

to relocate nesting sites at the post-tsunami beaches.

After this catastrophic event, all turtle camps were closed and ANET conducted its last boat survey in 2006. In 2007, Dr. Kartik Shanker, from the Indian Institute of Science and Dakshin Foundation, collaborated with ANET to set up a camp to monitor leatherback sea turtles on Little Andaman Island. This project has seen a new order of field assistants, young Karen boys and Saw Burney, the elderly boatman on his boat the MV Powmay (named after his daughter in-law). In the first year, the camp was run only by our Karen crew, and two research assistants, Devi Subramaniam and the energetic Adhith Swaminathan, eventually expanded the camp to two beaches, on South Bay and West Bay.

It is to the team's credit, despite all odds over the past five years, that work and interest on sea turtles and their conservation has continued. From ingenious use of flotsam and jetsam found on the beach, and of coastal resources on the island, this crew have made comfortable camps and collected valuable data on leatherback turtles. They have also extended the conservation program by reinvigorating it with fresh energy and ideas. It is this curiosity and energy that sparked Satish Bhaskar's first sea turtles surveys in the region to become a conservation and research program, and it is rewarding to see it continuing in young (and old) islanders. Our field assistants have included:

Original surveys across the islands and monitoring at South Reef Island led by Satish Bhaskar:

- Saw Nelson, Saw Paung and Saw Waller, Allen Vaughan, Saw Boney.

Periodic surveys with Harry Andrews and Team (ANET 1995-2001), and monitoring at 3 nesting sites for 4 years:

- Boat surveys- Saw Paung, Harry Andrews, Saw Shwether, Saw Palaiwa, Saw Pambwein, Allen Vaughan, Saw Poricha, Saw Agu, Manish Chandi.

- Rutland Island, Jahaji beach Camp- Naveen Ekka, Paritosh Biswas, Saw Pambwein, Saw Chi-Maung, Saw Sa-thaw.

- Middle Andaman Island, Cuthbert Bay Camp- Saw Paul Pee, John Kumar, Saw Tintu, Saw Johnny, late Ambika Tripathy.

- Great Nicobar Island, Galathea Camp: - Saw Agu, Saw Glen, Shreyas Krishnan and late Ambika Tripathy.

Leatherback sea turtle work at Little Andaman Island with Kartik Shanker and IISc/Dakshin/ANET:

- Saw Burney, Saw Thesarow, Saw Pambwein, Devi Subramaniam, Saw Standly, Saw Lulay, Saw Willy, Saw Columbus, Saw Kenick, Saw John, Sonu and Adhith Swaminathan. ■

POST-NESTING MIGRATORY ROUTES OF LEATHERBACK TURTLES FROM LITTLE ANDAMAN ISLAND

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INTRODUCTION

Among the seven species of sea turtles, leatherback turtles (*Dermochelys coriacea*) are known to undertake some of the longest migrations (Pritchard and Trebbau, 1984). Over the last two decades, there has been concern about the drastic decline in the nesting populations of this species in the Pacific Ocean (Spotila *et al.* 2000), though some

nesting populations have increased in the Atlantic Ocean. In India, leatherback turtles are listed under Schedule I of the Indian Wildlife (Protection) Act 1972, which offers the highest degree of protection to wildlife in India.

Current leatherback nesting sites in India are restricted to the islands of the Andaman and Nicobar archipelago

(Andrews *et al.*, 2006a, b). Very little is known about the status of leatherback populations from the Indian waters, barring recent work by the Andaman and Nicobar Environment Team (ANET) on Great Nicobar Island. More recently, a monitoring programme has been initiated by the Indian Institute of Science, Bangalore, ANET and Dakshin Foundation, Bangalore on Little Andaman Island. In order to understand where these turtles range and the mortalities to which they are subject, a satellite tracking project was initiated in January 2011.

METHODS

Seven female leatherback turtles were tagged with Kiwisat 202 Platform Transmitter Terminals (PTT), (Sirtrack Wildlife Tracking Solutions Ltd., New Zealand) at West Bay, Little Andaman. The transmitters interfaced with the CLS-ARGOS system for deriving surface position coordinates. The location coordinates were filtered and analysed using the Satellite Tracking and Analysis Tool (STAT) (Coyne and Godley, 2005). The PTTs were fitted with a salt-water switch which automatically switched on whenever the turtle surfaced to breath, sending location signals to the nearest geo-synchronised satellite in orbit. The PTTs were programmed with a duty-cycle to transmit continuously for the first three months, and every alternate day for the rest of the period. The PTTs were attached on the most prominent part of the medial carapacial ridge, usually posterior to the

widest area of the carapace. Two holes were drilled through the medial ridge with an orthopaedic drill bit, with each hole only penetrating a few millimetres into the carapace. The transmitters were designed specifically for direct attachment to a leatherback turtle, and were secured on one side of the medial ridge using stainless steel cables inserted in surgical tubing, which acted as a sheath for the tether attachment. The cables were secured using stainless steel crimps. Direct attachment through the medial ridge has proven to be a successful alternative to the harness method (Fossette *et al.*, 2008; Byrne *et al.*, 2009). Using the described method, three nesting leatherback turtles were tagged during 2010-2011 and four turtles were tagged during 2011-2012 nesting seasons.

