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Sea Turtles of Maharashtra and Goa

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Daniel (1983) listed three species of sea turtles in Maharashtra—hawksbill turtles, green turtles and loggerhead turtles. Later, Bhaskar (1984) and Das (1985) reported the presence of olive ridley turtles. Green turtles and olive ridleys are known to nest in Maharashtra in small numbers (Shaikh 1983, Gole 1997). Goa, a small neighbouring state to the south, has records of three species of sea turtles—olive ridleys, leatherbacks and green turtles. Records have been kept of olive ridley and leatherback nesting in Goa (Kar and Bhaskar 1982, Bhaskar 1984, Das 1985), but recent records indicate the nesting of only olive ridleys. Studies on sea turtles in India have mainly focussed on the east coast; very little information is available on occurrence and nesting sites on the west coast. In view of the decline in sea turtle populations, a survey was carried out along the coasts of Maharashtra and Goa from March 2000–March 2001 to evaluate their current status.

Study Area

MAHARASHTRA

From its border with Gujarat in the north, to its border with Goa in the south, the coastline of Maharashtra covers about 720 km (Figure 1), with five coastal districts—Sindhudurg, Ratnagiri, Raigad, Thane and the urban area of Mumbai (Gole 1997). The main occupation of the coastal people is fishing.

GOA

Goa has a coastline of 160 km, bounded by the coastlines of Maharashtra to the north and Karnataka to the south (Figure 1). The state is divided into only two districts, South Goa and North Goa. The beaches of Goa are prime tourist destinations and are usually highly populated; in fact, the tourist season lasts from October to May, which encompasses the sea turtle nesting season. The main occupation of the coastal people is fishing; mechanised fishing methods are intensive along the entire coast.

