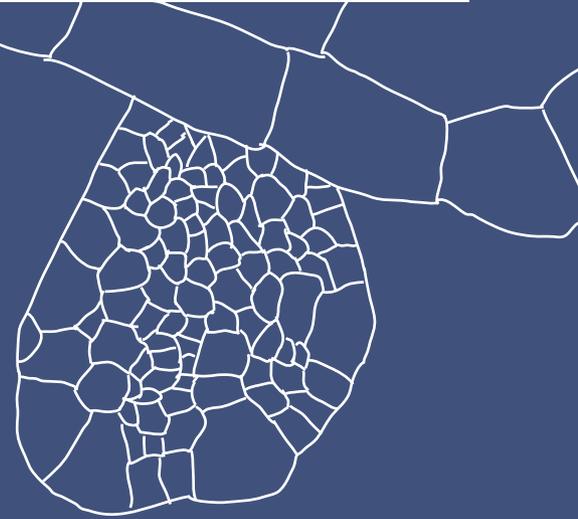




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The Indian Ocean Turtle Newsletter was initiated to provide a forum for exchange of information on sea turtle biology and conservation, management and education and awareness activities in the Indian subcontinent, Indian Ocean region, and south/southeast Asia. The newsletter also intends to cover related aspects such as coastal zone management, fisheries and marine biology.

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Reference styles in list:

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Guest Editorial

Early accounts of marine turtles from India and neighbouring waters

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One of the most difficult challenges for turtle researchers and conservationists is to understand how populations (or “management units”) have behaved over time: have they decreased, stayed the same or increased in size? Because it is rare to find systematic information on population sizes and trends that goes back more than a couple of decades, one is often obliged to try to make use of old accounts, even when they are cursory. Hence, brief descriptions relevant to marine turtles from an oceanographic campaign in Indian waters at the end of the 19th century and the situation at the Madras Aquarium in 1911 may be of interest.

Two such historic sources are Alfred Alcock’s (1902) account of four years on the Royal Indian Survey Ship *Investigator*, and John Henderson’s (1913) general account of the Madras Aquarium. While marine turtles were not of primary interest for either the *Investigator*’s oceanographic survey, or for the aquarium, these reptiles are mentioned in at least five passages by Alcock, and with some detail by Henderson. Although not systematic, this information helps to portray the general situation regarding marine turtles over a century ago in various places in India, as well as on a remote island of Myanmar.

Alcock’s account of the oceanographic survey

From 12 December 1888 until 21 March 1889 the *Investigator* was working at False Point and other locations along the coast of Orissa, such as Gopalpur (Alcock, 1902: 59). Although many details about different marine organisms were described, there appears to be not a single mention of marine turtles. This is unusual since during the

past few decades at least, the period from December to March overlaps with the main nesting season of *Lepidochelys olivacea* in Orissa at several places (Shanker *et al.*, 2004) that are not more than 10 km from where the *Investigator* was working.

Between 14 and 22 April 1889 the *Investigator* was based at Port Blair, Andaman Islands, from where they made short excursions. Alcock (pg. 79) wrote:

“Though I never came across any Andamanese, I once saw a kitchen-midden of ashes, shells, and bones of fish, turtle, and dugong.”

He continued (pp. 85–86) with an account for 23 April:

“On the beach of South Sentinel we were fortunate enough to witness the entry of a brood of turtles into the world. There was a tremendous commotion in the dry sand, and out of it there emerged a swarm of little objects, looking like beetles, which all with one consent made for the sea. Even when we caught them and started them off in the opposite direction, some unerring instinct caused them at once to turn round towards the sea again, as other observers in other lands have described.”

Unfortunately, there is inadequate information to decipher which species was involved, but in modern times *Chelonia mydas* are documented nesting on South Sentinel (Andrews *et al.*, 2006).

Much later in the year, on 28 October 1889, the

ship left Bombay and steamed back to the Bay of Bengal; between calling at Port Blair and Rangoon, they stopped at Diamond Island where Alcock reported (pp. 93–94) that:

“It is a great breeding resort of turtles and the Burmese who farm the eggs objected that our boat-party would frighten all the turtles away.”

This remote Burmese island is known as a nesting area for *C. mydas* (Thorbjarnarson *et al.*, 2000); it is notable that Alcock described the Burmese as *farm*ing turtle eggs, when most likely they were simply collecting them for later transportation to Rangoon (Yangon).

A little later, a team from the *Investigator* camped on Little Coco Island sometime after 8 November, where Alcock (pg. 142) reported:

“On the beach there were numerous tracks of turtles, whose *caches* of eggs we several times found violated by the great water-lizard (*Varanus salvator*).”

This northern-most island of the Andamans is also well-known to be an important nesting area for *C. mydas* (Andrews *et al.*, 2006).

A month later, Alcock reported (pg. 205):

“On December 12th we left Minnikoy [southern-most of the Lakshadweep islands], taking with us good store of the turtles for which the island is so justly famous, our immediate destination being Colombo, there to take in coal preparatory to resuming our survey of the Coromandel coast.”

Again, Minicoy is regarded as an important nesting area for *C. mydas* (Tripathy *et al.*, 2006).

The Madras Aquarium

The Madras Aquarium was opened on 21 October 1909 under the charge of the Superintendent of Museums, and in 1912, the Governor of Madras

decided to enlarge it; in 1919, the Aquarium was administratively transferred to the Department of Fisheries. It became very popular, and in 1919–1920 a total of 163,517 people were reported to have paid for admission. At the time it was the only permanent aquarium on the “Asiatic mainland” (Hornell [1921?]: 1–2).