RESULTS

Of the seven turtles that were tagged, two turtles transmitted for about 6 months (179 and 193 days) and four turtles transmitted for 51 to 92 days; one turtle transmitted only a single data point (Table 1). Four out of six turtles travelled south east of the Andaman and Nicobar Islands, two along the coast of Sumatra, and two beyond Cocos (Keeling) Island towards Western Australia. Two turtles moved south-west of the islands, one of which travelled south of the British Ocean Territory (Figure 1). Turtle 103333, tagged on 04 January 2011, transmitted for 179 days and travelled

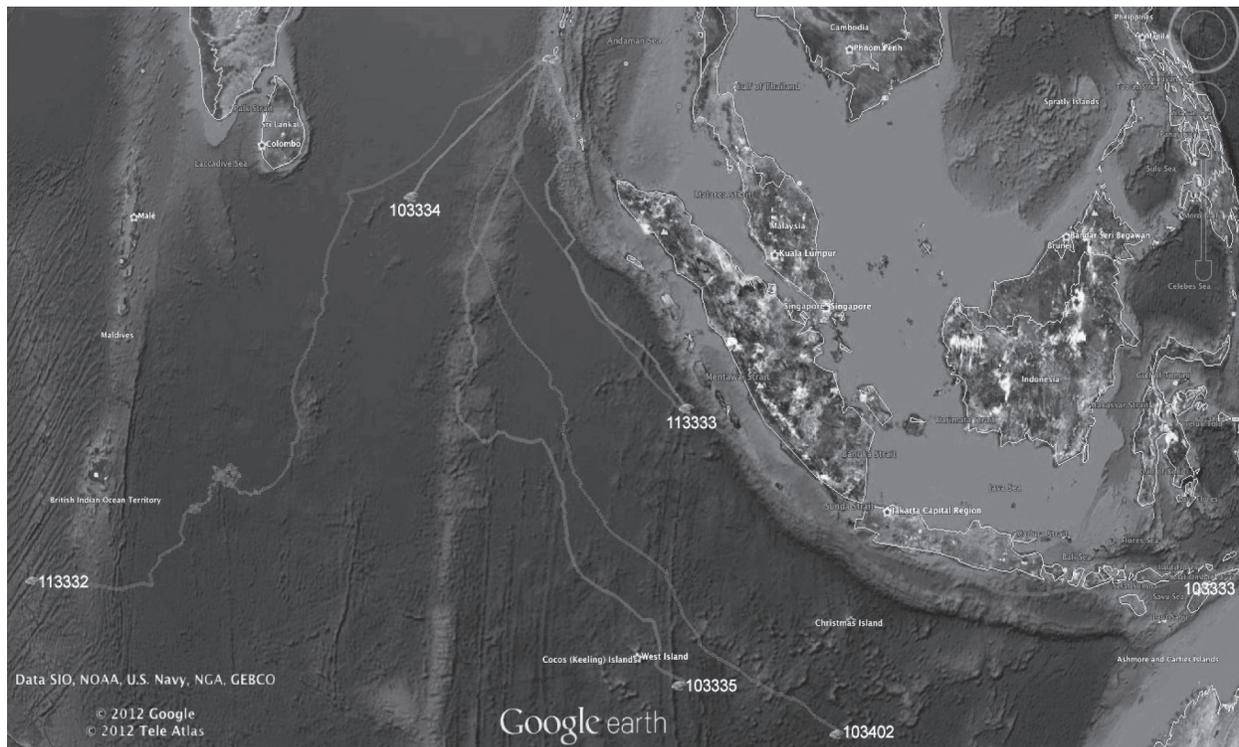


Figure 1. Post-nesting migratory paths of leatherback turtles tagged in West Bay, Little Andaman, during 2010-2012

the longest distance of 7312 km (straight line distance: 4185 km) (Table 1).

Three more turtles will be tagged with PTTs during the 2012-2013 nesting season.

Table 1. Post nesting migratory data of the leatherback turtles tagged in West Bay, Little Andaman.

| ID | Release Date | CCL (cm) | CCW (cm) | Last Location Date | # Days Transmitted | Distance Travelled (km) |
|--------|--------------|-------------|-------------|-----------------------|-----------------------|----------------------------|
| 103333 | 04-01-2011 | 154 | 150 | 02-07-2011 | 179 | 7312 |
| 103334 | 04-01-2011 | 170 | 120 | 14-03-2011 | 69 | 1077 |
| 103335 | 05-01-2011 | 153 | 112 | 07-04-2011 | 92 | 4600 |
| 103402 | 02-12-2012 | 161 | 117 | 29-04-2012 | 77 | 4634 |
| 113332 | 23-01-2012 | 152 | 110 | 24-07-2012 | 183 | 6998 |
| 113333 | 23-01-2012 | 161 | 117 | 14-03-2012 | 51 | 2690 |
| 113334 | 23-01-2012 | 160 | 110 | 23-01-2012 | 0 | 0 |

DISCUSSION

The patterns that emerged after satellite tracking of leatherback turtles from the Little Andaman Island provided some preliminary insight into their migratory patterns in the Indian Ocean. Upon departure from the West Bay Beach, leatherbacks migrated southward along varied paths, utilizing the broad expanses of the Southern Indian Ocean. While there was no single migratory corridor (Morreale *et al.*, 1996; Benson *et al.*, 2007), multiple turtles were observed to follow similar routes, with some relationship to bathymetry which requires further investigation. As the first telemetry study on leatherback turtles in the region, this provides useful information on their migratory pathways in the Indian Ocean, and highlights potential threats from deep sea fishing operations in the southern Indian Ocean. More data are, however, required to understand patterns of migration and identify specific threats during these migratory journeys.

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