

Chapter 3

The status of sea turtle populations on the Maharashtra and Goa coasts of India

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INTRODUCTION

Maharashtra and Goa, on the west coast of India, are also rich in the diversity of sea turtles. Daniel (1983) listed three species viz., hawksbill, green turtle and loggerhead in Maharashtra's waters. Later Bhaskar (1984) and Das (1985) reported the olive ridley turtle. But recent survey showed that except the loggerhead, all the other four species are reported from Maharashtra (Giri and Chaturvedi, 2003). Goa, Maharashtra's southern neighbouring state, is also rich in the diversity of sea turtles, where olive ridley, leatherback and green turtles are reported. The olive ridley is known to nest sporadically along the entire coast of Maharashtra. There are some reports of nesting of green turtle also (Shaikh, 1983; Gole, 1997; Giri and Chaturvedi, 2003). There are also records of the nesting of olive ridley and leatherback turtles in Goa (Das, 1985; Bhaskar, 1984), but recent nesting records are only of olive ridleys (Giri and Chaturvedi, 2001). In Goa, the Forest Department has been protecting some sea turtle nesting beaches with the help of local people from 1997 (Giri and Chaturvedi, 2001). In Maharashtra, a sea turtle conservation movement was started by an NGO, Sahyadri Nisarga Mitra (SNM) in 2002. In the first year, the SNM started their work in one village and have now spread to 13 villages from three coastal districts of Maharashtra (Katdare and Mone, 2003).

Most studies on sea turtles in India have mainly focused on the east coast and little information is available on the population on the west coast. During this survey, monitoring was carried out on some of the potential beaches in Maharashtra. The major threats to sea turtles in Maharashtra are from poaching of eggs and incidental catch in fishing nets. The threats in Goa are mostly from incidental catches in fishing nets and developmental activities along the beach. Recently, due to the efforts of the Forest Department in Goa and SNM in Maharashtra, there is a change in the attitude of local people towards the sea turtles. In some localities, they are helping to protect sea turtles and their nests. Apart from this, locals are also collecting data related to nesting on their beaches. This information will be essential for long term monitoring. Today these activities are restricted to few sites, but they are fast spreading to other localities which will surely help conserve sea turtles in Maharashtra and Goa.

STUDY AREA

Maharashtra

From the border of Gujarat on the north, to the border of Goa on the south, the coastline of Maharashtra covers about 720 km. This region has five coastal districts, Sindhudurg, Ratnagiri, Raigad, Thane and the urban area of Mumbai. The main occupation of the people on the coast is fishing and agriculture. In small villages fishing is mostly carried out by using traditional methods. Apart from this, mechanised fishing is also intensively carried out along the entire coast. There is sporadic nesting of olive ridleys along the entire coast with a few good nesting beaches in Sindhudurg and Ratnagiri districts (Giri and Chaturvedi, 2003). Most of these beaches are sparsely populated and low in fishing activity.

Goa

Goa is a small state on the west coast of India with a coastline of 160 km, bounded by Maharashtra to the north and Karnataka to the south. Of the 160 km of coastline, about 65 km are sandy beaches, which are suitable for nesting. The state is divided into two districts, South Goa and North Goa. The main

occupation of the people on the coast is fishing. Mechanised fishing is carried out intensively along the entire coast of Goa. Most of the beaches of Goa are highly populated as they are the important destinations for Indian and foreign tourists. The tourist season in Goa is from October to May, which coincides with the breeding season of sea turtles. A few beaches, with low influx of tourists, are known for sea turtle nesting. Of these, three beaches – Morjim, Galgibag and Agonda – are protected by Forest Department, especially during the breeding season.

METHODOLOGY

Monitoring

One of the objectives of this project was to monitor nesting sites to assess the conservation status of different species of sea turtles. There are confirmed reports of nesting of olive ridleys in Malwan in Sindhudurg district (Giri and Chaturvedi, 2003). Hence, during the first phase, a 50 km stretch of sparsely populated beaches near Malwan in Sindhudurg district (Fig. 3.1) was monitored from February to April 2004. There are 21 villages / beaches in this stretch and on an average three visits were made to each site during the survey period. During each visit, the entire beach was surveyed two times. Early morning surveys were carried out to check for signs of nesting. Night surveys were carried out to check for fresh nesting. Information regarding beach profile and mortality was also collected. Interactions with locals, especially fishermen, were used to collect information on incidental catch in fishing nets and offshore sightings of dead or live sea turtles. Along with these interviews and discussions, slide shows were arranged to increase general awareness towards conservation of nature, focusing on sea turtles as flagship species. These shows were mainly arranged for local communities in coastal villages.

In the second phase, from October 2004 to March 2005, monitoring was restricted to the beaches where sea turtle conservation is being carried out. These beaches were mostly in the Ratnagiri and Raigad districts; all sites were selected by Sahyadri Nisarga Mitra (SNM). According to some locals, there were reports of sporadic nesting of sea turtles in the monsoon on some of the beaches in Sindhudurg district. These localities were surveyed during the monsoon of 2005 but no nesting was reported.