On page 15 of the first “Guide to the Marine Aquarium” (Henderson, 1913), the following account is provided:

“The Turtle Tank - In this are generally to be found two or more of the four known species of marine Turtles, enumerated below in the order of their frequency on the Madras coast:-

(1) The Green or Edible Turtle (*Chelone mydas*). Common on the Madras coast. This species is usually described as herbivorous, but local specimens are quite as carnivorous as any of the other turtles. The shell reaches a length of four feet and is mottled or spotted above.

(2) The Loggerhead (*Thalassochelys caretta*). Not uncommon on the Madras coast. This turtle is about the same size as the last, from which it may be distinguished by the uniform brownish colour of its upper shell.

(3) The Hawksbill (*Chelone imbricata*). Not uncommon in the Gulf of Mannar. Tortoise shell is obtained from the horny plates which cover the upper shell. The Hawksbill may be recognised by the hooked upper jaw, from which the popular name is derived, and by the fact that the dorsal plates overlap. It is the smallest of the marine turtles.

(4) The Leathery Turtle (*Sphargis coriacea*). Rare on the South Indian coast. A specimen was captured on the Guntûr coast in April 1911, but up to the time of writing none have been brought to the Aquarium. It is the largest of all the turtles and reaches a length of eight feet.”

Several observations from Henderson's comment are warranted.

- a) The reference to the "Madras Coast" must be interpreted within the historic context of the early 20th century, for this term could refer to two very different areas: the coast in the immediate vicinity of the city of Madras (now Chennai), or the coast of Madras Presidency (also called the "Presidency of Fort St. George"), a large political entity during colonial times that included almost the entire present-day south India, with the states of Tamil Nadu and Andhra Pradesh, as well as the Malabar region of north Kerala, much of Karnataka, and the Lakshadweep Islands (Eastwick & Murray, 1879). Given that Henderson also refers separately to the Gulf of Mannar for the hawksbill turtle and "South Indian coast" for the leathery turtle, and that these two areas would be included within Madras Presidency, it seems that Henderson used the term "Madras" in the more restrictive sense, to refer to the coast near the city of Madras.
- b) Green turtles were reported to be "common on the Madras Coast", but a century later it seems that they are no longer common along the coast of Madras city.
- c) The comment that green turtles "are quite as carnivorous as any of the other turtles" could be a general observation, say based on stomach contents of animals that had been slaughtered for market, or it could refer just to animals in captivity.
- d) Loggerheads were said to be "not uncommon on the Madras coast". It is important to note that in Henderson's time there was confusion between two species that are recognised today: *Caretta caretta* and *Lepidochelys olivacea*, and both of them were often called loggerheads (Frazier, 1985). Nonetheless, the description of colour (brownish) and size (comparable to that of a green turtle = shell length 4 feet long) is consistent with *C. caretta*, but inconsistent with *L. olivacea*. If

indeed *C. caretta* were not uncommon 100 years ago, this would indicate a significant decline in the abundance of this species in this area.

- e) Hawksbills were "not uncommon in the Gulf of Mannar", and today this description is not inappropriate.
- f) Leatherbacks were evidently rarely sighted, and the capture of one off the Guntur coast in April 1911 was regarded as noteworthy; the situation today seems to be comparable.
- g) It is remarkable that the olive ridley turtle, *Lepidochelys olivacea*, which today is one of most common turtles in the Gulf of Mannar (Bhupathy & Saravanan, 2007), was evidently not recognised a century ago.

Remarkably, by the time of the subsequent guide to the Madras Aquarium about a decade later, marine turtles were no longer featured as important attractions, although by then there were more tanks and improved facilities at the aquarium (Hornell [1921]?).

Summary

While not systematic, the information provided by the oceanographic survey and aquarium guide indicate several generalities:

1. A century ago green turtles were notably common on inaccessible islands of the Andaman Sea, namely South Sentinel, Little Coco, and Diamond, and also on Minicoy, in the south of the Lakshadweep Islands. They were also common on the Madras coast. There has evidently been a decline in abundance on the Madras coast, but it is not known if the impressive nesting populations on Diamond Island and Minicoy are comparable in abundance to their earlier state.
2. Loggerhead turtles have evidently declined in abundance along the Madras coast.
3. The Gulf of Mannar continues to be an

important area for Hawksbill turtles.

4. Leatherback turtles continue to be rarely reported in waters off south India.
5. Remarkably, olive ridley turtles are abundant

today in areas from Orissa to the Gulf of Mannar, where they were not reported a century ago. It is intriguing to ponder the possibility that some of the mass nesting populations in Orissa are a relatively recent phenomenon.

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Post-tsunami status of leatherback turtles on Little Andaman Island

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Introduction

The Andaman and Nicobar Islands host the largest nesting population of leatherback turtles in India which is one of the most important in the region (Andrews, 2000a). The Nicobar region has a nesting population over 1,000 individuals and is hence of global significance (Andrews, 2000a; Andrews & Shanker, 2002). Initial surveys of the islands by Satish Bhaskar in the 1970s revealed significant leatherback nesting beaches on Great Nicobar Island (Bhaskar, 1979a,b). Subsequent surveys in the 1990s (Bhaskar & Tiwari, 1992; Bhaskar, 1993, 1994) in Little Nicobar Island recorded many leatherback nesting beaches, each with several hundreds of nests per season. A tagging programme was initiated by the Andaman and Nicobar Islands Environment Team (ANET) for leatherbacks at Galathea beach on Great Nicobar Island in 2001 and more than 250 leatherbacks were tagged between 2000 and 2002 (Andrews *et al.*, 2002); the beach was monitored till December 2004 when the tsunami hit the islands. Against the backdrop of recent drastic declines of the Indo-Pacific leatherback populations (Spotila *et al.*, 2000), the Andaman and Nicobar Islands gain importance as a critical nesting site for this species.

