

Sea Turtles along the Gujarat Coast

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Introduction

The state of Gujarat is bestowed with the longest coastline in the country covering more than 1600 km. However, of four turtle species believed to occur in the state, only the Olive ridley (*Lepidochelys olivacea*) and Green turtle (*Chelonia mydas*) are reported to breed while Leatherback (*Dermochelys coriacea*) and Hawksbill (*Eretmochelys imbricata*) are seen occasionally (Bhaskar, 1978, Kar and Bhaskar, 1982 and Bhaskar 1984). Other than these studies, no recent status information on the breeding populations of these species is available. The geo-morphological condition of the coast has favoured industrial sectors to develop many ports, jetties, petrochemicals, oil refineries and pipeline terminals, mining industries, and cement factories to get transportation by sea. Impacts of industrial development on this coastal ecosystem are discussed by Sen Gupta and Deshmukhe (2000). Lack of studies and coupled with rapid industrial development necessitated this study to assess the status of breeding population of sea turtles along the Gujarat coast under GOI – UNDP Sea Turtle Project with the following objectives.

- To assess the breeding population status
- To identify existing threats and suggest conservation strategies.

Study approach

Prior to the intensive field survey, potential nesting sites, i.e., extent and distribution of sandy beaches were identified from 1:50,000 Survey of India (SoI) topo maps. A rapid questionnaire survey was conducted along the coastal villages to determine the current status of nesting beaches. To estimate the status of the breeding population, intensive field survey was conducted along the coast during night and day depending on accessibility between August

and December. This paper discusses the population status and predation threat with suggested conservation strategies.

Result

Distribution of major shore types

Out of 19 districts and 184 talukas of the state, 11 districts and 40 talukas actually share the coastline of the state. Based on SoI topo sheet, four major shore types have been identified such as: pure sandy shore (S), rocky shore with sandy patches (RS), marshy shore with sandy patches (MS) and pure marshy stretches (M). A qualitative assessment of different shore types showed that out of 40 talukas, only 12 talukas (30%) had pure sandy shore, which supposedly provide potential habitat for nesting. Nearly 45% of the talukas (18) fall under total marshy category, which is not suitable for nesting. Six are rocky shores and four are marshy shores with sandy patches.

Nesting population and density

A total of 676 nests were encountered during this survey, of which there were Green turtle 461 nests and the rest were of Olive ridley nests. Nesting of Leatherback (*Dermochelys coriacea*) and Hawksbill (*Eretmochelys imbricata*) were not recorded. Estimated nesting density of Olive ridley and Green turtle for the entire survey area was 0.44 and 0.94 nests/km respectively (**Table. 1**). Among the districts Jamnagar had the highest density of Olive ridley (0.81nests/km) and Green turtle (2.10 nests/km) nests. The second dominant district was Kachchh for Olive ridley (0.73) and Junagadh for Green turtle (1.32). In Kachchh and Bhavnagar coasts only Olive ridley nests were recorded. Irrespective of species, the overall estimated density of nests were 3 nests/km for Jamnagar followed by Junagadh coast (1.64) (Table 2).

Table 1. Nesting population and density for different districts

District	Distance Survey (km)	No. of OR Nest	Density	No. of GR Nest	Density	Total Nest	Density
Kachchh	83.50	61	0.73	0	0	61	0.73
Jamnagar	111.50	90	0.81	234	2.10	324	2.91
Junagadh	170.50	54	0.32	225	1.32	279	1.64
Amreli	25.00	3	0.12	2	0.08	5	0.20
Bhavnagar	100.75	7	0.07	0	0	7	0.07
Total	491.25	215	0.44	461	0.94	676	1.38

OR = Olive Ridley; GR = Green Turtle

Threats

Nest predation

Excluding Amreli and Bhavnagar data (due to low record) and 37 nest collected by the forest department for hatchery in Kachchh, 627 out of 676 recorded nests were used to assess the predation rate. Out of 627 nests recorded in three districts, 21% (131 nests) were predated by human and 36% (227) by animal. Estimated overall predation rate was 57%. The beach in Kachchh had sporadic nesting with all the 24 nests encountered being predated (100%). Comparison between Jamnagar and Junagadh showed, significantly more predation (75%) in Jamnagar. Turtle nests were under higher animal predation than human predation (Table 2).