In Goa, the coastline is comparatively small and most of the beaches are highly populated. Olive ridleys are known to nest on some of the sparsely populated beaches (Fig. 3.2). There are a few sites where Forest Department with the help of locals is protecting the nests of olive ridley. Information on sea turtle nesting was collected by the Forest Department and locals at these sites. Data was also collected on threats, effect of tourism on nesting sites and local people's perspectives towards sea turtles from 32 beaches in Goa. This information was mainly based on the interviews with local coastal villagers, trawler owners and workers, officials of Forest Department, Indian and non-Indian tourists and people linked to the tourism business. Based on the information collected during these interviews, points were attributed to each beach and the data is graphically represented.

Networking

The major threats to sea turtles in Maharashtra are from the poaching of eggs and incidental catch in fishing nets. The threats in Goa are from incidental catch in fishing nets, developmental activities along the beach and poaching of eggs. We interacted with different NGOs, village leaders and villagers, schools and colleges to make them aware about sea turtles and encouraged them to participate in sea turtle conservation, which is slowly spreading on the coast of Maharashtra.

The local NGOs involved in this activities were Sahyadri Nisarga Mitra (SNM), Chiplun in Maharashtra and Green Cross in Goa. Both these NGOs actively carried out awareness campaigns in both the states. To promote the sea turtle conservation activities of SNM in Maharashtra, BNHS provided a small grant through the Salim Ali Nature Conservation Fund during the breeding season of 2004. A one day workshop was also conducted in Maharashtra and was attended by 62 stakeholders. These were mostly local NGOs, Forest Department officials, local villagers, teachers and students.

