

An Overview of Wildlife Institute of India's Sea Turtle Research Program in Orissa

Bivash Pandav

Wildlife Institute of India

P.O. Box # 18, Chandrabani, Dehradun 248 001, Uttaranchal

Email: pandavb@wii.gov.in

Four species of sea turtles – olive ridley (*Lepidochelys olivacea*), green (*Chelonia mydas*), hawksbill (*Eretmochelys imbricata*), and leatherback (*Dermochelys coriacea*) – are reported to occur in the coastal waters off Orissa (Dash and Kar, 1990; Pandav, 2000). However, nesting of only one species, the olive ridley has been confirmed so far. The remaining three species are extremely rare in Orissa. The olive ridleys arrive in the coastal waters of Orissa by late October and early November. Mating takes place in the coastal waters during November and December followed by sporadic and mass nesting from January to April. Scientific research on sea turtles started in Orissa a little over two decades ago. Nevertheless, much of this has remained largely confined to the world's largest known sea turtle rookery at Gahirmatha. An estimated half a million ridleys have been recorded to lay their eggs at Gahirmatha (Dash and Kar, 1990). While most of the studies on sea turtles in Orissa concentrated on the Gahirmatha nesting population, little attention was paid to other sea turtle nesting beaches along the Orissa coast.

The Wildlife Institute of India's (WII) involvement with sea turtle research in Orissa started in 1993. During the 1993-94 sea turtle breeding season, the WII, in collaboration, with the wildlife wing of Orissa Forest Department, carried out a six month status survey of olive ridley sea turtles and nesting habitats along the Orissa coast (Pandav *et al.*, 1994a). Apart from documenting the sea turtle nesting and mortality all along the Orissa coast, this survey led to the discovery of a new sea turtle mass nesting beach near the mouth of river Rushikulya along the southern Orissa coast (Pandav *et al.*, 1994b). After the discovery of Rushikulya rookery, the WII initiated a long-term research and monitoring program all along the Orissa coast. The three mass nesting beaches in Orissa at Gahirmatha, Devi River mouth and Rushikulya together support a significant portion of the world's olive ridley population. Although the nesting population at Gahirmatha has been the focus of several studies over the past two decades, little is known about the turtles at the other two rookeries in

Orissa. This study was aimed at monitoring the turtle population all along the Orissa coast and addressing key issues related to their conservation.

The off shore aggregations of olive ridleys in the coastal waters off Gahirmatha as well as the nesting populations at the three rookeries were studied during 1995 – 1999. 1,767 olive ridley mating pairs were captured in the coastal waters off Gahirmatha of which 1,657 males and 1,616 females were double tagged using monel metal flipper tags. On the beach, 10,327 nesting females were tagged during the study. This study reveals that straight carapace lengths of males and females at Gahirmatha are $66.2 \pm 2.9_{sd}$ cm and $66.7 \pm 2.4_{sd}$ cm respectively. When compared with sizes from other populations, it appears that average lengths of carapaces and range of sizes obtained in this study are larger than other geographical regions. Both male and female olive ridleys showed strong fidelity to breeding ground. Ridleys tagged at Rushikulya rookery nested within 100 to 300 m (range of 0 to 1,000 m) during subsequent seasons. Nesting females also showed some degree of movement between nesting beaches, both within as well as between nesting seasons. The range of such inter-rookery movement of olive ridleys in Orissa varied from 35 to 320 km ($n = 6$). Recovery of 18 tagged turtles from Sri Lanka and three from southern Tamilnadu (Gulf of Mannar) provides a clue about the non-breeding areas of the olive ridleys nesting in Orissa. One-year remigration intervals were most common for recaptured ridleys of both sexes with second and third year intervals correspondingly less common. Tag recovery from dead turtles washed ashore on the Orissa coast also provided evidence of considerable movement in the coastal waters off Orissa.

