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### Short Communication

## Conservation of olive ridley sea turtle *Lepidochelys olivacea* (Reptilia/Chelonia) along the Nagapattinam coast, southeast coast of India

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Nesting and mortality of *Lepidochelys olivacea* (Eschscholtz, 1829) was studied in 50 km beach stretch along the Nagapattinam coast during December 2000 to May 2001. *Lepidochelys olivacea* was common constituting 97.1 % of turtles recorded. This species emerged from sea for nesting during December and continued till April. The nesting of *Lepidochelys olivacea* was sporadic and the peak was observed in the second fortnight of February. The poor nesting (20 nests/ km) in the area could be due to high adult mortality (12 % females) due to incidental catch in the gill nets, and nest predation (> 90 %) by human. The Nagapattinam coast will not sustain the nesting population of *Lepidochelys olivacea* longer, if immediate conservation measures are not undertaken.

[ **Key words:** Conservation, olive ridley turtle, *Lepidochelys olivacea*, mortality, nesting ]

Five species of sea turtles - leatherback (*Dermochelys coriacea*, Linnaeus 1766), loggerhead (*Caretta caretta*, Linnaeus 1758), olive ridley (*Lepidochelys olivacea*, Eschscholtz, 1829), hawksbill (*Eretmochelys imbricata*, Linnaeus 1766) and green (*Chelonia mydas*, Linnaeus 1758) turtles are reported within Indian limits<sup>1</sup>. Among them the olive ridley sea turtle (*Lepidochelys olivacea*) is common along the Indian coasts. All species of sea turtles are listed in Schedule I of the Indian Wildlife Protection Act 1972 providing the highest legal status<sup>2</sup>. Published information on the status of sea turtles and their ecology pertaining to the southeast coast of India is scanty<sup>3-7</sup>. *Lepidochelys olivacea* nests sporadically all over the Indian coasts; while at Orissa coast exceptionally it nests in mass<sup>1,8</sup>. Sea turtles are reportedly declining all over the world due to hunting, encroachment of nesting beaches by human, development projects, and mortality due to unscientific fishing practices<sup>9</sup>. Mortality of thousands of *Lepidochelys olivacea* in the nesting area due to incidental catch in fishing gears has also been reported<sup>10</sup>. Mortality of adult turtles in the breeding ground will lead to severe population decline as matured individuals and their eggs are lost forever. Adult mortality would also affect their long term

survival as these turtles require over 10 years to attain sexual maturity<sup>11</sup>. In addition, sea turtle eggs are also exploited by human all over their ranges. Information on the population, arrival and departure pattern in the nesting ground and threats are important for proposing conservation strategies for species especially the migratory ones. The present paper deals with aspects of nesting and mortality of *Lepidochelys olivacea* (Reptilia/Chelonia/Cheloniidae) along the Nagapattinam coast, Tamil Nadu, southeast coast of India, and outlines measures to conserve them.

Nagapattinam is one of the 13 maritime districts of Tamil Nadu, and is criss-crossed by several distributaries of the river Cauvery. The entire beach has sandy areas which appear suitable for turtle nesting. Major ground vegetations found in the area are grass, *Spinifex littoreus* and creeper, *Ipomoea pescaprae*. Fortnightly surveys were done in 50 km coast from December 2000 to April 2001. The field work was done for four hours from 0500 to 0900 hrs. In one day, about 10 km coastline was surveyed at a stretch, and tracks, live or dead turtles observed were recorded. On locating a turtle, observation date, species, curved carapace length and injuries, if any were noted. Depending on the availability of fresh and intact turtle carcasses, sex

was determined based on the tail length; longer ones males and shorter ones females. Shell of the dead turtles were marked with paint to avoid repeat count during subsequent surveys. Number of nests in the sampled area during the season was estimated using the formula  $N = n \cdot d \cdot t$ ; where,  $N$  = estimated number of nests,  $n$  = mean number of nests/night (1.44 nests),  $d$  = number of days taken to survey the shore (5 days),  $t$  = duration of the nesting season (150 nights-December to April).