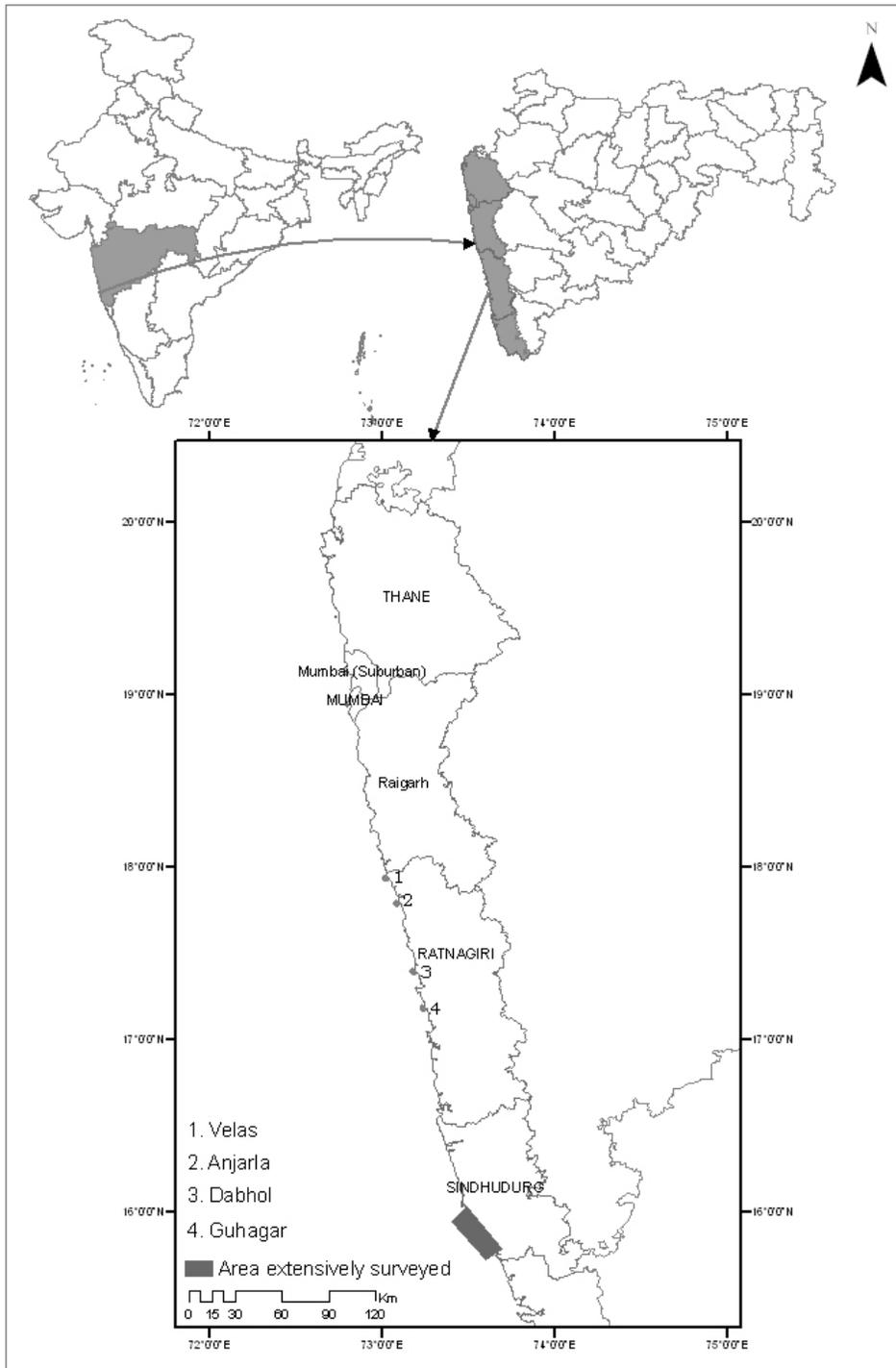


Fig: 3.1 Some Important nesting sites of sea turtles in Maharashtra

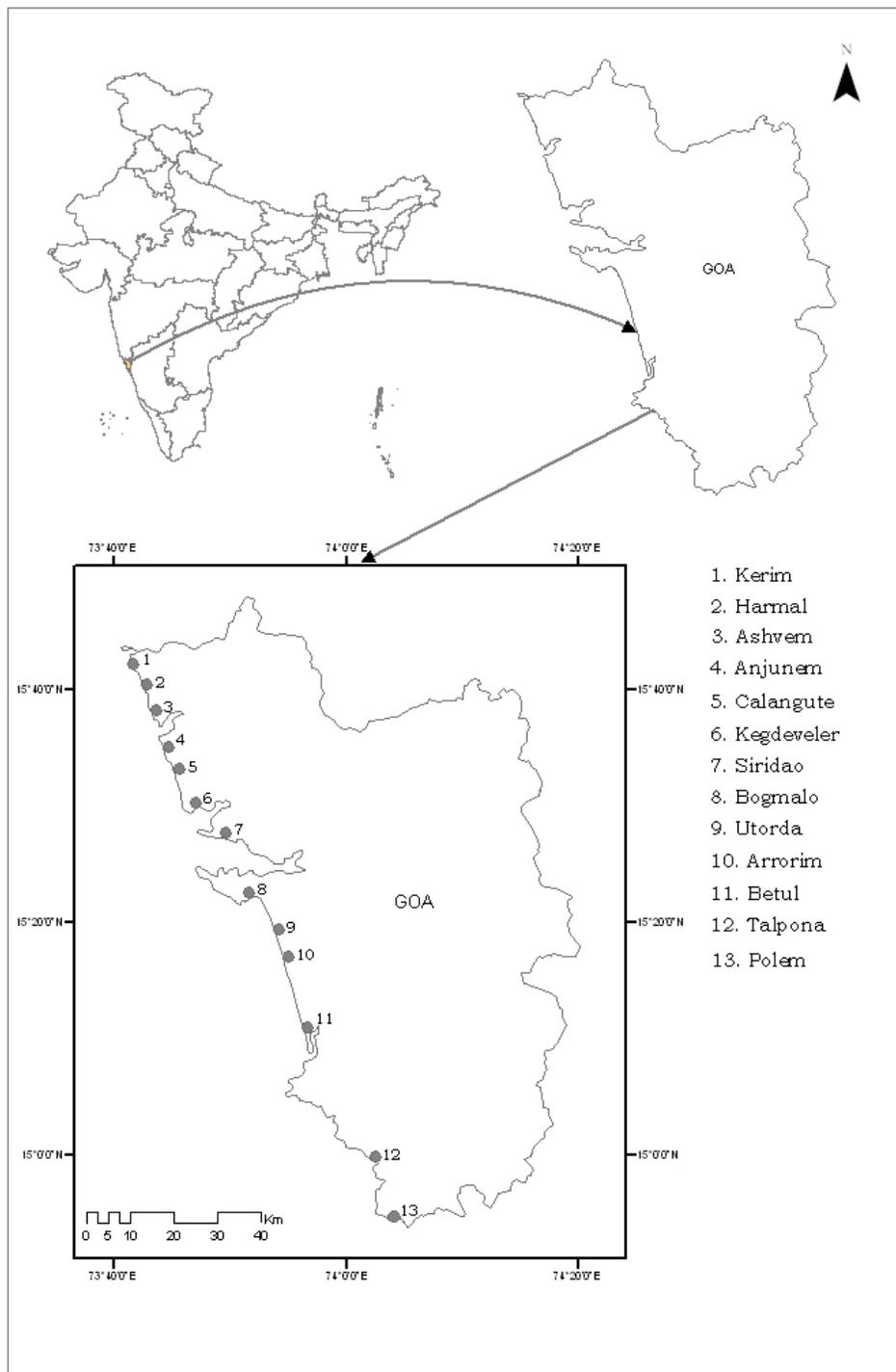


Fig: 3.2 Some Important nesting sites of sea turtles in Goa

RESULTS AND DISCUSSION

Monitoring in Maharashtra

In Maharashtra, the nesting season is from October to March and there are reports of sporadic nesting of olive ridleys from the entire coast. The potential areas for the nesting of olive ridleys in Maharashtra are mostly in Sindhudurg and Ratnagiri districts (Giri and Chaturvedi, 2003). Hence sites were selected for intensive monitoring in these two districts.

