

Monitoring of marine turtles along the Kerala and Tamil Nadu coasts

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Introduction

Among the five species of sea turtles distributed in the Indian region, four of them, the olive ridley (*Lepidochelys olivacea*), green turtle (*Chelonia mydas*), leatherback (*Dermochelys coriacea*) and hawksbill (*Eretmochelys imbricata*) nest on Indian coasts (Kar & Bhaskar, 1982). All these species are distributed in Tamil Nadu and in the coastal waters of Kerala. The Wildlife Institute of India (WII) recently implemented a UNDP–Government of India sea turtle conservation project. This project (2000–01) evaluated the status of marine turtles and their nesting habitats in all maritime states of India, which included an assessment of threats to turtles. Data on important nesting beaches were generated, which form the benchmark for monitoring (Shanker & Choudhury, 2006). Information on the status of marine turtles along the Tamil Nadu coast was generated as a part of this project (Bhupathy & Saravanan, 2002, 2006a; Bhupathy & Karunakaran, 2003). Among many aspects, monitoring the population trend of a species is critical for the preparation and implementation of conservation programmes. In this context, the Madras Crocodile Bank Trust (MCBT) initiated a countrywide programme for monitoring marine turtles including the islands. As a part of this programme, the Sálim Ali Centre for Ornithology and Natural History (SACON), Coimbatore undertook monitoring of sea turtles along the Kerala and Tamil Nadu coasts during 2003–05. The objective of this project was to assess the conservation status of different species of marine turtles, and to network with and provide training to government officers and non-government organisations (NGOs) in both states to enhance conservation actions. In this paper, we report the major findings of the sea turtle monitoring programme along the Kerala and Tamil Nadu coasts during November to April 2003–04 and 2004–05.

Methodology

Study area

The all-India coordinated UNDP–GOI–WII sea turtle project (2000–2001) suggested that the Nagapattinam and Chennai coasts in Tamil Nadu and the beaches of North Kerala are important marine turtle nesting areas (Bhupathy & Saravanan, 2006b). We monitored turtle nesting and mortality along the south Chennai (12°31′–12°8′N and 80°10′–79°56′E, Fig. 1) and Nagapattinam coasts (11°51′–11°30′N and 79°51′–79°46′E, Fig. 2) which are part of the Palar and Cauveri deltas respectively. The North Kerala coast (approx. Kozhikode–Kannur; 11°41′–12°38′N and 74°55′–75°38′E, Fig. 3) has many west flowing rivers and remnants of mangrove vegetation at the river mouth. The west and east coasts receive major rainfall from the Southwest (May–July) and Northeast (October–November) monsoons respectively.

Field methods

Each study sector was divided into 10–km units and surveyed each fortnight (during 0600–0830 hours) for recording nesting and mortality of turtles (Table 1). Data on nesting intensity was based on tracks found on the beach. As surveys were done at fortnightly intervals, tracks found during each survey were considered as new. Nest predation by animals or exploitation by locals was based on tracks and signs found near exploited nests. The number of carcasses found on the shore was counted as an index of turtle mortality. Carcasses of turtles were marked with paint to avoid repeat count. Researchers appointed by the project surveyed the Mamallapuram–Pondicherry (50 km) and Nagapattinam (30 km) beaches each fortnight by foot. The Chennai (6 km) and North Kerala (20 km) beaches were monitored by local

NGOs on a daily basis. Along the North Kerala coast, the availability of sandy areas for turtle nesting was assessed during February–March 2003. We also interviewed local persons to obtain information on turtle nesting and mortality.

Nesting intensity for the locality studied was calculated based on average nesting during this

study. Total nesting during the season was estimated as:

$$N = n \times d \times t,$$

where N – Estimated nesting,
 n – average nesting during sampling,
 d – number of 10 km sectors, and
 t – duration (90 days – January to March).

