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NESTING OF *LEPIDOCHELYS OLIVACEA* ALONG THE SOUTHERN CHENNAI COAST, WITH EMPHASIS ON HABITAT CHARACTERISTICS

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(with three text-figures)

ABSTRACT.– **The nesting of olive ridley turtles (*Lepidochelys olivacea*) along a 50 km of beach south of Chennai, Tamil Nadu, India, was studied from January to March 2004. Fortnightly surveys were done on foot between 0600 and 0830 h on five consecutive days to locate tracks, nests, and carcasses of turtles that had been washed ashore. Nest location with respect to the distance from high tide line, river mouth and nearest village were recorded. Coastal vegetation was sampled every 500 m and at each site used for nesting. Peak nesting was observed in the first fortnight of March, and estimated nesting density was 10.8 nests/km. A total of 135 carcasses of ridleys were located and mortality was largely from incidental catch in fishing gears. Number of nests located was negatively correlated with various distance categories from nearest village (r = -0.443, p = 0.050, n = 20), high tide (r = -0.628, p = 0.039, n = 11) and river mouth (r = -316, p = 0.034, n = 44). Turtles preferred to nest near *Ipomoea pescaprae* (*sw* = 0.445) compared to *Spinifex littoreus* (*sw* = 0.207). Further studies on nest site selection would provide pertinent information for both sea turtle conservation and plans for coastal development.**

KEY WORDS.– **Sea turtle, nest site preference, coastal vegetation, environmental factors, stranding.**

INTRODUCTION

Globally, seven species of sea turtles are recognized (Pritchard and Mortimer, 1999) five (*Dermochelys coriacea*, *Caretta caretta*, *Eretmochelys imbricata*, *Lepidochelys olivacea*, *Chelonia mydas*) of which are found in Indian waters. All five species are listed in the Indian Wildlife Protection Act, 1972. It is reported that marine turtles are declining worldwide largely due to egg collection, catching turtles on land and in the sea, marine pollution, and incidental catch in fishing gear (Limpus, 1995, Renaud et al., 1997). The nature of the offshore approach to nesting beaches, slope of the beach, vegetation, texture of the sand and illumination from inland are important factors influencing the selection of nesting sites by sea turtles (Mortimer, 1995). For many areas, habitat characteristics of turtle nesting beaches are poorly understood and available information is sketchy, although remarkably in the case of Tamil Nadu, there is mention in 4th Century Tamil Sangam poem that turtles nest among the ground glory, *Ipomoea* sp. (Sanjeevaraj, 1958). Based on the locations of mass nesting areas in Orissa, it is speculated that ridleys nesting in other parts of India would select beaches close to river mouths, but data, in this regard, are lacking (Tripathy et al., 2003a). The olive ridley sea turtle (*Lepidochelys olivacea*) is widely distributed throughout the tropics and subtropics, and it nests sporadically all over coastal India, with the exception of Orissa, where mass nesting occurs at three localities (Pandav, 2000; Shanker et al., 2003). While in-

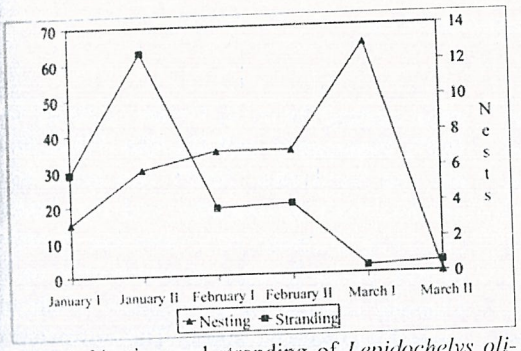

Figure 3. Nesting and stranding of *Lepidochelys olivacea* along the southern Chennai coast, Tamil Nadu during January – March 2004.

were considered new, as the interval between surveys was 10–15 days and tracks were obliterated during the survey.

Vegetation was evaluated at every 500 m along the entire beach using point sample method. At each site, the presence of vegetation along the perpendicular line from the high tide up to 25 m inland was noted. Based on the representation of each or combination of plant species in the samples (n = 101), proportion of the same was calculated and considered as their availability. Plant species found within a 5 m radius of each nesting site was enumerated and proportion of the same was considered as utilization by turtles. Data on nest site with respect to distance from high tide line was measured using a flexible tape and nearest river mouth and village in most cases were recorded using a GPS.

Number of nests (estimated) along the beach surveyed during the study was calculated as

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

(Bhupathy and Karunakaran, 2003),

where N = total nesting, n = average nesting of the day/10 km, d = number of sectors surveyed, and t = study period (in days).

Preference of nesting sites by turtles with respect to ground vegetation was calculated based on the availability and utilization of ground vegetations.

$w = r/a$ and, further standardized as $B = w/\sum w$, where a = ratio of availability of one or combination of plant species and r = ratio of utilization of the locations with one or combination of plant species by turtles for nesting.

The beach was divided into various sectors such as 0–50 m, 50–100 m, etc, with respect to the distance from river mouth and village, and inland perpendicular to high tide line as 5 m, 10 m, 15 m, etc. Number of nests located in the above sectors was correlated with distance categories using Pearson correlation (SPSS, version 6).