Phase I – Nesting

For the first phase, monitoring was carried out from January to April 2004. We selected a 50 km stretch of sparsely populated beaches near Malwan, the southernmost part of Sindhudurg district (Table 3.1). Apart from a large fish landing centre like Malwan, most of the beaches are sparsely populated. There are 21 villages / beaches in this stretch. The longest of all these beaches was Vengurla (6 km) and shortest was Kille Niwati (0.5 km). Apart from this, six potential sparsely populated beaches in Ratnagiri district were also surveyed. There were fresh nesting reports from these beaches in the recent past. About two visits were made to each of these sites during the survey. We recorded only two fresh nests from the entire stretch of 50 km during this survey. On February 2, 2004, we saw fresh track marks and one exposed nest at Achara, likely poached by local people. There are also reports of sand mining from this beach. At Tambaldeg, we saw one more fresh mark and an undisturbed nest on February 1, 2004. This is one of the villages where the Forest Department protects nests with the participation of local people. This is a small village with a 3 km long beach. The beach is about 500 m from the village and is backed by *Casuarina* plantations and sand dunes. Traditional fishing is carried out in this village and locals consume turtle eggs. On January 23, 2004 we saw one predated nest, probably by stray dogs at Guhagar in Ratnagiri district.

The maximum number of nests was recorded at Velas. This beach is about 2 km in length, and is backed by *Casuarina* plantations. The village is about 1 km away from the beach. The main occupation of the people of this village is agriculture. The people of this village do not eat sea turtle meat but collect and eat turtle eggs. There is a small stream between the village and the beach which gets flooded during high tide. The village is separated from the beach during this period. Thus it is largely a secluded and undisturbed beach. The main threat to the sea turtle nests on this beach is from predation by jackals. On January 22, 2004, we recorded three predated and one partly predated nest. Sahyadri Nisarga Mitra (SNM) started sea turtle conservation on this beach in 2002 with the help of the local community. In 2002-2003, they reported 50 nests on this beach. All the nests were relocated into a hatchery. Out of 5372 eggs from 50 nests, 2734 hatchlings were released with the hatching success 50.89% (Katdare, 2003). In 2003-2004, a total of 30 nests were protected on this beach by SNM. Of 3028 eggs, 1500 hatchlings were released. During 2003-2004, SNM also protected five nests in Murud, Saldure and Anjarla, all in Ratnagiri district.

Mortality

The main threat to adult sea turtles is from incidental catch in the fishing nets. During this survey period of four months, we recorded 39 dead turtles from the stretch of 50 km. Of these, there were 28 olive ridleys and 11 green turtles (Table 3.1). We checked for external injuries, but apart from small cuts on the flippers in a few turtles, there was no evidence of injury, suggesting that most died due to asphyxiation. The locals also believe that the cause of the death could be incidental catch in fishing nets. Compared to other parts of the Maharashtra coast, there are very few villages in the Sindhudurg district where sea turtle meat is consumed by some people. Most fishermen release the turtle immediately if they get caught in their fishing nets. And if the turtle is already dead, they are thrown into the sea. The fishermen also reported the sighting of many dead turtles at sea.

Table 3.1: Sites visited during first phase

Name of the beach	Sightings / nesting	Remarks
District: Sindhudurg		
Kolam - Chivala	2 olive ridleys	SCL 13.50 & 27.00
Dandi / Nishankathi	Olive ridley	SCL 28.00
Devbag-Tarkarli	Olive ridley Green turtle	SCL 26.00 SCL 25.00
Bhogave	3 olive ridleys	SCL 50.00, 32.00 & 35.00
Achara	Olive ridley Green turtle	SCL 29.00 SCL 26.00
Tondavali	2 green turtles	SCL 25.00 & 27.00
Talashil	Olive ridley Green turtle	SCL 40.00 SCL 29.00
Tambaldeg	2 olive ridleys Green turtle	SCL 25.00 & 28.00 SCL 26.00
Morve	-	
Kemundale	Olive ridley 2 green turtles	SCL 28.00 SCL 32.00 & 26.00
Vengurla	3 olive ridleys Green turtle	SCL 28.00, 30.00 & 24.00 SCL 37.00
Velaghar -Arawali	2 olive ridleys	SCL 33.00 & 27.00
Mochamad	-	
Taank	Olive ridley	SCL 35.00
Vayangani / Dabholi	Olive ridley Green turtle	SCL 24.00 SCL 31.00
Khavane	2 olive ridleys Green turtle	SCL 27.00 & 29.00 SCL 28.00
Faliyefonde	Olive ridley	SCL 29.00
Kondur	Olive ridley	SCL 26.00
Kelus	Olive ridley	SCL 30.00
Neevati	2 olive ridleys Green turtle	SCL 31.00 & 25.00 SCL 27.00
Kille Niwati	-	
District: Ratnagiri		
Gavkhadi	-	
Ganeshgule	-	
Guhagar	One nest	Damaged
Hedavi	-	
Velaneshwar	-	
Velas	4 nests	3 predated and 1 partly predated