A total of 205 carcasses of turtles were recorded in 50 km stretch of the beach from December 2000 to April 2001 which include 199 *Lepidochelys olivacea* and six *Chelonia mydas*. The occurrence of these species in this area was reported earlier<sup>4</sup>. The present study showed that *Lepidochelys olivacea* was common constituting 97.1%. Other species such as *Dermochelys coriacea* and *Eretmochelys imbricata* though reported by locals, could not be observed during this study.

Seventy two nests were located following turtle crawls on the beach. Mean distance of the nest location with respect to the High Tide Mark was 37.27 m (SD=27.66 m). Based on the crawl width and pattern and season, all nests were assumed as that of *Lepidochelys olivacea*. The number of dead turtles observed in the area also confirmed the same. Turtles emerged from sea for nesting during December and continued till April. The nesting intensity was low till the first fortnight of February, and the peak was observed during the second fortnight (Fig. 1). The estimated number of nests along the Nagapattinam coast was 1080 (20 nests/km). Of the 72 nests observed, 69 were found predated; 66 (95.6%) by human, two by domestic dog and one by Jackal, *Canis aureus*. The egg poachers traversed the beach during night, and it appears that fewer than 4% of the nests

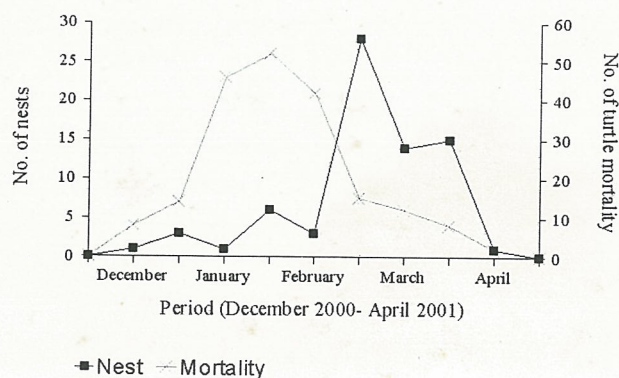


Fig. 1 — Nesting and mortality of *Lepidochelys olivacea*

escaped predation. Similar to the present observation, about 90% of the sea turtle nests were pilfered by human on the Madras (Chennai) coast<sup>12</sup>.

In the present study, we counted 199 carcasses of *Lepidochelys olivacea* along 50 km of the beach (about 4 carcasses/km). The Curved Carapace Length (CCL) ranged from 50 to 77 cm ( $\bar{X}$  = 68.7 cm, SD = 2.5 cm,  $n$  = 199). About 99% of turtles had carapace length over 60 cm, and the remaining below 60 cm (Fig. 2). It is speculated that this species attains sexual maturity when it grows over 60 cm in CCL<sup>13</sup>. Twenty years of research along the Orissa coast yielded only five sub-adult turtles (<60 cm)<sup>14</sup>. Record of two sub adults (CCL 50 and 59 cm) along the Nagapattinam coast in one season is significant, as information on the sub-adult turtles are scanty.

Sex identification was possible in 94 (47.2%) of 199 turtles carcasses. The sample showed that females dominated in number compared to males (male-female ratio is 1:3.3). Female biased sex ratio was reported<sup>10</sup> in *Lepidochelys olivacea* along the Orissa coast (1:2.7). Of the 94 fresh and intact carcasses, 66 (70%) had visible injuries; cut marks on the neck, flippers and shell. Head or one of the flippers were missing in eight cases. Gill nets were widely used for marine fishing in this area. The fishermen would chop off the flippers or club the head of the live turtles entangled. This is to remove the reptiles from net without major damage to the net or handling person. This is contrary to the Tuticorin - Kanniyakumari coast, where live turtles are collected and consumed<sup>4</sup>. About 28 (30%) turtles did not have visible injuries, and might have largely died due to drowning and stress. This was indicated from the bulged eyes and everted internal organs through the openings such as cloaca.

