meters. The tidal and subtidal areas in north Andaman Islands have been uplifted (Sarang Kulkarni, 2005) by about 0.60-0.90 m (Alfred et al., 2006). The tsunami has also exposed the western coast reef flats of Interview Island, North Reef Island, Latouche Island, South Reef Island, West Island, Landfall Island, East Island and Anderson Island (Alfred et al., 2006). The Landfall, West, Latouche and North Reef are the important green turtle nesting areas (Andrews and Tripathy, 2004). Due to this the access of turtles to the beach is restricted. The islands of North Button, Middle Button, South Button, North Passage, Outram, Havelock, Inglis and Neil Hugh Rose Islands, the reported green and hawksbill nesting areas, along Ritchie's Archipelago suffered no major impact. The tsunami devastated the northeastern side beach of the

Jolly Buoy Island in South Andamans (Alfred et al., 2006).

Nearly 30% of the land has been lost in Katchal Island. Trinkat Island has almost been split into three pieces (Ramachandran et al., 2005). Katchal Island is unique for nesting of green, hawksbill, olive ridley and leatherback turtles. Leatherback turtle nesting grounds in Car Nicobar and Great Nicobar have been affected. The nesting beaches in South Andaman, Little Andaman, and the Nicobar group of islands have almost vanished as all these islands have gone down by one to three meters. In the east coast of Great Nicobar, the Galathea, an important sea turtle nesting ground was affected. Little Nicobar has also borne the brunt of tsunami waves. Many islands of Andaman and Nicobar group shifted southwestwards. Many areas in Andaman and Nicobar Islands showed levels of subsidence on joint impact of earthquake and tsunami.

The latest generation of leatherback, green, hawksbill, and olive ridley turtles has been washed away. The nesting beaches in South Andaman, Little Andaman, and the Nicobar group of islands have almost vanished as all these islands have submerged by one to three meters due to tectonic activity (CORDIO/IUCN, 2005). This will have an impact on the reproductive potential of leatherback, green, hawksbill and olive ridley turtles which nest along these islands. The popular leatherback nesting sites in Great Nicobar Island like mouths of Galathea, Alexandria and Dagmar rivers (Bhaskar, 1979) have also been affected due to tsunami.

Several new beaches have formed in these islands (Jackson Creek – at northern mouth side to a length of 5 km and a 2 km long beach at 4 km south (Sarang Kulkarni, 2005)) and some turtle nesting in these new sites has also been reported after the tsunami event. The important leatherback turtle nesting sites in Mahatma Gandhi Marine National Park escaped from tsunami. Due to the tsunami, the sand and sediment from land have been deposited on the sea grass beds which will have a long term impact on the population of dugongs (Sarang Kulkarni, 2005). The litter scattered on the beaches is a real threat to the nesting turtles (Ramachandran et al., 2005). The turbidity of the coastal waters will have an effect on the sea grass ecosystem. Loss of sea turtle nesting habitat due to sand removal in beaches in Camorta, Katchal, Nancowry and Trinkat has been observed (Ramachandran et al., 2005). Though the sand cover has increased in Camorta and Nancowry Islands, the same has considerably reduced in Katchal and Trinkat Islands.

The data on sea turtles is really lacking in many places of the islands due to difficulty in continuous monitoring owing to inaccessibility. So, it will be difficult to make comparison with the post tsunami event and to assess the change in pattern. The tagging study itself is not comprehensive and so it

will be difficult to compare the data. The foremost importance is to take up a comprehensive study on all aspects in all places of the islands and create a database. Collaborative studies with neighbouring nations are also essential to assess the migration/foraging pattern.

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