Many of the prime turtle nesting sites in the Andaman and Nicobar Islands were badly affected by the December 2004 earthquake and the subsequent tsunami (Andrews *et al.*, 2006a). The coastline and the shore topography were severely altered in many of these islands, with the Nicobar group of islands undergoing submergence (Ramachandran *et al.*, 2005), while coastal plates in some of the Andaman Islands were uplifted (Alfred *et al.*, 2005; CORDIO/IUCN, 2005). The impact of these drastic changes on the shape and structure of the coast and on the nesting patterns of sea turtles are poorly understood (Alfred *et al.*, 2005; Ramachandran *et al.*, 2005).

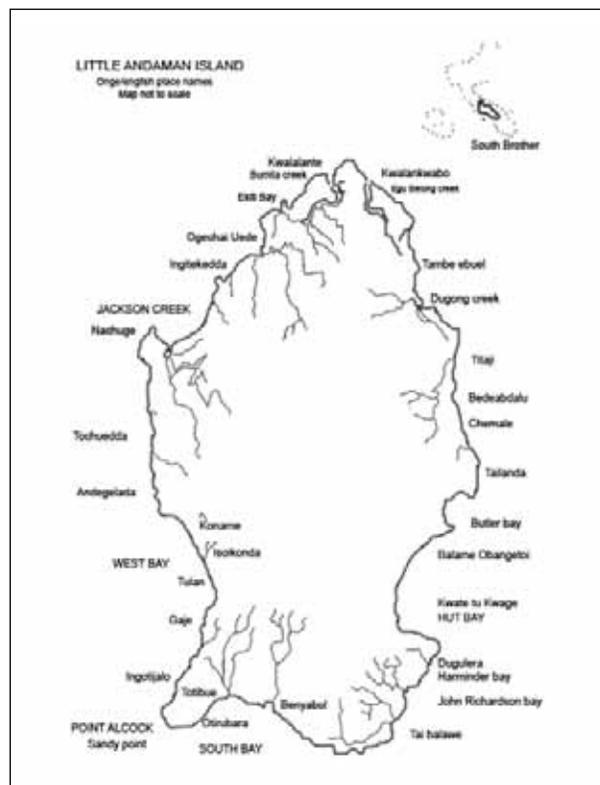


Figure 1. Map of Little Andaman Island

Source: Andrews *et al.*, 2006b

Preliminary studies have indicated that the southern and western coasts of Little Andaman (Figure 1) are key nesting sites for leatherback turtles in the Andaman group of islands (Andrews *et al.*, 2006b). The island underwent an upheaval of 1 meter and the coastline underwent considerable changes. The beaches at South Bay and West Bay of the Little Andaman Island are major nesting sites for leatherback turtles and nesting was observed to be very poor in the subsequent years (2005-2007) (Andrews *et al.*, 2006a). Andrews *et al.* (2006a) recorded only two leatherback nests on West Bay and no evidence of nesting was found on South Bay.

In 2008, the Centre for Ecological Sciences, Indian Institute of Science (IISc), Bangalore initiated a long-term tagging and monitoring programme on Little Andaman Island in collaboration with ANET and the Andaman and Nicobar Forest Department to monitor post-tsunami leatherback nesting recovery. Initially, due to logistic constraints, the South Bay beach was chosen and has been monitored for the last four years from 2008 to 2011.

Every year, a camp was established on the South Bay beach and daily monitoring of leatherback nesting was carried out roughly between the months of December and March. During the 2010-11 nesting season, a camp at West Bay on Little Andaman Island was also established to monitor nesting and initiate satellite telemetry of leatherback turtles.

Post-tsunami nesting of leatherback turtles in Little Andaman

Since the initiation of the long-term tagging and monitoring programme in 2007, detailed nesting records are available for each year to show that there are about 50 to 100 nests laid in South Bay and West Bay beaches on Little Andaman Island.

Year 1 (January 2008 to April 2008):

A total of 38 nests and 3 false crawls were observed at South Bay during the monitoring period (Table 2) and observations revealed severe nest depredation, mostly by monitor lizards and occasionally by feral dogs.

The nesting intensity of leatherbacks on the South Bay beach showed a clear peak in the first week of January in comparison to the rest of the season, and nesting abruptly declined towards the third week of January and remained within the narrow range of 2-10 nests till end of February (Figure 2).

Year 2 (December 2008 to February 2009):

A total of 59 nests were observed at South Bay beach (Table 2). Monitor lizard predation was

again observed to be substantial, though it was not quantified. A total of 8 individuals were tagged and three were recaptured within the season (Table 1).

A rapid survey of the beach of West Bay revealed a total of 70 nests/tracks, 65 of which were old (2-3 months old) and 5 were fresh (less than a week old). Except for a few, all the nests were predated by monitor lizards.

Year 3 (December 2009 to March 2010):

The number of leatherback nests observed at South Bay during this season was very low in comparison to the two previous years (Table 2). A total of 7 nests and 1 false crawl were observed during the four-month period. Out of the 7 nests that were laid, monitor lizards predated one nest. Two new leatherbacks were tagged (Table 1).

A rapid survey was carried out at West Bay and 38 nests were encountered (again substantially less than in previous years).