Turtle mortality

During the survey, 37 dead turtles were encountered in different areas. The mortality rate estimated based on encounter rate per km showed comparatively high mortality in Kachchh coast (0.12 turtle/km). Despite their being no record of Green turtle nesting on the Kachchh coast, five fresh dead turtles were found. Species specific mortality showed comparatively high rate in Green turtles (0.06) than in Olive ridley (0.02) with the overall mortality rate of 0.08 turtle/km (Table 3) Other existing threats identified were the spread of oil particles, sand mining and sewage pollution. However these threats were recorded more frequently in Jamnagar and Junagadh coasts compared to other areas. A detailed quantitative study is needed to understand the magnitude and the significance of their impacts on the nesting population.

Table 2. Nest predation in different districts

Districts	Total nest	Human predation	Animal predation	Overall
Kachchh	24	37.50% (9)	62.50% (15)	100% (24)
Jamnagar	324	20.37% (66)	41.09% (136)	75.09 (202)
Junagadh	279	20.07% (56)	27.24% (76)	47.31%(132)
Total	627	20.89%(131)	36.20% (227)	57.09%(358)

Number of nest predated are given in parenthesis

Table 3. Turtles mortality recorded in different districts

Districts	No. of dead turtle recorded		Total	Distance covered	Mortality rate
	GR	OR			
Kachchh	5	5	10	83.50	0.12
Jamnagar	10	1	11	111.5	0.10

Junagadh	13	1	14	170.50	0.08
Amreli	0	0	0	25.0	
Bhavnagar	0	2	2	100.75	0.02
	28 (0.06)	9 (0.02)	37	491.25	0.08

Species specific mortality is given in parenthesis

Discussion

Among the districts surveyed, Jamnagar and Junagadh coasts provide potential habitat for nesting compared to other coasts. This estimate was lower than the earlier estimate (Bhaskar 1984) for the western part of Saurashtra Peninsula (between Okha to Veraval). No nesting of Leatherback (*Dermochelys coriacea*) and Hawksbill (*Eretmochelys imbricata*) were recorded during this survey. Turtle eggs are under predation by animals and human beings. Animal predation (36%) is more than human predation, which is higher than the estimates for Olive ridley (20-30%) in Rushikulya on the Orissa coast (Pandav *et al.* 1998). The estimated overall 57% predation rate will have significant impact on the survival rate of sea turtles on the Gujarat coast. Record of only 37 dead turtles with the encounter rate of 0.07 turtles/km showed mortality due to incidental catch along this coast was very low. However this needs an inepth study..

Conservation strategy

- Public awareness should be created keeping fisherfolk, NGOs, local students and coastal industrial based working people as target groups.
- Involvement of local people for the continuous monitoring of nesting population survey during the entire nesting season would provide good data base and also help in conservation activities.

- For the entire Jamnagar and Junagadh coast, the only turtle hatchery centre is at Madhavpur. Therefore one more hatchery is suggested for Jamnagar coast.
- Training programme for the forest field staff and local villagers in turtle hatchery management will improve the hatching success and thereby increase the survival rate.

Reference

BHASKAR, S. (1978) Note from the Gulf of Kutch. Hamadryad 3: 9-10.

BHASKAR, S. (1984) *The distribution and status of Sea Turtles in India*. Proceeding of the workshop on Sea Turtle Conservation: CMFRI publication. No: 18.

KAR, C.S. & S. BHASKAR. (1982) The status of Sea turtles in the eastern Indian Ocean. Pp:365-373. In: *The biology and Conservation of Sea Turtles* (ed. K.A. Bjorndal), Smithsonian Institution Press, Washington D.C.

PANDAV, B., B.C. CHOUDHURY & C.S. KAR (1997) Mortality of Olive ridley (*Lepidochelys olivacea*) due to incidental capture in fishing nets along the Orissa coast, India. Oryx 31 (1): 32-36.

SEN GUPTA, R. & G. DESHMUKHE (2000) *Coastal and Maritime Environments of Gujarat: Ecology and Economics*. Gujarat Ecological Society, Vadodara, Gujarat. 150 pp.