RESULTS

Beach vegetation.– About 70% of the sample points had vegetation within 25 m from the high tide line. Major shore vegetations of the area were *Spinifex littoreus* followed by a mixture of *S. littoreus* and *Ipomoea pescaprae* (Fig. 2). Sand bars without any terrestrial vegetation was found near river mouth. About 50–100 m away from high tide line, *Casuarina* plantations and *Pandanus* were common. *Casuarina* plantations are a part of the coastal shelterbelt programme for protecting the mainland from natural calamities, such as cyclones. Human settlements and agriculture largely affect the area farther inland in the area. Major occupations of the inhabitants of the coastal villages are fishing, and their fishing boats were left on the shore itself. Nest predators, such as jackals (*Canis aureus*) and domestic dogs (*Canis familiaris*) inhabit the *Casuarina* plantations and human settlements, respectively.

Nesting and mortality.– A total of thirty eight turtle tracks was recorded in the fortnightly sampling from January to March 2004, of which 36 nests had eggs. Egg shells found nearby predated nests and signs of animals/humans indicated the status of the nest. Number of eggs in the nests robbed by humans was confirmed through interviews with villagers with the help of the field assistant from this study. Peak nesting was observed in the first fortnight of March (Fig. 3). Estimated number of nests for January–March was 540, which worked out to be 10.8 nests / km (Table 1).

Of the 36 nests observed, 25 (69.4%) were found depredated. Among the depredated nests, based on signs found nearby, jackals and domestic dogs contributed 54.2% and 33.3%, respectively, and human about 12.5% of the nests pilfered eggs. Native communities such as Irulas consume turtle eggs occasionally. Carcasses of 134 ridleys and five green turtles, *Chelonia mydas* were observed during this investigation.

Table 2. Relationship of nests of *Lepidochelys olivacea* with various habitat parameters along the southern Chennai coast, Tamil Nadu. SD= Standard deviation, n = sample size, r = correlation, p = significance.

Distance from nest (m)	Mean	SD	Range	Pearson correlation		
				n	r	p
Nearest village	758.6	586.7	10–2000	20	-0.443	0.050
River mouth	4783.3	3973.6	100–13000	44	-0.316	0.034
High tide line	17.2	21.01	0–100	11	-0.628	0.039

Table 3. Nest site preference of *Lepidochelys olivacea* with respect to ground vegetation along the southern Chennai coast, Tamil Nadu.

Beach vegetation	Proportion of availability *(a)*	Proportion of use *(r)*	Preference (w) Index	Standardised Index (B)
Spinifex littoreus	0.375	0.343	0.92	0.207
Ipomoea pescaprae	0.115	0.228	1.98	0.445
Mixed vegetation (*Spinifex* + *Ipomoea*)	0.210	0.086	0.41	0.092
Open sandy beach (No vegetation)	0.300	0.343	1.14	0.256

Nest depredation by both wild and domestic animals, and pilfering by humans have been reported in sporadic nesting areas along the Chennai (Whitaker, 1977) and Nagapattinam (Bhupathy and Karunakaran, 2003) coasts, and predation may be as high as 90% in localities such as the latter one. However, the present study area (southern Chennai coast) appears largely undisturbed with respect to illegal egg collection. Native communities, such as Irulas, occasionally use turtle eggs, but do not consume turtles, as done by the inhabitants around Gulf of Mannar (Bhupathy and Saravanan, 2003). Human consumption of turtle eggs is common throughout the nesting area of the ridleys, including the Indian coast (Frazier, 1980).

Factors such as beachfront illumination, topography, grain size of the sand, and vegetation may influence the selection of nest site by turtles (Mortimer, 1995). However, in general, studies on these aspects are scanty. Nest sites that provide optimum condition for developing eggs and hatchling dispersal are important for the survival of populations. In the present study, relationship between the nest location and distance from coastal villages was marginally significant, but negative (r = - 0.443, p = 0.05). This could be due to the limited impact of these coastal villages on nesting turtles as they were devoid of artificial illumination during night. It has been reported that artificial beachfront illuminations disorient both adults and hatchlings (Mortimer, 1995; Tripathy et al., 2003b). Selection of nest sites close to high tide line would have greater chance of inundation, but farther inland would result in higher predation of hatchlings during their emergence and movement towards the sea. Apart from this, sites further inland from the high tide line may be dry and this condition would lead to desiccation of eggs and poor hatching. Other factors, such as topography (elevation) of the beach, which were not studied during this study, may play a role in the selection of nest sites by turtles. Significant negative correlation (r = -0.316, p = 0.034, n = 45) between number of nests located in various distance categories from river mouth showed that turtles nested close to river mouth, and this corroborates the popular belief that ridleys largely nest close to river mouths. Factors such as grain size, moisture content and chemical nature of the sand would also be deterministic in this regard. However, further investigations are required on this direction.

Vegetation of the southern Chennai coast is largely psammophytes, which are similar to other parts of the east coast (Pandav et al., 1997; Bhupathy and Karunakaran, 2003). The role of beach vegetations in nest site selection by turtles is unclear, but views on the same are contradictory (see Mortimer, 1995). We speculate that the root of *Ipomoea pescaprae* may help bind the sand and prevent collapse of nests while under construction. The grass *Spinifex littoreus* has runners and grows in comparatively drier zones of the beach, and has a thick network of roots.

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