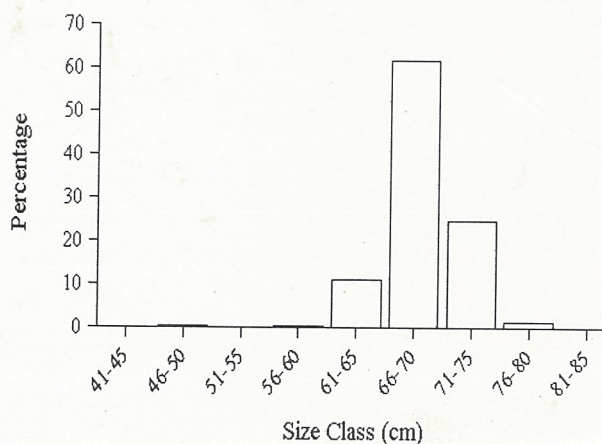


Fig. 2 — Size structure of *Lepidochelys olivacea*

Turtle mortality was highest during January (Fig. 1) which could be due to the aggregation of turtles in the shallow water area nearby beach for reproductive activities such as selection of mate, courtship and finding appropriate nesting beach. This is also an important gillnet fishing ground. Fishermen in the area largely used small mechanised boats and *catamarans* for fishing. Gill nets spread during the previous evening were removed in the following morning. Any live turtle entangled would be beaten to death. Eleven villages were found on the coastal belt (50 km) under study. The mechanised boat and *catamaran* density of the area was about 192 vessels/village or about 39/km which is high compared to Orissa coast<sup>10</sup>.

Nagapattinam is a sporadic nesting ground for *Lepidochelys olivacea* which is similar to other parts of the east coast<sup>6,7</sup> excepting the Orissa coast, where it is mass nesting<sup>8</sup>. Over 80% of the observed mortality was during January and first fortnight of February (Fig. 1). This strongly indicates that most of the turtle mortality occurred prior to nesting. Of the 199 dead turtles, 150 were adult females. Assuming one nest per female, at least 150 nests could have been added in case of no mortality. Sea turtles are known to lay more than one clutches during one nesting season<sup>11,13</sup>. Adding to the estimated 1080 nests, a total of at least 1230 nests would have been laid along this coast during this study. This shows a reduction of about 12% nesting during this nesting season as well as loss of similar proportion of females forever. Higher adult mortality (>12% females) and nest predation (>90%) would have led to the present poor nesting (20 nests/km) in the area. Turtle eggs are being exploited along the east coast over several decades<sup>3,12</sup>. Higher incidental mortality and exploitation of eggs resulted in serious population declines in sea turtles world over<sup>9</sup>.

In the prevailing conditions, Nagapattinam coast would not sustain the nesting population of *Lepidochelys olivacea* for longer. As all sea turtles are endangered, fishing regulations especially for placing gill nets during January- February may reduce turtle mortality considerably. Awareness programme involving local fishing communities of the area would also yield desired results. This should include demonstration of appropriate techniques for removing entangled turtles and safe release. Intensive beach patrolling by the Forest Department during February and March may reduce egg poaching, and would help in recruitment.

About 8500 *Lepidochelys olivacea* were tagged along the Orissa coast during 1999 by the Wildlife Institute of India, Dehra Dun, and subsequently 22 tags were reported from the Sri Lankan coast and Gulf of Mannar, India (Pandav B., personal communication). We recovered two of them (WR26135, WG14805) from Kanniyakumari, the southern tip of the Indian Peninsula during November 2000<sup>15</sup>. However, none of the dead turtles found on the Nagapattinam coast had tags, and fishermen were also unaware of any turtles with tags. It is hypothesised that *Lepidochelys olivacea* takes deep sea route while migrating to Orissa for mass nesting. It is interesting to know the feeding grounds of turtles that nest on Nagapattinam coast. A study involving tagging of turtles along this coast would reveal this and several other hidden mysteries of sea turtle life history.

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