The location of olive ridley mating pairs sighted during the study in the coastal waters off Gahirmatha were recorded and the extent of distribution was obtained by drawing a Minimum Convex Polygon (MCP) around the turtle locations. Mating pairs were found to be aggregated in an area of 52.58 sq. km (100% MCP) in the coastal waters off Gahirmatha and

the area of maximum utilisation was 27.52 sq. km (90% Harmonic Mean). All the sightings of mating pairs recorded during the study were within 5 km of the coastline. All the observed mating took place within a depth of 20 metres. Turtles nesting in Orissa showed a distinct temporal pattern of nesting with most of the nesting taking place during neap tidal nights. A drastic change in beach profile was observed at the Nasi rookery, Gahirmatha during the study. In total, 34,469 and 77,208 eggs were examined at Gahirmatha and Rushikulya rookeries, respectively, to determine the incubation success. The mean hatching and emergence success at Gahirmatha varied from 47.7% to 94.4% and 39.8% to 84.3% respectively. Similarly, the mean hatching and emergence success at Rushikulya varied from 83.8% to 97.01% and 69.78% to 96.1% respectively. The hatching success of the eggs laid at Rushikulya rookery was found to be significantly higher than that at Gahirmatha.

Of the two mass nesting beaches (Gahirmatha and Rushikulya) regularly monitored during the study, extensive beach erosion was observed at the Nasi rookery, Gahirmatha. Beach erosion resulted in loss of almost 59% of the total nesting area at Nasi rookery, Gahirmatha. The disorientation of turtle hatchlings due to lighting was prevalent at Rushikulya rookery. During the study, the Orissa coast witnessed an exponential increase in number of dead turtles. In total 46,219 adult olive ridleys were counted dead along the Orissa coast during the study. All the dead turtles counted during the study were adults. The number of dead turtles counted in the survey sectors showed a strong correlation with the number of mechanised fishing vessels operating in their respective coastal waters.

The findings of this study strengthen the case for establishing a network of protected areas for sea turtles along the Orissa coast. This study proves that olive ridleys in Orissa use more than one beach for nesting during and across breeding seasons. Based on the movement of turtles between nesting beaches and in the coastal waters off Orissa obtained during this

study it is proposed that the entire sea turtle population visiting Orissa coast should be considered as a single conservation unit. Therefore, protection of all the three mass nesting beaches as well as their coastal waters is extremely crucial for the survival of sea turtles in Orissa. Further, the analysis of incubation success data strengthens the importance of smaller rookeries like Rushikulya.

The large-scale mortality of adult turtles in Orissa recorded during the study is a matter of utmost concern and needs to be addressed immediately. The need for strengthening patrolling in offshore waters where turtle congregations occur and the use of TEDs are some of the steps that need to be taken up immediately. Turtle congregations elsewhere along the coast other than Gahirmatha need to be located so that adequate protection can be provided to the turtles in those offshore waters. Keeping in view the intensity of artificial illumination at Rushikulya rookery, the use of low intensity lights is suggested to mitigate the problem. Finally, this study recommends a continuous monitoring of the turtle population in Orissa.

References

- DASH, M.C., & C.S. KAR (1990). The Turtle Paradise - Gahirmatha. Interprint, New Delhi. 295 pp.
- PANDAV, B., B. C. CHOUDHURY & C. S. KAR (1994a). Discovery of a new sea turtle rookery along Orissa coast, India. Marine Turtle Newsletter 67, 15-16.
- PANDAV, B., B.C. CHOUDHURY, & C.S. KAR (1994b). Olive Ridley Sea Turtle (*Lepidochelys olivacea*) and its nesting habitats along the Orissa coast, India - A status survey. Wildlife Institute of India, July 1994.
- PANDAV, B. (2000). Conservation and management of olive ridley sea turtle (*Lepidochelys olivacea*) population along the Orissa coast. Unpublished Ph.D. thesis submitted to Utkal University, Bhubaneswar.