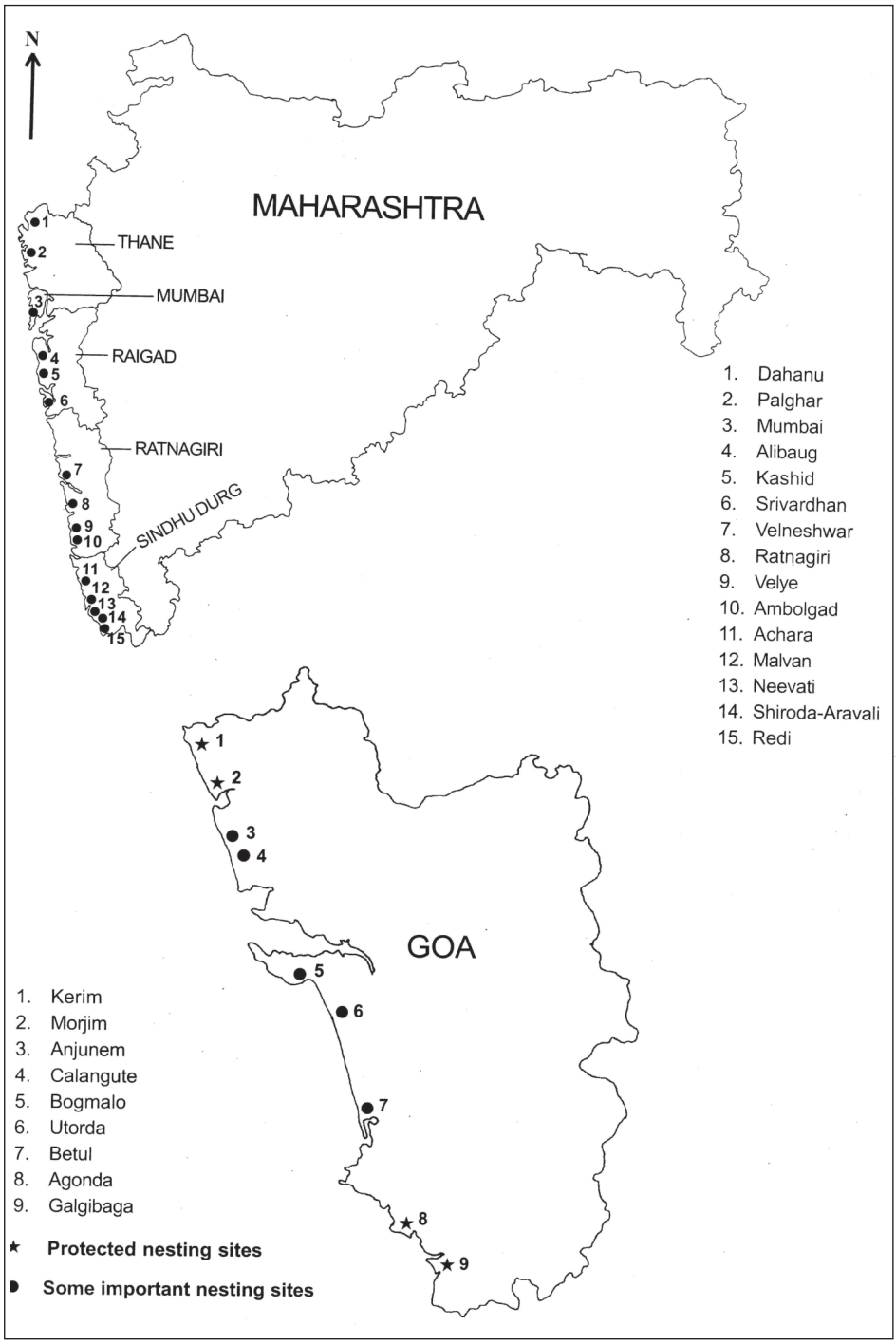

Figure 1. Coastal districts of Maharashtra and Goa, indicating some important nesting beaches.

Methodology

Preliminary information was gathered from local communities, fisher folk, trawler owners and workers, fisheries and forest department personnel, and non government organisations. (During this initial interaction, colour photographs of sea turtles were shown to the interviewees to identify species.) In the case of local people and fisher folk, at least three persons were interviewed at each site , and the name and address of at least one person from every site was recorded. Fish-landing sites were also visited and information on incidental catch was recorded from trawler owners and workers. Additionally, press reports on sea turtles were published in local newspapers. Information was also collected by distributing 'reply-paid' postcards in select areas, either during or after the surveys. The surveys were carried out in two phases.

***First Survey**:* A preliminary survey was carried out from 13–31 May 2000 to collect baseline information. Nine localities in Goa and 29 localities in Maharashtra were visited at this time. The coasts of Mumbai, Thane and some parts of Raigad district are highly disturbed, and only some localities were visited in these districts. The less-populated and undisturbed beaches of Ratnagiri and Sindhudurg were covered more extensively.

Second Survey: The second survey was carried out six months later, from 4–22 December 2000, during the breeding season. In most cases, the beaches were covered at night and early morning to check for nesting activity and tracks. Three localities in Goa and 43 localities in Maharashtra were visited. This survey was site-specific, and the selection of sites was based on data collected during the first survey and from information received during feedback.

Results

MAHARASHTRA

Based on information received from 60 localities along the five coastal districts, there are confirmed reports of the occurrence of olive ridleys, green turtles, leatherbacks and hawksbills. The olive ridley is the most common species, followed by green turtles, leatherbacks and hawksbills. Sporadic nesting is reported from all the sites (Table 1). On average, about two to three nests were reported from all the localities visited by us during the survey. The nesting season commences in December and extends till March. Some locals of Thane and Raigad districts reported nesting during the monsoon months, i.e. from June to September, but during our study no nesting was reported at this time. The locals differentiate green turtles and olive ridleys from their size, shape of carapace, and sometimes even from the number of scutes and colouration.

Olive ridley turtles

The occurrence and sporadic nesting of olive ridleys is reported along the entire coast of Maharashtra and in all the localities visited in the survey (Table 1). Local fisher folk and trawler-workers reported that these turtles get entangled in their fishing nets. According to them, olive ridleys are seen throughout the year in the sea and recent sightings were reported from most landing sites. During this survey, five carapaces and three dead olive ridleys were seen in different zones (Table 2).

Table 1. Records of nesting of sea turtles in Maharashtra and Goa.