Table 1: Sea turtle monitoring schedules along the Kerala and Tamil Nadu coasts during 2003 - 05

Beach Sector	Distance (km)	Duration	Monitored by
Kerala			
Kozhikode	6	September–December 2003	Theeram
Kasarakod	10	September–December 2003	Naythal
Tamil Nadu			
Chennai	6	January–April 2004 January–April 2005	SSTCN
Mamallapuram-Pondicherry	50	January–April 2004	MCBT–CMS Project
Nagapattinam	30	January–April 2004 December 2004–May 2005	MCBT–CMS Project

Turtle Monitoring

Nesting

Sandy beaches suitable for sea turtle nesting were found on the North Kerala (i.e. Kannur and Kasarkod) coast. A survey conducted for documenting nesting and mortality along the 60 km coast during February–March 2003 yielded no nests. Interviews with fishermen revealed that turtles nest along the west coast largely during September–November with the peak during October. Data collected by NGOs working in this area, namely *Theeram* and *Naythal* supported this. According to them, on an average, about three nests were found per kilometer in the area. These NGOs, in collaboration with the Kerala Forest Department and local communities, especially the fisherman, collect turtle eggs and maintain hatcheries in Kolavipalam, Kozhikode (*Theeram*) and near Kasargod (*Naythal*). The hatchlings are released into the sea. Apart from collecting biological information and protecting nests, these

hatcheries are used for nature education and public awareness programmes.

The Mamallapuram–Pondicherry beach (50 km) was surveyed for only one year (2003–04). In all, 36 olive ridley nests were recorded during the fortnightly sampling from January–March 2004. Peak nesting was observed in the first fortnight of March. Estimated nesting density along this area was about 11 nests per km during January–April 2004 (Table 2).

The Chennai beach has been monitored (on a daily basis) by the Students’ Sea Turtle Conservation Network (SSTCN) since 1988 and was continued during this study as well. A total of 50 nests (8.3 per km) were recorded during January–April 2004. During 2005, they recorded 62 nests (10.3 per km; SSTCN data). Average nesting intensity for 16 years was 9.4 nests per km (Shanker, 2003). A hatchery is being maintained by the SSTCN on an annual basis.

Table 2: Nesting of ridleys along the Mamallapuram–Pondicherry coast (50 km), Tamil Nadu during January–March 2004

Fortnight	Number of nests	Average nesting/day/10km
January I	3	0.6
January II	6	1.2
February I	7	1.4
February II	7	1.4
March I	13	2.6
March II	0	0
Total	36	7.2
Average nesting/day/10km		1.2
Estimated nests		540
Nests per km		10.8

The Nagapattinam beach was monitored for turtle nesting during 2003–04 and 2004–05. On the 30 km beach monitored, a total of 17 and 30 nests were recorded during the fortnightly sampling from December–April in 2003–04 and 2004–05 respectively (Table 3). This works out to about 7.5 and 15 nests per km. Nesting along this beach was about 20 nests per km during 2000–01.

Table 3: Nesting of ridleys along the Nagapattinam coast during 2003–04 and 2004–05

Fortnightly survey	2003–04	2004–05
December II	0	0
January I	3	*
January II	3	*
February I	6	8
February II	2	9
March I	3	9
March II	0	2
April I	0	2
April II	0	0
Total	17	30
Estimated nest/ km	7.5	15

*Not surveyed due to disturbance in the area caused by the 26th December 2004 Indian Ocean tsunami.

Turtle nesting along the east coast of Tamil Nadu (Chennai and Nagapattinam) occurred during January to March, whereas it was between September and December along the North Kerala coasts. In other words, turtles nested subsequent to the major monsoon season of the area, namely the northeast and southwest monsoons. Peak nesting along the east and west coasts were during February and October respectively. The intensity of the sea turtle nesting on the Kerala and Tamil Nadu coasts is sporadic, and its density varied from 3 to 15 nests per km. The reasons for the difference in the number of nests observed along the Chennai and Nagapattinam coasts during 2003–04 and 2004–05 are unclear. These variations may be attributed to factors such as annual or cyclic changes in the nesting of turtles (for larger data set, see Shanker, 2003), which has to be investigated further.

Turtle mortality

No sea turtle carcass was observed along the west coast (North Kerala) during both years (i.e. 2003–04 and 2004–05). Interviews with fishermen in the area also revealed that dead turtles get stranded along these beaches only occasionally.

Along the east coast, 139 turtle carcasses (~3 per km) including 134 olive ridleys and five green turtles were recorded on the Mamallapuram–Pondicherry coast during 2003–04. During the same period, 92 carcasses including 90 olive ridleys and two green turtles were observed along the Nagapattinam coast (Table 4). Compared to the previous season, only 21 carcasses (20 olive ridleys and one green turtle) were observed during 2004–05, and all of them prior to the Indian Ocean tsunami on 26th December 2004. No new carcasses were observed during January–April 2005. Fishing activities were halted during this period due to the damage and loss of boats and infrastructure, and the fears and rumours of another tsunami in the area. Hence, it may reasonably be concluded that mortality of turtles in the area was largely due to fishing activities.