Year 4 (November 2010 to February 2011):

South Bay

A total of 58 nests were observed (Table 2). 6 new leatherback turtles were tagged out of which 2 tags were recaptured within the season (Table 1). Nest depredation rates by monitor lizards and feral dogs were again high.

West Bay

A total of 91 nests were observed. During the monitoring period, 23 nesting females were tagged and 10 were recaptured during the season (Table 1). No turtles from previous years were recaptured (Table 1).

Monitor lizards predated 55 of the 91 nests (more than 50%) observed. The nesting intensity of leatherbacks was evenly spread out from the last week of November to the first week of January (Figure 2).

Table 1. Number of leatherback turtles tagged and recaptured
(Note: The 2010-2011 data is a total for both South Bay and West Bay, Little Andaman)

Year	Number of leatherback turtles tagged	Number of recaptures in the same season	Number of recaptures in subsequent years	Total number of nests
2007 - 2008	6	3	0	38
2008 - 2009	5	3	0	59
2009 - 2010	2	1	0	7
2010 - 2011	29	12	0	149

Table 2. Compilation of available information of leatherback nesting at South and West Bay, Little Andaman

Year	No. of nests in South Bay	No. of nests in West Bay
Before 2004	40-100 nests per season (Bhaskar, 1979a, 1981; Sivasundar 1996, Andrews, 2000b)	
2005 - 2006	0 (Andrews <i>et al.</i> , 2006)	
2006 - 2007	Low, but specific numbers not available (Shanker & Chandi, <i>pers. comm.</i>)	
2007 - 2008*	38	Unknown
2008 - 2009*	59	70 tracks
2009 - 2010*	7	38 tracks
2010 - 2011	58	91

*data from Namboothri *et al.*, 2010

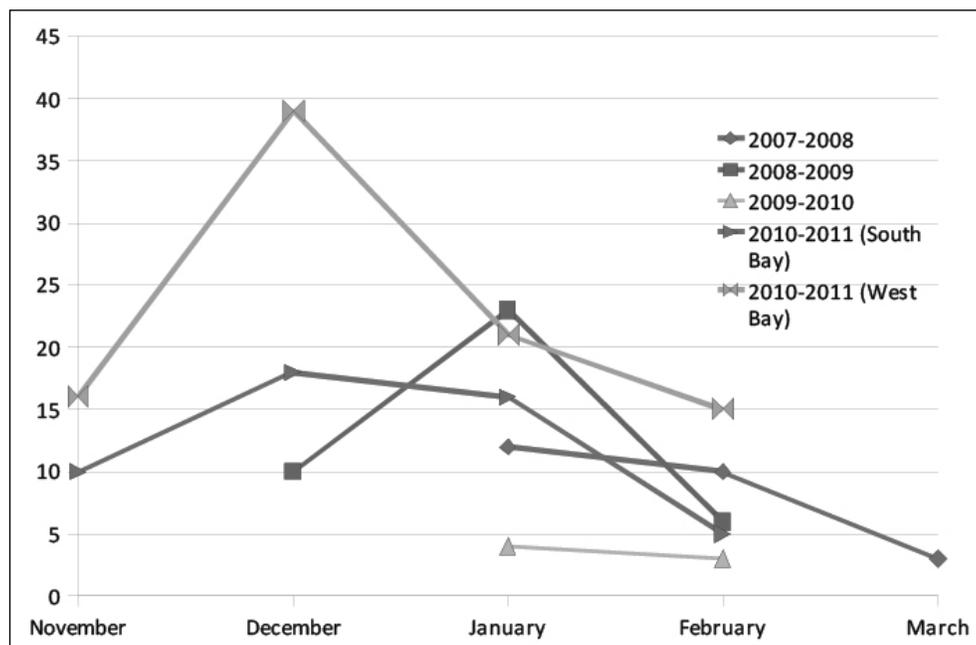


Figure 2. Nesting peaks of leatherback turtles in Little Andaman
(Note: Data represented for 2007-2010 is only for South Bay)

Conclusion

Leatherback nesting trends reveal lower nesting levels during the first two years following the 2004 tsunami (Table 2). However, nesting seems to have recovered at both West Bay and South Bay as indicated by the figures (Table 2). However, in the absence of baselines for comparison, it is difficult to determine if the nesting intensities have returned to pre-tsunami levels.

A drastic fall in nesting intensities at both West Bay and South Bay was noticed during the 2009-2010 season. However, such fluctuations are considered normal for leatherbacks (Pritchard, 1996). Only long-term data on nesting can confirm trends. Nesting seems to commence approximately around the second or third week of November. Data from the four years of monitoring suggest an increase in nesting intensities from the end of December to early January and a substantial reduction by the second or third week of February (Figure 2). Our findings are restricted to the post-tsunami recovery of leatherback populations at the important nesting sites of the Andaman group of islands. However, the larger and more significant nesting sites lie in

the Nicobar group of islands and there is still a substantial gap in our understanding of recovery at these sites.

High rates of depredation of nests by monitor lizards and occasionally by feral dogs were observed during all the seasons. A majority of the old and fresh nests were depredated. A systematic quantification of depredation rates at West Bay revealed that more than 50% of the nests were predated. Monitor lizard predation of the nests is a natural process. However, the threat of nest depredation by feral dogs has been increasing. More studies quantifying the effects of depredation need to be carried out to understand what long-term effects this high rate of depredation might have on the population.

With support from the Space Technology Cell at the IISc, satellite telemetry studies on leatherback turtles have been initiated at Little Andaman Island to track their post-nesting movements. In January 2011, three leatherback turtles at West Bay were fitted with satellite transmitters. Initial results show the turtles swimming southwards in the Indian Ocean. More satellite transmitters will be deployed on leatherback turtles in the upcoming season.