SCL - Straight Carapace Length

Phase II Nesting

As the nesting frequency is very low on the entire coast of Maharashtra, as indicated by phase I of monitoring, we employed a different monitoring technique for the second phase from October 2004 to March 2005. In this phase, monitoring efforts were concentrated on beaches where sea turtle conservation activities were taking place. All these sites were selected by Sahyadri Nisarga Mitra (SNM). The selection of these site was based mainly on the number of recent nesting reports and the response of local people towards sea turtle conservation. A total of 10 villages, two from Raigad, seven from Ratnagiri and one from Sindhudurg district were selected for monitoring (Table 3.2).

The main threat to the sea turtle nests is from humans in most of these localities. Apart from this, the nests are also predated by jackals and stray dogs. To protect these nests, SNM has initiated hatchery programmes. Before starting sea turtle conservation programmes, SNM meets with the local people and makes them aware about sea turtles and the need for conservation. Then SNM selects two or three interested volunteers from each village. These volunteers are given some remuneration for their work. Then SNM provides basic training with regard to collection and relocation of nests and maintenance of the hatchery. During the breeding season, these volunteers patrol the beach daily and relocate eggs to the hatchery. The hatchery is located just above high tide line. It is mostly rectangular and is prepared by using G.I. Mesh and wooden poles. To avoid injury to hatchlings from the mesh, the bottom half of the hatchery is covered with cardboard sheets from all the sides during the hatching period. The eggs are incubated under natural conditions. After hatching, the hatchlings are immediately released. The volunteers maintain data including date and time of nesting, number of eggs, date of hatching and number of hatchlings released.

Table 3.2: Village wise nesting data in the breeding season of 2003-04

Sr.	Locality	# of nests
District: Raigad		
1	Diveagar	4
2	Harihareshwar	4
District: Ratnagiri		
3	Velas	14
4	Kelashi	1
5	Karde	0
6	Kolthare	4
7	Dabhol	4
8	Ambolgad	0
9	Madban	0
District: Sindhudurg		
10	Tondoli	0

During 2004- 05, SNM started sea turtle conservation at Harihareshwar in Raigad district. Here four nests were protected; out of 455 eggs, 255 hatchlings were released successfully. This beach is about 4 km long and is divided in two by a small rocky hillock. This is also a sparsely populated beach with minimum fishing activity. Here, the major threat to the sea turtle nests is from humans and stray dogs. Though this is the first year of sea turtle conservation, four nests of olive ridley were protected on this beach. During 2004-05, Sahyadri Mitra, a local NGO from Mahad started sea turtle conservation at Diveagar in Raigad district. They are working in collaboration with SNM. This beach is also a sparsely populated beach with low fishing activity. The main reasons for the selection of this site were recent nesting reports and the willingness of some local people to participate in sea turtle conservation. They reported and protected four nests and 237 hatchlings were released.

The maximum nesting was reported from Velas during 2004-05; 14 olive ridley nests were reported and protected on this beach. A total of 1468 eggs were relocated in the hatchery and 744 hatchlings were released. Four olive ridley nests reported and protected in Dabhol in Ratnagiri district. This is small 2 km long beach backed by *Casuarina* plantations. This is the first attempt at sea turtle conservation on this beach; out of 410 eggs, 233 hatchlings were released. Four nests were protected in Kolthare in Ratnagiri district, a sparsely populated beach. Again, this was the first year of sea turtle conservation activity; only 82 hatchlings were released out of 322 eggs. In Kelashi, only one nest was reported. This beach is about 3 km long and is undisturbed. A total of 14 hatchlings were released from 51 eggs. Other sites were Karde, Ambolgad, Madban and Tondoli in Ratnagiri district. Despite intensive monitoring during the breeding season, no nesting was reported from these sites.

Monitoring in Goa

In Goa, the nesting season of sea turtles is from October to March. Like Maharashtra, there is sporadic nesting of olive ridleys along the entire coast of Goa. From the nesting season of 1997, the Forest Department started protecting turtles and their nests. Prior to this, turtle eggs were regularly poached by the locals for consumption. The Forest Department deploys two forest guards and a couple of local volunteers at each site. The forest guards and volunteers patrol the beach to prevent the poaching of eggs. Their duty also involves noting the location of nests and protecting them from stray dogs and jackals. These nests are protected *in-situ*. These sites are Morjim and Agonda in north Goa and Galgibaga in south Goa. Compared to other beaches in Goa, these are less disturbed and unpopulated beaches.

Morjim was the first site in Goa where sea turtle conservation was started by the Forest Department in 1997. During 1997-98, only five nests were protected on a small part of this beach. In the next year (1998-99), eight nests were protected. Along with an increase in the number of nests protected, more areas of the beach came under protection and during 2000-01, 30 nests were located and protected. In the subsequent years the number of nests declined and during 2003-04 only nine nests were protected (Table 3.3).