Table 4: Olive ridley mortality along select beaches of Tamil Nadu and Kerala during 2003–04

Location	Beach monitored (km)	Turtle Mortality*	Nest predation (%)	Remark
North Kerala	60	Low	Unknown	Single survey
Nagapattinam	30	90 (2)	100	Fortnightly survey
Mamallapuram-Pondicherry	50	139 (5)	69.4	Fortnightly survey
Chennai	6	Low	Low	Daily survey

Number in parenthesis indicate number of green turtles

* total count

Turtle mortality was highest during January on the east coast (Table 5). Prior to and during January, turtles aggregate in the shallow nearshore waters to breed. These areas are also important gill net fishing grounds. Fishermen in the area largely used small (mechanised) boats and *catamarans* for fishing. The density of fishing vessels (both mechanised and non-mechanised) was 26 and 28/km on the Mamallapuram and Nagapattinam coasts respectively. Gill nets were set in shallow

waters for about 8–10 hours. Turtles entangled in the nets died due to drowning, as indicated by the prolapsed internal organs through body openings. The fishermen in the area also chopped off the flippers or clubbed the head of live turtles found entangled in the net. This was done for removing turtles without damage to the nets and fishermen themselves. In all, 70% of the fresh carcasses found on the shore had one or two missing flippers and shell or head injuries.

Table 5: Mortality of olive ridleys along the Chennai and Nagapattinam coasts during 2003–2005 based on carcasses found along the beach

Fortnightly survey	Mamallapuram – Pondicherry	Nagapattinam
December II	0	0
January I	29	26
January II	61	22
February I	19	9
February II	20	14
March I	2	6
March II	3	9
April I	0	4
April II	0	0
Total	134+5*	90+2*

* Green turtles

Exploitation

Inhabitants of these study areas (Chennai, Nagapattinam and North Kerala) do not consume turtles, but they consume turtle eggs. Locals on both Nagapattinam and Mamallapuram–Pondicherry coasts collected eggs of a large number of nests. As the Chennai and North Kerala coast beaches were monitored on daily basis by the SSTCN and other NGOs, exploitation of eggs by

humans were negligible. These NGOs collected turtle eggs to maintain hatcheries with the involvement of students and local communities.

Along the Nagapattinam coast, all the nests found during 2003–04 were predated; 14 (82.5%) by humans and 2 (17.5%) by domestic dogs. Professional poachers traversed the beach extensively on foot during the night to collect eggs. Of the 36 nests observed during January–April

2004 along the Mamallapuram –Pondicherry coast, 25 (69.4%) were predated (Table 6). Among the predated nests, jackal and domestic dog contributed 54.2% and 33.3% respectively. Inhabitants of the area depredated about 12.5 % of the total nests observed in the area. Native

communities such as *Irulas* consume turtle eggs occasionally. Locals collected eggs from almost all nests along the Nagapattinam coast, whereas inhabitants took only 12.5% of them along the Mamallapuram coast. This indicates that the latter beach is relatively less disturbed.

Table 6: Exploitation of turtle eggs along select beaches of Kerala and Tamil Nadu

Location	Beach monitored (km)	Nest predation / exploitation (%)	% of predation		
			Humans	Domestic dog	Jackal
North Kerala	20	Low	Unknown	–	–
Nagapattinam	30	100	82.5	17.5	–
Mamallapuram–Pondicherry	50	69.4	12.5	33.3	54.2
Chennai	6	Low/ Unknown	–	–	–

Suggestions for Conservation

Annual closed season for fishing

As over 50% of the adult turtle mortality occurred during January, a closed period for gill net fishing is suggested in the area for a month (January) along the east coast. During this period, alternate fishing techniques to be used by the fisherman should be explored. Discussions with the concerned departments (mainly Forest and Fisheries Departments) and other stakeholders are required for active participation and effective implementation.

Control of egg depredation

The depredation of turtle eggs is widespread along the entire olive ridley nesting range, and in some areas it is very severe. Depredation is more common where no protected areas or NGO activities are present. Poaching has almost stopped in select sectors of North Kerala, where NGOs such as *Naythal* and *Theeram* are active. These NGOs use the local fishermen to collect eggs for hatcheries. Enhanced beach patrolling by the Forest Department and other agencies during the peak turtle nesting season is crucial for the long-term survival of marine turtles. Intensive beach patrolling for two months (February–March) on the turtle nesting beaches of the east coast of Tamil

Nadu may save as many as 65–90% of the nests from poachers. Beach patrolling during September–October is suggested along the west coast for the conservation of turtles.