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Observations on the exploitation of sea turtles along the Tuticorin coast, Tamil Nadu, India

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Introduction

Sea turtles have been used for local consumption since time immemorial providing food (oil and protein) as well as other commodities (bone, leather and shell) to coastal people around the world. Their shells are widely used for the production of various curios. There are four species of sea turtles found in the Gulf of Mannar (Kar & Bhaskar, 1982): green (*Chelonia mydas*, local name: *Paer aamai*), olive ridley (*Lepidochelys olivacea*, local name: *Yeth aamai*), leatherback (*Dermochelys coriacea*, local name: *Ezhuvvari aamai*) and hawksbill (*Eretmochelys imbricata*, local name: *Kilimooku aamai*). Turtle fishing was practised in this region for ages and chelonians were exported to Sri Lanka

and other countries until a couple of decades ago (Agastheesapillai & Thiagarajan, 1979; Frazier, 1980). The Indian Wildlife Protection Act (1972) lists all species of marine turtles in Schedule I, thereby giving them the highest degree of protection.

Methodology

Study area

The present study presents observations on the exploitation of various species of sea turtles along the coast of Tuticorin (Threspuram) (N - 08°48'50.42'', E - 78°09'43.92'') and Punnakayal (N - 8°38'13.10'', E - 78°6'56.90'') from June 2006 to July 2007.

Field methods

Data on exploitation of turtles were collected by regular observations of turtle carapaces found near ditches, unused buildings and inside thickets that bordered the coastline. Monthly observations in the above areas were made carefully to determine the extent of mortality of turtles. Turtles usually get caught in ray nets, locally known as *thirukka valai* (Bhupathy & Karunakaran, 2003), which are similar to the *pachuvalai* gillnets described by Kuriyan (1950). In the study area, gillnets were mostly used for fishing. Gillnets are set in shallow waters and left for about 8 - 10 hours. Turtles that are entangled in the nets commonly die, either due to asphyxiation, or the fishermen chop off the flippers and/or club the head of live entangled turtles, to remove them from the net (Bhupathy *et al.*, 2006).

During monthly patrols, each encountered carapace was assigned to a species using key characters such as the number and pattern of scutes and their colouration; they were measured to the nearest cm for curved carapace length (CCL) and curved carapace

width (CCW) using a flexible tape. The location of the carapace was noted. Then it was photographed and tagged with paint. Those carcasses found in ditches were also visually counted and identified and data noted on the location where it was found. Additional information about the incidental capture of turtles was obtained through informal discussions with fishermen and other members of the local community.

Results and discussion

The average size of encountered green turtles was 92.4 cm CCL (SD \pm 14.6) and 88.3 cm CCW (SD \pm 15.4). The mean size of olive ridley carapaces was 80.2 cm CCL (SD \pm 10.0) and 77.13 cm CCW (SD \pm 11.16). For hawksbills, the mean CCL was 68 cm (SD \pm 10.4) and CCW was 60.33 cm (SD \pm 13.8). Green, olive ridley and hawksbill turtles show an exploitation ratio of 62.0%, 34.8% and 3.2% respectively during June 2006 to July 2007 in the study area. Agasteesapillai and Thiagarajan (1979) reported that green turtles constituted 89% of all turtles caught in the Gulf of Mannar and Palk Bay during 1971 and 1976.

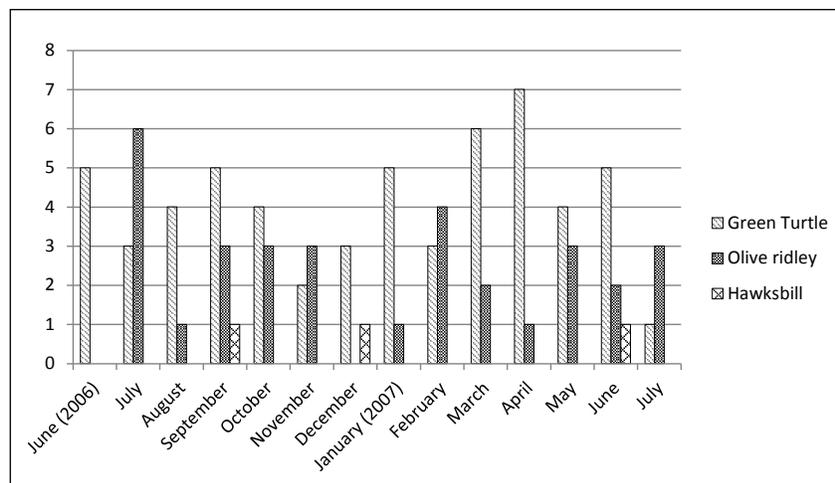


Figure 1. Number of turtles killed during the period of June 2006 to July 2007

Green turtles were captured every month, with a peak in March and April (Figure 1). Olive ridley turtles were also captured nearly every month, with a peak in August. As reported by local fishermen, olive ridleys substituted for the unavailability of greens. The abattoir of turtles was opened mostly on Sundays. Turtle meat price ranged from Rs. 120 – 150 for green turtles and Rs. 100 – 120 for olive ridleys. Hawksbills

were not consumed because the local people were fearful of being poisoned by the meat (Das, 1995). During this study, out of three hawksbill turtles, two were hit by propellers and one was caught in a net. But in the case of greens and olive ridleys, all of them were caught in fishing nets. Some people in the area reported that turtle meat and blood cured diseases such as piles and tuberculosis.