Galgibaga is another well known sea turtle nesting site in south Goa where eggs of sea turtles were popular as food among locals. Then in 1999, with the initiative of a local priest and help from the Forest Department, a sea turtle conservation movement was started in this village. In the first year, 10 nests were protected. In the next breeding season (2000-01) protection was given to 33 nests. Subsequently, 19 nests were protected in 2002-03, and in the breeding of 2003-04, 14 nests were protected (Table 3.3)

Table 3.3: Nesting data in Goa

Year	Number of nests		
	Morjim	Galgibaga	Agonda
1997-98	5	-	
1998-99	8	-	
1999-2000	14	10	
2000-01	31	33	9
2001-02	20	9	-
2002-03	11	19	15
2003-04	9	14	6
2004-05	6	5	9

Agonda is a locality in North Goa where sea turtle conservation was initiated in 2000-2001. This is also a sparsely populated beach with minimal tourist activities. Compared to the other two beaches, the number of nests on this beach is low. In 2003-04, six nests were protected here.

Apart from the above nesting sites, there are a few other nesting beaches in Goa where there were recent reports of sea turtle nesting. Although the Forest Department of Goa has taken initiatives to protect the sea turtle nesting sites, this is likely to be successful only if the local community supports the endeavour. Most of the potential sea turtle nesting sites are undisturbed and less populated. But now, due to sea turtle nesting, these beaches are on the tourist map of Goa and many tourists are visiting these beaches to see the nests. With the influx of tourists, the tourism industry is also taking interest in these sites. Thus, there is a direct or indirect benefit to local communities. We collected information on the outlook of local people towards sea turtle conservation, the benefits they are getting from this activity and the views of the tourists. These are important aspects that are essential to formulate a conservation action plan for sea turtles in Goa.

Potential nesting sites

To rank the beaches according to their suitability for turtle nesting, we took into consideration beach profile, disturbance and fresh nesting reports (Table 3.4). Beaches with three points are potential nesting sites and these are Querim and Morjim in north Goa, and Agonda, Talpona and Galgibaga in south Goa. These are less populated beaches with moderate tourist activity. Apart from this, there are a few other beaches such as Velsao, Betalbatim, Colva, Benaulim and Betul with potential for nesting, but there is very little information from these sites. Similarly beaches scoring two points represent moderate nesting beach potential. These are mostly disturbed beaches. Beaches scoring one point are not suitable for sea turtle nesting as most of these beaches are either highly developed or rocky.

Table 3.4: Potential nesting sites in Goa

Category	Name of Beach
High	Querim, Morjim, Velsao, Betalbatim, Colva, Benaulim, Betul, Agonda, Talpona, Galgibaga
Medium	Arambol, Manderem, Ashwem, Siridao, Agassaim, Arossim, Utorda, Majorda, Varca, Cavelosim, Mobor, Palolem
Low	Calangute, Candolim, Sinquerim, Canaguinim

Local support

We collected data on the outlook of the local community towards sea turtle conservation and the beaches where people were willing to support this activity were given more points (Table 3.5). Villages like Ashwem, Morjim, Betul, Agonda, Talpona and Galgibaga showed a high degree of support towards conservation. Beaches scoring two points, one point and zero point represent moderate support, low support and no support respectively. In most of the villages the locals feel that due to the importance given to sea turtles, they will not get enough space on the beach for running temporary hotels for tourists.

Table 3.5: Degree of local support from the villagers in Goa

Category	Name of Beach
High	Ashwem, Morjim, Betul, Agonda, Talpona, Galgibaga
Medium	Querim, Arambol, Manderem, Calangute, Candolim, Majorda, Betalbatim, Colva, Benaulim, Varca, Cavelosim, Mobor, Canaguinim, Palolem
Low	Vagator, Anjuna, Baga, Sinquerim, Bambolim, Siridao, Agassaim, Arossim

Benefits to coastal villages from turtle nesting

Most coastal villages derive either direct or indirect benefits from sea turtles. Villages like Querim, Mandrem, Ashwem and Morjim in the north Goa and Benaulim, Betul, Agonda, Talpona and Galgibaga in South Goa derive more benefit from sea turtle nesting (Table 3.6). Most of these beaches are secluded compared to the other populated beaches in Goa, and very few tourists visit these beaches. But during the breeding season of sea turtles, which coincides with the tourist season in Goa, many interested local and overseas tourists visit these beaches. Those engaged in the tourism industry like taxi drivers, shack owners, local guesthouses and hotels benefit during this period.