District	Locality	Species	Poaching
Maharashtra			
Thane	Bordi, Gholvad, Dahanu, Chinchner, Shirgaon, Arnala, Vasai	olive ridley	No
Mumbai	Manori, Gorai, Versova, Worli, Vashi Creek	olive ridley, green turtle	No
Raigad	Mandve, Kihim, Nagaon, Revdanda, Korlai, Kashid, Nandgaon, Murud, Nanvali, Borli, Srivardhan, Hareshwar	olive ridley, leatherback	Yes
Ratnagiri	Ade, Anjarla, Harne, Burondi, Dabhol, Guhagar, Velneshwar, Hedavi, Sakhareagar, Nandivade, Sandkhol, Nevare, Varavade, Ganapatipule, Ratnagiri, Gavkhadi, Poorngad, Vetye, Ambolgad, Vijaydurg, Devgad	olive ridley, green turtle	Yes
Sindhudurg	Kunakeshwar, Achara, Vayangani, Tondavali, Talashil, Kolamb, Malwan, Tarkarli, Neevati, Khavane, Kelus, Mochemad, Shiroda-Aravali, Shiroda-Kerwada, Redi	olive ridley, green turtle, leatherback	Yes
Goa			
North Goa	Morjim, Kerim, Panaji, Calangute, Harmal, Ashvem, Kegdeveler, Anjunem, Siridao, Arambol, Agonda	olive ridley, leatherback	Yes
South Goa	Galjibaga, Malim, Polem, Bogmalo, Utorda, Arrorim, Betul, Talpona	olive ridley	Yes

Table 2. Number of carapaces and dead turtles encountered during field survey.

	Mean SCL	Range	Number
Olive ridleys	67.9 (3.8)	62.7–73 cm	8
Green turtles		40–50 cm	2
		60–70 cm	2
	94.1 (5.1)*	80–100 cm	5
	Overall (green turtles)	44.5–100.3 cm	9

* Mean within this size class.

Some recently confirmed nesting sites are the beaches of Shiroda–Aravali, Mochemad, Neevati, Khavane, Tondavali, Achara, Vetye, Ambolgad, Hareshwar and Kashid Sarva. Most of these beaches are about two to four km in length and are not highly populated. An 8-km stretch between Shiroda–Neevati and a 12-km stretch between Malwan–Achara in Sindhudurg district may be important nesting beaches for the olive ridley, as reports of nesting in this region were higher than in others.

Ten years ago, there were reports of seven to eight nests in a single night during the breeding season, in sites like Tondavali and Talashil. But in the entire breeding season of 2000–01, only two nests were reported from these villages, which might imply a decline in the population in the recent past. Apart from this, the undisturbed beaches of Vetye and Ambolgad in Ratnagiri district, and Hareshwar and Kashid-Sarva in Raigad district are also relatively important nesting sites as five to six nests have been reported here during each breeding season.

Green turtles

The occurrence of this species is reported along the entire coast of Maharashtra but nesting is sporadic and reported from only a few localities (Table 1). Sightings are mostly reported by trawler-workers, who say that the turtles are associated with rocky areas where they feed on algae. Recent sightings have been reported from some localities in Sindhudurg and Ratnagiri districts. In two villages, Neevati and Khavane, close to Malwan in Sindhudurg district, seven carapaces of green turtles were seen. These were discarded as incidental catch in fishing nets. According to the fisher folk, these turtles are also caught in traditional nets like *rampan* and gill nets. Some people indicated that the species is seen in large numbers during November and December. In the first week of June 2001, a juvenile green turtle (straight carapace length 9 cm) was collected by a fisherman after it was caught in his fishing net in Vashi creek near Mumbai. Altogether, nine carapaces were seen, of which two were of juveniles (Table 2).

The nesting density of green turtles is lower than that of olive ridleys. Out of the 60 beaches surveyed, nesting of green turtles was reported from only 14 localities; of these nine were from Sindhudurg and four from Ratnagiri. These nesting beaches are Kelus, Neevati, Khavane, Tondavali, Talashil, Vayangani, Achara, Kolamb and Machemad in Sindhudurg district, and Nevare, Varavade, Vetye and Ambolgad in Ratnagiri district.

Leatherback turtles

This species is uncommon in Maharashtra with sporadic sightings along the entire coast and old nesting reports from two localities (Table 1). Sightings are mostly reported by trawlers while fishing in deep sea. Fisher folk from Kelus, Achara and Malwan in Sindhudurg have reported recent sightings of this species at sea. A fisherman at Achara reported that a leatherback nested there about ten years ago; he remembered its large size and ridges. An old fisherman from Kashid, in Raigad, also claimed to have seen this species nesting about 15 years ago.

Hawksbill turtles

This species also appears to be rare. Some locals of Khavane (Sindhudurg) reported having seen this species ten years ago, identifying the species from photographs. A few trawler-workers from Malwan and Ratnagiri claim to have seen this species in their waters.