Figure 2. Satellite map showing Tuticorin and Punnakayal in Tamil Nadu, India

This study reveals the pattern of current exploitation of sea turtles along the Tuticorin coast. Most of the fishermen confirmed that those turtles that were entangled in nets and were still alive were taken for consumption. Sea turtle populations in this area have been reported to have declined due to their over-exploitation for trade and from accidental drowning in fishing gear such as gillnets and trawlers (Bhupathy & Saravanan, 2002). This study therefore recommends that government officials should periodically check whether fishermen use TEDs (Turtle Excluder Devices) in their fishing nets.

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Figure 3. Carapace and flippers of a freshly killed olive ridley turtle. Photo: T. Mohanraj

Moreover, the state fisheries department and forest department must ensure strict enforcement of the law in this regard. Unless this is done, it will not be possible to stop the exploitation of turtles in the Gulf of Mannar.

Acknowledgements

The author is very grateful to Dr. S. Bhupathy, Scientist, SACON, Anakatti for his encouragement and help throughout the study. Thanks are also due to Mr. Rameshwaran for his assistance in the study area.

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Nesting surveys of olive ridley turtles (*Lepidochelys olivacea*) along the beaches of Sriharikota Island, Andhra Pradesh, India

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Introduction

A 10 km long beach was surveyed in 2003 and 2006, during the breeding season of January to March, to obtain basic data on sea turtles nesting in Sriharikota and identify conservation issues.

Among the five species of marine turtles found in Indian waters, all except the loggerhead turtle *Caretta caretta* have been reported from the state of Andhra Pradesh (Tripathy *et al.*, 2003). The olive ridley turtle (*Lepidochelys olivacea*) is the most common marine turtle nesting along the Indian coast. The mass nesting beaches of the species in India are at Gahirmatha (>100,000), Devi river mouth and Rushikulya (>10,000 in each site) in Orissa (Tripathy *et al.* 2003; Shanker *et al.*, 2004). The coasts of Andhra Pradesh and Tamil Nadu have been subject to surveys (Bhupathy & Saravanan, 2002; Tripathy *et al.*, 2003) to determine its breeding status along this stretch. However, the stretch of 56 km nesting beach of Sriharikota Island, the spaceport of India, was not covered by these surveys due to the island's protected status. We could partly fill this lacuna due to a 6-year (2001-2007) faunal diversity project funded by the Indian Space Research Organisation (ISRO). During the project, a 10 km long stretch of beach was surveyed during the 2003 and 2006 breeding seasons (January to March) to obtain basic data on sea turtles nesting in Sriharikota and identify the conservation issues facing them.

Study area

Sriharikota is a spindle shaped island (of area 181 sq. km) situated in Nellore and Tiruvallur districts of

Andhra Pradesh and Tamil Nadu respectively. It is bounded on the east by the Bay of Bengal and on the north, south and west by the waters of Pulicat Lake. The island comprises low ridges of sand, marine and aeolian in origin, rising 4.5 - 6 m and sloping from west to east. The water table is *ca.* 2 to 5 m. Sriharikota has been connected by road to Sullurpet (18 km) on the mainland since 1970. The rainfall is largely from the northeast monsoon (October to December). Some rainfall is also received during the southwest monsoon (June to September). The area is prone to cyclones, usually in the early part of May and October, during the onset of the two monsoons. The annual rainfall is *ca.* 1,200 mm. December to February is the winter season, with temperatures as low as 10°C. March to September is the summer season with temperatures rising over 40°C. Relative humidity is lowest during May (18%), while the maximum (99%) is recorded during October (Suryanarayana *et al.*, 1998; Sivakumar & Manakadan, 2004).

The island was taken over by the Indian Space Research Organisation (ISRO) between 1969 and 1972 to set up India's spaceport, now called the Satish Dhawan Space Centre (SDSC), and the island is a high-security zone. The SDSC has a Conservation and Landscape Division (C&LD) for the conservation and management of forests. Sriharikota Island is important from the biodiversity point of view as it has the last remaining, largest and best-preserved tracts of coastal tropical dry evergreen forest left in India.

Methods

A team of three persons carried out the surveys during the 2003 and 2006 breeding seasons each

year between January and March. The area covered was a 10 km stretch of beach from the northern tip of Sriharikota to the mouth of the Pedda Wagu. This stretch was divided into 5 km long segments. One 5 km stretch was surveyed per day, and the total of 10 km was surveyed over two days every month. In March 2006, the entire transect was covered three times, i.e., over a period of six days. The team surveyed each segment early in the morning. The entire transect was covered at least once in a month. Nests were located by looking for tracks of turtles on the beach leading to the nest or by looking for exposed nests that had been predated/collected by animals/humans. On location of nests, site details such as distance of the nest from water and the forest edge, presence/absence of vegetation at the nest site, status of nest, etc. were collected. Dead turtles found on the beach were also recorded during these searches. The carapace and tracks of the turtles were investigated to identify the species (Shanker *et al.*, 2003).

Results

A total of 27 nests and 60 nests of olive ridley turtles were recorded during the 2003 and 2006 breeding seasons respectively. Of these, only two nests were found intact each year, the rest were predated either by jackals or wild boar (52% in 2003 and 75% in 2006) or collected by people (41% in 2003 and 22% in 2006). In addition, complete carapaces of 22 and 36 adults were found in 2003 and 2006 respectively.