Community participation

Awareness programmes and community participation in the conservation efforts are important for getting desired results. Hatchery programmes involving the public with incentives and alternate livelihoods may increase the success of the sea turtle conservation initiatives many fold. Regular egg poachers of an area may be identified and used in the hatchery programme. In this direction, supporting the efforts made by SSTCN (Chennai), Students' Sea Turtle Network (SSTN)(Nagapattinam), *Theeram* (Kozhikode) and *Naythal* (Kasaragod) with both technical and financial inputs are essential.

An ideal location among the current study areas for starting a sea turtle hatchery programme is the Tranquebar–Poompuhar (Nagapattinam) coast. This programme has a network in place with the involvement of Forest Department and local community, and could act as a model nature education and conservation initiative. A hatchery programme is particularly necessary for the Nagapattinam coast, as local people collect the eggs of almost all nests.

Research

The data on turtle nesting along the east coast during 2000–01, 2003–04 and 2004–05 showed high fluctuation in the nesting density. For instance, along the Nagapattinam coast, it varied from 7.5 (2003–04) to 20 (2000–01) nests per km. Data generated for about two decades by the SSTCN on the Chennai coast also showed similar variations (2.8 to 17.5 nests per km, Shanker, 2003). Reasons for these fluctuations need to be investigated. It is necessary to continue the monitoring of turtle nesting and mortality along important areas such as Chennai and Nagapattinam. The nesting season of sea turtles along the east and west coasts was different, and it would be interesting to examine whether the same population nests along both coasts. Tagging programmes along both these coasts simultaneously may provide important information such as breeding stock and movement pattern of turtles.

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Figure 1: Map showing the Chennai–Pondicherry coast and prominent villages