GOA

Occurrences of olive ridleys, green turtles and leatherback turtles have been reported in 19 localities in Goa, from which information was received. Olive ridleys are common, but sightings of green turtles and leatherbacks are sporadic. October to March is reported to be the breeding season; nesting was reported from 18 of the 19 localities surveyed.

Except for some reports of nesting of leatherbacks at Morjim, all other records were of olive ridleys.

In Goa, there is greater general awareness of sea turtles than in Maharashtra, due to media exposure, actively supported by the forest department. However, during the surveys, most people were unwilling to volunteer information. The Goa forest department has initiated a sea turtle conservation movement, with the help of the local people, by protecting nesting sites of turtles in some areas. The department deploys two forest guards and some volunteers to assist them. Their duty involves locating nests, *in situ* protection and maintenance of data on nesting. A temporary fence is erected around each nest till the hatchlings emerge, at which time they are collected and released.

Most beaches in Goa are peopled with sun-bathing tourists, with the additional paraphernalia of restaurants and souvenir shops. However, nesting beaches (where turtle conservation is practiced) are not popular tourist spots and are less populated.

Morjim is a small village in northern Goa, with a two-km-long beach. On the southern side of the beach is the Chapora River, which flows into the Arabian Sea. The beach has undisturbed sand dunes and is bordered by coconut and *Casuarina* plantations.

Goan sea turtle conservation efforts were initiated in Morjim. The locals here once regularly poached turtle eggs for consumption. In 1996, a retired army officer, Captain Gerald Fernandes, initiated the sea turtle conservation movement by protecting nests *in situ*, with the help of local villagers. During the breeding season of 1997–98, only five nests were protected, near the river mouth. The following year, protection was provided to eight nests, and in the year 2000–01, 30 nests were protected (Table 3). Local turtle-enthusiasts also reported seeing a clutch of hatchlings with white spots, matching the description of leatherback hatchlings.

Galgibaga is a small village in southern Goa. To the south, its beach is bounded by the Galgibaga River, which flows into the Arabian Sea. This two-km stretch of beach is backed by sand dunes with dense *Casuarina* plantations. The main occupation of the villagers is fishing, toddy-tapping and farming.

The sea turtle conservation movement at Galgibaga started in 1999. A priest from the local church took the initiative by involving local people and school and college students. Former egg poachers were also included in this conservation programme. The forest department supports the movement by providing financial as well as moral support. In 1999, ten nests were protected, and in the next breeding season (2000–01), protection was given to 33 nests (Table 3). Five of the 2000–01 nests were translocated from Talpona, a nearby village where egg depredation is high.

Agonda lies to the north of Galgibaga and its beach is also about two km in length. The main occupation of the locals is fishing. In the breeding season of 2000–01, the locals saw a nesting turtle and informed the forest department. With the help of a local politician, the turtle conservation movement was initiated and ten nests were protected.

Kerim is located in northern Goa and its beach is about three km in length, bounded by a river to the north, and to the south by rocky land that projects into the sea. This is backed by *Casuarina* plantations. Nesting of turtles had been previously recorded from

this area, but the locals poached most of the nests then. In 2000–01, a single nest was located and protected by the forest department (Table 3).

Apart from the four above-mentioned sites, some other important nesting sites which have reported recent nesting during the surveys are Harmal, Ashvem, Anjunem, Calangute, Kegdeveler, Siridao, Bogmalo, Utorda, Arorrim, Betul and Talpona. Egg depredation is high in these localities, and these beaches need to be brought under the sea turtle conservation movement in Goa.

Table 3. Breeding success of olive ridleys in Morjim, Galgibaga and Agonda.

Breeding Season	**No. of nests**	**Mean no. of eggs** (X±SD)	**Mean breeding success %** (X±SD)	**Mean no. of days for hatching** (X±SD)
Morjim				
Sept. 1997–March 1998	5	125 ± 43.4	70.6 ± 32.0	51.4 ± 2.1
Nov. 1998–May 1999	8	99.37 ± 13.39	54.23 ± 26.58	58.75 ± 7.72
Oct. 1999–May 2000	14	115.1 ± 13.89	62.78 ± 23.22	51.1 ± 2.72
Oct. 2000–April 2001	30	116.2 ± 26.75	69.73 ± 1788	51.1 ± 1.56
Galgibaga				
Nov. 1999–March 2000	10	103.75 ± 15.23	79.63 ± 22.11	54.37 ± 1.76
Sept. 2000–April 2001	33	108.59 ± 29.7	74.59 ± 22.64	56.93 ± 8.35
Agonda				
Dec. 2000–April 2001	9	94 ± 23.72	84.89 ± 8.13	52.12 ± 3.51