The average distance of nests from the low tide line was 14.9 m (\pm 8.06 m) and from the high tide line was 8.1 m (\pm 7.03 m). Almost 52% of the nests were within 10 m or less from high tide line; 25% were between 11 - 20 m, five percent of the nests were between 21 - 30 m, and the rest were within the high tide line. Nests were 36.2 m (\pm 16.5 m) away from scrub forest or *Casuarina* plantations that border the beaches. Out of 87 nest sites, 75 sites were bordered by *Casuarina* plantations. The average distance between nests and *Casuarina* plantations was 51.9 m (\pm 24.2 m; n = 22). Shoreline vegetation such as *Spinifex littoreus* and *Ipomoea pescarpae* were found in 22 nest sites; four nests had these sand dune species 2 m away; and the rest (n = 61) did not have any vegetation around them.

Discussion

From the data collected and accounts of the local tribal Yanadis, it appears that the Sriharikota beach is a regular breeding site of olive ridleys, with probably about 500 nests each year. From the data gathered and accounts of tribals, it seems that only the olive ridley turtles nest in Sriharikota. As for the numbers of olive ridleys nesting, if the records obtained in the 10 km stretch are extrapolated for the c. 50 km, these would work out to 135 and 300 turtles during 2003 and 2006 respectively. Tripathy *et al.* (2003) recorded 274 nests from Sriharikota in a 15 km long stretch between January and March 2001. However, according to ISRO, no such study was carried out in the island, and what is referred to as Sriharikota is probably the stretch of land immediately north of the island.

In 2003, the surveys were carried out for two days in January and two days in February. Surveys in each month resulted in records of 13 and 14 nests respectively. Surveys were carried out for two days each in January and February and six days in March during 2006. There was no record of nests during the surveys in January 2006, although there were records of dead turtles. Fourteen nests were recorded in February and 46 nests in March 2006. From this, it appears that most of the turtles nest between mid-January and mid-March in Sriharikota, as reported in other adjacent areas (Shanker, 1995; Tripathy *et al.*, 2003). According to local tribals, nests may be found till May.

More than 70% of the nests were recorded in the northern stretch during both the years. This stretch has the mouths of the Vepenjeri Canal (contiguous with Pulicat Lake), Mavalam or Malliplatte Vagu (a perennial stream of Sriharikota Island) and Sudaneri Odappa (a monsoonal stream of Sriharikota Island). Beaches adjacent to river mouths are preferred nesting sites of the olive ridley turtle (Tripathy *et al.*, 2003).

The conservation issues facing olive ridley turtles in Sriharikota are:

Nest predation: Seventy percent of the clutches recorded during the survey were preyed upon either

by wild boar (*Sus scrofa*) or golden jackal (*Canis aureus*), which are common on the island. The tribal Yanadis poached 28% of the nests.

Mortality of adult turtles: From interactions with the Yanadis, we learnt that there is occasional slaughter of marine turtles on the island. As many as 22 dead turtles were noticed during the beach surveys.

Plantations: In many areas, the tall *Casuarina* plantations occupy almost the entire area of the beach. Besides occupying nesting areas and the potential impacts of shading on sex ratios, these plantations offer shelter for mammalian predators.

Illumination: Some stretches of the beach have illuminated roads and buildings, and the lights could disorient hatchlings.

Recommendations

Since Sriharikota is a high-security zone, it can serve as an ideal refuge for nesting sea turtles with basic conservation initiatives. The main problems facing

sea turtles are egg predation by jackal and wild boar, egg collection by tribals, encroachment of beaches by *Casuarina* plantations, lighting at some parts of the coast, and trawling along the coast. An awareness programme for the tribal community, by engaging them in monitoring programmes during the breeding season, may reduce egg collection. The tribals could also be involved in collection and guarding of eggs in predator proof fenced areas. Implementation of guidelines for coastal illumination given in Choudhury *et al.* (2003) need to be adopted to prevent mortality among hatchlings. Care should be taken to leave enough area for breeding turtles while establishing *Casuarina* plantations to serve as shelter belts. According to Choudhury *et al.* (2003), *Casuarina* plantations should be established at a minimum distance of 200 m from the high tide line in turtle nesting areas.

Acknowledgements

We thank the Indian Space Research Organisation for funding the project and extending all necessary help during the study.

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Mass mortality of *Lepidochelys olivacea* observed at Kottapeta beach in Srikakulam along the east coast of Andhra Pradesh, India

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The coastline of Andhra Pradesh is one of the important sporadic nesting habitats of olive ridley turtles (*Lepidochelys olivacea*). The species is known to nest on the northern Andhra Pradesh coast (Rajasekhar & Subba Rao, 1993; Priyadarshini, 1998) which encompasses three districts namely Srikakulam, Vizianagaram and Visakhapatnam. Olive ridley turtles are categorised as Vulnerable on the IUCN Red List (IUCN, 2010) and are included in Schedule I of the Indian Wildlife (Protection) Act, 1972. This coast may also serve as an intermediate developmental habitat for sub-adult ridley turtles and for juvenile and sub-adult green turtles *Chelonia mydas* (Tripathy *et al.*, 2003).

About 154 carcasses of *Lepidochelys olivacea* that were entangled in fishing trawlers were washed

ashore at Kottapeta coast, near Bhavanapadu Fishing Harbour in Srikakulam district (18°16'37.17"N & 83°53'47.62"E) along the coastline of north coastal Andhra Pradesh (Figure 1) on 17th March 2011. The local fisher folk claimed that the big trawl nets used by the adjacent harbour located at Visakhapatnam city were responsible for these deaths.