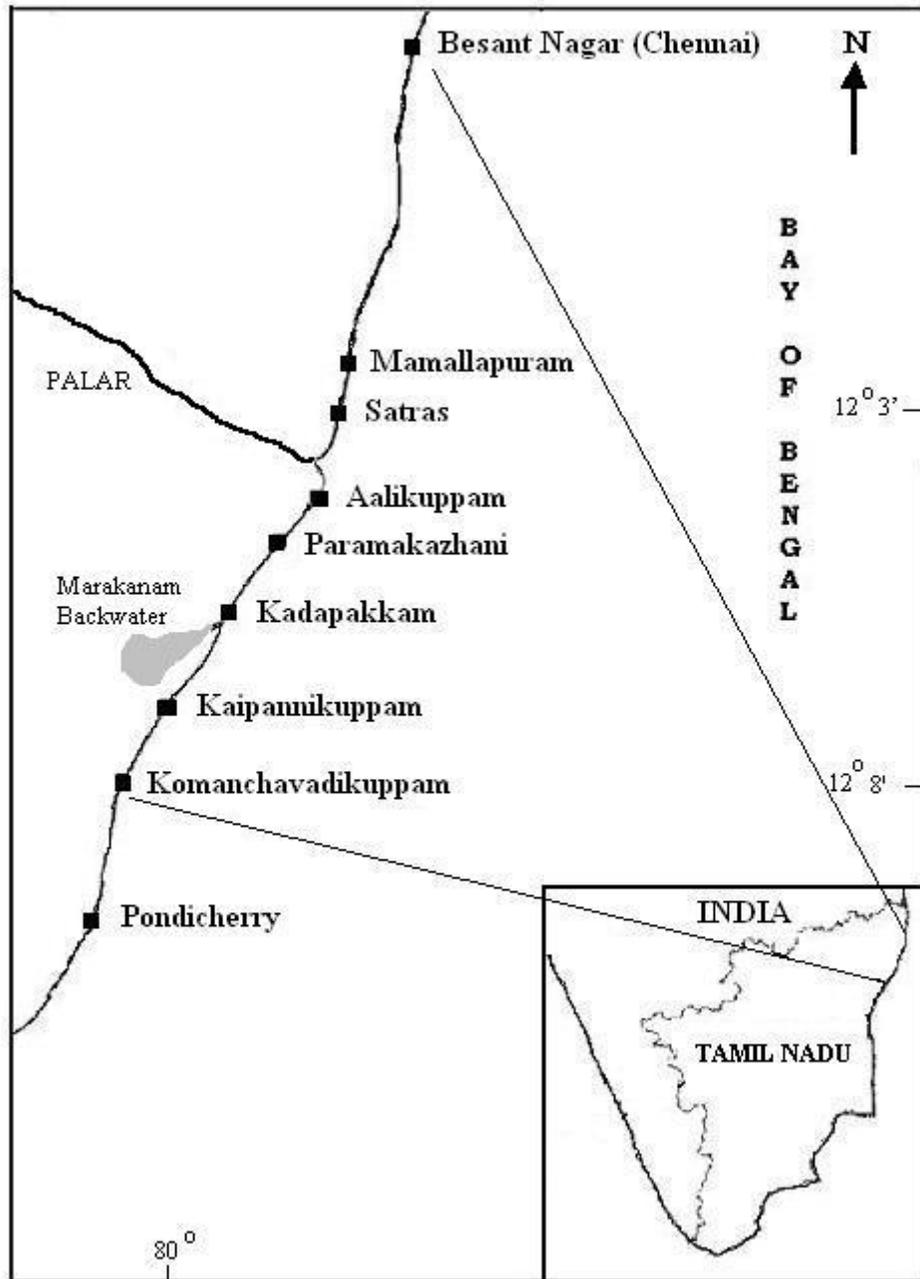


Figure 2: Map showing the study area along the Nagapattinam coast

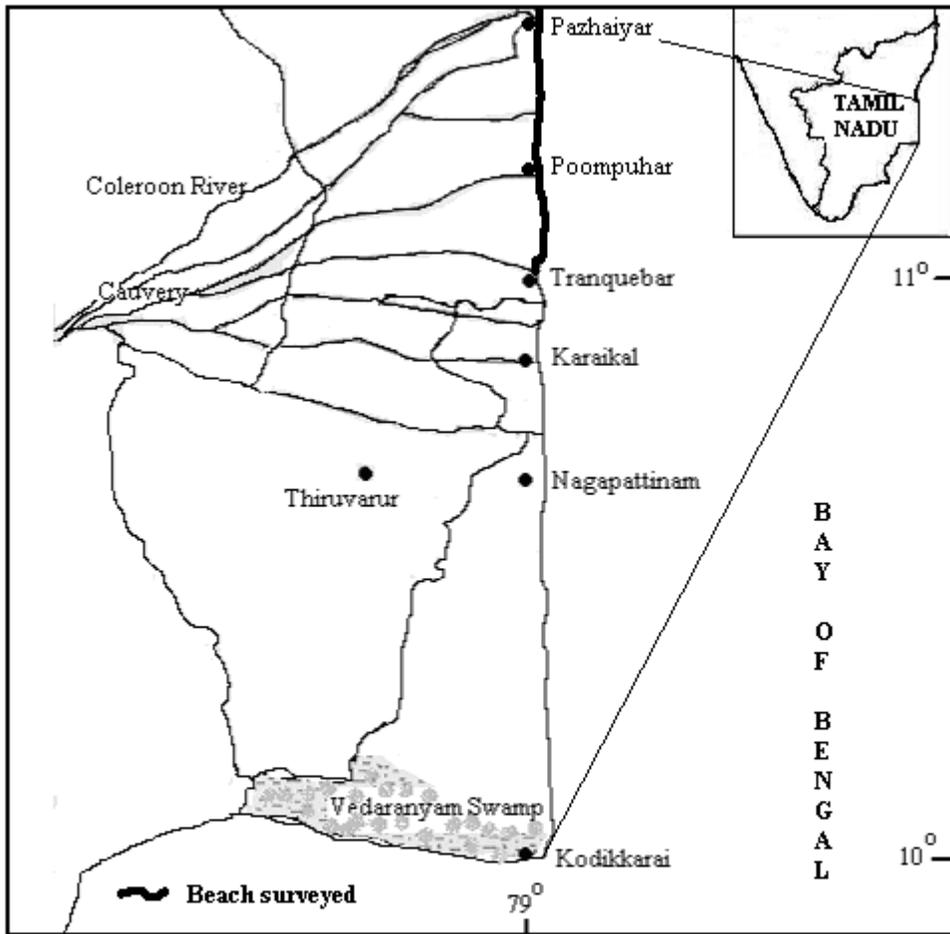


Figure 3: Map of Kerala showing the study area