Table 3.6: Benefit to coastal villages from turtle nesting

Category	Name of Beach
High	Querim, Manderem, Ashwem, Morjim, Benaulim, Betul, Agonda, Talpona, Galgibaga
Medium	Arambol, Calangute, Candolim, Vaingunim, Bambolim, Agassaim, Velsao, Majorda, Betalbatim, Colva, Varca, Cavelosim, Mobor
Low	Vagator, Anjuna, Baga, Coco, Miramar, Arossim, Canaguinim, Palolem

Shack owner perspectives on sea turtles

A shack is a temporary shelter / hotel built on the beach to attract tourists. As these shacks are on the beach, they may sometimes pose hurdles for nesting sea turtles. However, in 2003, we saw two nests very close to one of the shacks in Morjim. The role of shack owners is also important in sea turtle conservation as they can help in reporting and protecting turtle nests. Most shack owners from turtle nesting sites are aware of their beach being a potential nesting site of sea turtles. They also believe that the number of tourists is increasing in recent years due to sea turtle nesting. They are supportive to the Forest Department's initiatives to conserve turtle nests. Some shack owners do report sea turtle nesting to the Forest Department. According to them, it is more profitable to promote ecotourism than poaching of eggs for consumption. Most of them also feel that conservation of sea turtles is important, as it is a unique species. We interviewed five shack owners near different sea turtle nesting sites. When asked about their views on turtle nesting on their beach, 45% responded positively. They are happy that sea turtles nest on their beaches and are willing to support sea turtle conservation activities. Interestingly, 25% of shack owners responded negatively. They felt that once the beach is declared a sea turtle nesting site, then many restrictions will follow.

Apart from the above, we also collected information on other aspects related to sea turtle conservation. One of the aspects was awareness of sea turtle nesting sites among tourists. We found that 46% of overseas tourists are aware of these sites as they are made popular by the local media and the tourism department. Interestingly, the awareness level of Indian tourists is low and is only 21%. Goa is known for its beautiful beaches and most tourists visit Goa to enjoy its scenic beauty (34% overseas and 17% Indian). Yet, 19% of overseas tourists visit Goa to see the turtle nesting sites whereas only 4 % of Indian tourists visit Goa to see these sites. When questioned on the endangered status of sea turtles, 49% of overseas tourists said that they were aware of this, while only 18% were unaware. However only 9% of Indian tourists were aware about the status of sea turtles and 24% were unaware.

We also collected information on the frequency of sea turtle sightings by fishermen. For this, we interviewed 50 fishermen from different areas. Eighteen responded positively and told us that they see turtles regularly. But they admitted that the frequency was very low compared to 10 years ago. Thirteen fishermen responded negatively and told us that they had not seen sea turtles at all in the last few years. The remaining 19 said that they had seen sea turtles occasionally. When asked about the TED (Turtle Excluder Device), 94% of fishermen told us that they did not have any knowledge about this device. This indicates that awareness programmes on the use and function of the TED needs to be conducted for fishermen. But as there are very few reports of incidental catch in fishing nets, this may not be a priority. There appears to be a slow decline in the number of sea turtle nests on different beaches in Goa (Table 3.3). The locals believe that the number of nesting sea turtles has declined in the last 10 years. The fishermen, who practice deep-sea fishing, also supported this view.

Networking

Most of the less populated beaches, where sea turtles nest, are difficult to reach for monitoring during the breeding season. Also, lack of awareness is the main cause of threats to sea turtles. Thus, the conservation of sea turtles and their nests on these beaches requires the involvement of local communities. We interacted with two local NGOs, Sahyadri Nisarga Mitra in Maharashtra and Green Cross in Goa. Both these NGOs actively carry out awareness campaigns in their respective states.

Sahyadri Nisarga Mitra (SNM)

Sahyadri Nisarga Mitra (SNM) is an NGO based in Chiplun, Ratnagiri district, Maharashtra. While documenting avian diversity, especially nesting of the white-bellied sea eagle, along the coast of Maharashtra, they came across some dead sea turtles and their exposed nests at Velas, in Mandangad taluka, Ratnagiri district. On enquiry, the locals informed them that these were sea turtle nests and were predated by jackals and stray dogs. SNM thus started sea turtle conservation in Ratnagiri district from October 1, 2002. They arranged awareness campaigns in 45 villages of this district. They met with local

people in different coastal villages and distributed information sheets about sea turtles. Posters giving information on sea turtles and their importance were also displayed on some important beaches.

In the breeding season of 2003-04, SNM organised a sea turtle conservation programme at Velas. This activity was extended to three more beaches, Anjarla, Saldure and Murud, all in Ratnagiri district, in 2004-05. Hatcheries were established and one or two locals were appointed on these beaches to locate sea turtle nests for the hatchery. They were given an honorarium by SNM. Apart from this, some locals helped voluntarily to locate and protect sea turtle nests. The SNM also arranged awareness campaigns through meetings with villagers, lectures and exhibitions. This campaigning has strengthened the turtle conservation movement in Maharashtra.