(Source: Goa forest dept. (with modifications))

Threats

POACHING OF EGGS

Poaching of eggs is a major hazard in all the localities surveyed in Maharashtra, and in the non-protected beaches of Goa. Local people consume the eggs, and 10–15 years ago, when nests were abundant, eggs were even sold in the local markets. In areas where large numbers of turtles once nested, people moved in groups along the beach to collect the eggs at dawn. A tradition in some localities in Maharashtra spoke of leaving five eggs in each nest after the collection of eggs, but this tradition has now changed (only one egg is kept in the nest), and in some places has completely died out.

POACHING OF ADULT TURTLES

Sea turtles are generally not killed by fisher folk in Maharashtra and Goa due to religious association—the turtle is believed to be an incarnation (the *kurma avatar*) of Vishnu. Hence, most sea turtles are immediately released if caught in fishing nets. However, some killing of adults does occur, the extent varying in different localities. Poaching was reported from most localities in Ratnagiri district. In Velneshwar, the freshly cut carapace of an olive ridley was seen. In most fish-landing sites in this district, live turtles are sold for Rs 200–500 each, depending on their size. In Sindhudurg, killing of turtles was reported from only two villages, Neevati and Khavane.

In Goa, several fisher folk stated that sea turtles were killed for their meat. In some places, there were even reports of nesting turtles being killed. The meat is mostly distributed among the locals, and only sometimes sold in local markets. In recent years, turtle poaching has been reduced due to awareness generated by the forest department.

INCIDENTAL CATCH IN FISHING NETS

Another major threat to sea turtles is from incidental catch in fishing nets, mostly trawl nets. According to information obtained from locals in different areas, on average five turtles are caught in fishing nets, per trawler per year. Turtles also get caught in traditional nets (*rampan*) used by the local fisher folk. In some places, turtles are released immediately from the nets. However, turtles caught accidentally in Ratnagiri district are said to be either consumed or sold. Around two or three dead turtles are reported every year in all the localities visited, most of which are likely to have died as incidental catch.

According to locals, about 25 green turtles were caught in fishing nets in two months (October–November 2000) between Neevati and Khavane near Malwan. Most of them were released but a few died due to drowning. One local from Khavane said that about ten turtles died in fishing nets in his area during October 2000. According to some fisher folk in both Goa and Maharashtra, as trawlers come close to the shore to fish, turtles tend to get trapped in the nets. In Goa, incidental catch in fishing nets is regularly reported; in two months, six turtles were trapped in the fishing nets of four trawlers. During our surveys, dead turtles or their carapaces were encountered at various sites.

While interacting with the trawler owners during our surveys, we found that very few are interested in using turtle excluder devices (TEDs) in their nets. Most of them are aware of turtle conservation activities, but many are unaware of the TED.

DEVELOPMENTAL ACTIVITY ALONG THE COAST

The coast of Mumbai is highly populated and polluted. The main threat to the sea turtles here is from developmental activities like the construction of new buildings and illumination. Another threat is from oil and chemical pollution and sewage. Due to this, nesting of turtles has not been seen during the last five years at most sites in Mumbai, and parts of Thane and Raigad districts.

Tourism activities like the construction of hotels and resorts have resulted in the widespread illumination of beaches in Goa. This have also resulted in the accumulation of non-biodegradable waste on the beaches. Late-night parties on the beach also affect nesting, as loud music and glaring lights scare away the turtles. Recently an effort was made by the electricity department to illuminate the road near the beach in Morjim, a protected olive ridley nesting site—but was not carried through, due to strong opposition by conservationists.

Recommendations

The sea turtle conservation movement that has started in some areas of Goa should be extended to other areas in the state; such movements also need to be introduced in some districts in Maharashtra. Recently, a sea turtle conservation programme has been

initiated at Chiplun, Ratnagiri district. In Goa, development on nesting beaches—like the construction of large resorts, illuminating of beaches for discos, clubs, etc—should be stopped or controlled during the breeding season. Educational programmes to build awareness of sea turtles and other marine fauna should be implemented or intensified in schools and coastal villages.

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