During the breeding season of 2004-05, people of several new localities started conserving sea turtle nests on their respective beaches. During this season, sea turtle conservation was started at 10 different villages covering three coastal districts in Maharashtra. Of these, two villages were from Raigad district, seven from Ratnagiri and one from Sindhudurg district (Table 3.2). In all these villages, the local villagers supported this activity. Some local NGOs, which had taken initiatives to start conservation activities, were also supported by the SNM to carry out the sea turtle monitoring at certain localities. This resulted in the protection of 31 nests from the above mentioned sites.

We organised a one-day workshop at Chiplun with the help of SNM in February 2005. This was attended by 62 participants from different fields. This was the first workshop on sea turtles in Maharashtra. The participants were mostly from the forest department, local NGOs, villagers, fishermen, trawler owners and workers, school teachers and students. The main objective of this workshop was to develop and strengthen sea turtle conservation along the coast of Maharashtra. The efforts of the SNM were appreciated by all the participants. In this workshop, we covered issues related to sea turtles and their conservation in Maharashtra. The introductory session on sea turtles and their life history made the participants aware of different aspects of sea turtle biology, their role in nature, their present status and threats. The second session, conducted by the members of SNM, focussed on the sea turtles of Maharashtra and the efforts of SNM towards the conservation of sea turtles at different localities. Information on how to translocate eggs from nests, development of hatcheries and their management was also given. In one session, conducted by Forest Department officials, participants were made aware of the legal status of sea turtles and other legal issues related to their protection. Information was also given on the activities of the Forest Department.

The last session was interactive and the participants were given an opportunity to express their views regarding sea turtle conservation. Most of the participants showed interest in conservation of sea turtles and were keen to extend it to their villages, but one of the major hurdles was funding for the establishment and management of hatcheries. In this session, we also selected some potential turtle nesting sites and local NGOs or individuals who would carry out awareness campaigns in these sites. It was also decided to nominate one nodal agency which would gather and disseminate information related to sea turtle conservation activities in Maharashtra. SNM was unanimously chosen as the nodal agency. To promote individual efforts towards sea turtle conservation, the SNM initiated an award, "Kasav Mitra" (Turtle Friend). This award is to be given to a person doing significant work in sea turtle conservation in Maharashtra. In the first year the award was given to Mr. Nandkumar Patil, the village leader of Velas. This was the first village in Maharashtra where the sea turtle conservation was started by SNM, and the role of Mr. Patil was vital. His personal interest led the SNM to develop a hatchery and other activities related to sea turtle conservation in this village.

Green Cross

Green Cross is a well known NGO based in Goa and is actively involved in the rescue and relocation of injured animals, especially reptiles. They also conduct lectures and slide shows on snakes in different areas in Goa. Their active involvement in sea turtle conservation started from the breeding season of 2003-04. Though sea turtle conservation in Goa started in 1999, it was confined to only a few beaches and most people were not aware about it. Hence, Green Cross is initially concentrating on an awareness programme. This includes illustrated lectures and meetings with target groups like fishermen, locals living

in the vicinity of nesting beaches, trawler owners and workers. We also networked with individuals who are involved in sea turtle conservation, including one of the authors (D.F.).

Tagging and tissue collection

This is essential for the long-term conservation of sea turtles, as tagging has not been carried out in Maharashtra and Goa until now. We had already applied for tagging and tissue sample collection for genetic analysis to the Ministry of Environment and Forests, Government of India. But permits were not received. We had informed the NGOs and locals involved in sea turtle conservation about tagging and tissue collection and they are willing to take up this work. Thus this work is to be initiated just after we get the permission from MoEF.

CONCLUSION AND RECOMMENDATIONS

Our study indicates that there is a decline in sea turtle populations in Maharashtra and Goa. This is mostly due to incidental catch in fishing nets, and consumption of eggs and adults by humans in some localities. Developmental activities like construction of hotels and resorts, sand mining and beach illumination also affect the nesting of sea turtles in some localities, especially in Goa. Most of these threats are due to lack of awareness about sea turtles. Most coastal villagers are aware of sea turtles, but they are ignorant about their importance, their legal status and protection given to them. Though efforts taken by some NGOs and people are showing promising results, there is a need to intensify this awareness campaign. The best results were seen in Maharashtra. Here due to meticulous efforts taken by the SNM, the sea turtle conservation movement, which was initiated in one village, has spread to 13 villages covering three coastal districts. All these localities are monitored with the help of local villagers. Every year new localities are being added to this list.

Currently, nests are protected in hatcheries in all the localities, which results in a reduction in hatching success (around 50%). To solve this problem, there is a need of *in-situ* protection of nests. This is practised in Goa where hatching success is higher than Maharashtra. The following recommendations may improve the conservation of sea turtles in Maharashtra and Goa:

1. Sea turtle conservation should be extended to other coastal districts of Maharashtra
2. There should be a control or ban on development activities causing disturbances to sea turtle nesting beaches in both the states.
3. Tagging studies should be carried out using local resources.
4. Locals at turtle nesting sites in Goa should be trained towards viable ecotourism.
5. The efforts of individuals or NGOs towards sea turtle conservation should be appreciated and encouraged

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