A team comprising Forest Department officials, local wildlife conservation NGOs and volunteers visited the spot and examined the carcasses. All the dead turtles were adults. The beached turtles were sexed using external characteristics. Of the dead turtles that were sexed, 86% were females, 6% were males and 8% were unidentified carcasses. Curved carapace length (CCL) and curved carapace width (CCW) were measured for all dead turtles.

Table 1. Size measurements of male and female olive ridley turtles stranded on Kottapeta beach in Srikakulam

Sex (n)	Curved carapace length (cm)		Curved carapace width (cm)	
	Average	Range	Average	Range
Males (9)	69.3	61.3 – 77.4	68.9	63.4 – 74.5
Females (132)	70.1	63.2 – 77.0	68.7	61.6 – 75.8
Unknown (13)	68.5	62.4 – 74.7	67.8	61.6 – 74.0

These turtles were probably migrating towards their mass nesting grounds in Orissa (some of them may also include the resident nesting population) as the coastline of Andhra Pradesh is believed to form part of the migratory route of the turtles that nest in Orissa (Tripathy *et al.*, 2003). The fact that there are many gravid females amongst the dead ones supports the theory (Figure 2). It is evident that non-use of Turtle Excluder Devices (TEDs) in mechanised fishing trawlers was the main reason

for these deaths. Depredation of eggs by humans and feral animals is also widespread in the region. In a similar incident, several olive ridley carcasses were found washed ashore in January 2008 at Thikkavanipalem in Parawada mandal, about 45 km from Visakhapatnam city (Rajasekhar & Murthy, 2008).

Incidental capture in trawl and gill nets is a major cause of marine turtle mortality along the east coast

of India (Rajagopalan *et al.*, 1996). In fact, fisheries related mortality is usually higher along the northern coast of Andhra Pradesh, which is probably due to the higher density of turtles in the region.

The indigenous TED developed by the Central Institute of Fisheries Technology (CIFT), Kochi is being promoted in Andhra Pradesh by the State Institute of Fisheries Technology, Kakinada (Bhavani Sankar & Ananth Raju, 2003). However, fisher



Figure 1. *Lepidochelys olivacea* carcasses washed ashore near Srikakulam. Photo: K.L.N. Murthy

The control measures which can be taken up by the authorities to reduce fisheries related mortality include:

- Declaration of no fishing zones during the nesting season in areas where the concentration of marine turtles is high, especially near river mouths (Godavari and Vamsadhara).
- Enforcement of laws: CRZ Rules, the Andhra Pradesh Marine Fishing (Regulation) Rules, 1995.

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folk have not been using TEDs and the operation of mechanised trawlers in the offshore waters during the nesting and breeding season is rampant. Apparently, violation of Coastal Regulation Zone (CRZ) regulations and failure of the authorities to keep a tab on the perpetrators caused this ecological mishap. Besides, breeding olive ridley turtles are also threatened by *Casuarina* plantations, beach erosion, artificial illumination, depredation of eggs and hatchlings along this coastline.



Figure 2. Eggs gushed down the oviducts of this dead gravid female. Photo: K.L.N. Murthy

- Enforcement of use of Turtle Excluder Devices (TEDs).

Although awareness campaigns in the form of ‘turtle walks’ and community education programmes in fishing villages are organised every year by Green Mercy (a local NGO and a member of Turtle Action Group), involvement of all stakeholders in sea turtle conservation on a larger scale is vital for securing the long term survival of the species and their coastal nesting habitats in the region.

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Government orders mast lights to be switched off!

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Chennai has seen what is possibly a first in India – Mast lights along the eight kilometer stretch of beach from Neelangarai up to the Adyar estuary will now be switched off during the turtle season to prevent disorientation of olive ridley hatchlings emerging from nests laid on the beach.

Volunteers from the Students' Sea Turtle Conservation Network (SSTCN) have monitored nesting and hatchling emergence along this stretch of beach since 1988. In recent years, 6 powerful mast lights had been put up on this stretch of beach and were kept on every night through the year.

While SSTCN volunteers patrol the beach throughout the season locating and monitoring nests, they still miss a few because the turtle nested very early or late, between patrols or the large number of people using the beach obscured the turtles' tracks. Hatchlings from these 'wild nests' are of particular concern. Each year, at the tail end of the season, volunteers painstakingly scour the beach for any hatchlings that may have been disoriented by the lights and are straying towards the light and away from the water. Each year they rejoice over the successful release of several dozen 'wild' hatchlings, but also mourn unknown numbers of hatchlings that have emerged

from 'wild' nests and headed for the huge mast lights. Frustrated volunteers followed hatchling tracks that ended abruptly among dog or crow tracks or went right up to the tar roads and disappeared.

For years, SSTCN volunteers made representations to officials in the forest department and the Chennai Corporation. However, promises to change the direction of the lights or reduce their intensity or brightness never amounted to action. In the 2010 season, however, Mr. Sundararaju took charge as the Chief Wildlife Warden. He arranged a meeting with the Secretary for Environment and Forests, the Corporation Commissioner and a representative of the Fisheries Department. He gave SSTCN the opportunity to make a presentation highlighting the problems the olive ridley turtles face on this coast with particular emphasis on the damage caused by the bright mast lights.

Concerned by the situation, the Secretary, Mr. Sarangi, suggested that turtles also have a right to safely access the beach, and directed the Corporation Commissioner to arrange to switch off the lights with immediate effect as the hatchling season was already underway – a significant achievement and a real step in the right direction.



Figure 1. A mast light near Elliot's Beach switched off making the beach darker and safer for emerging hatchlings. Photo: SSTCN

However, by the time the 2011 season was upon us, both the Corporation Commissioner and the Secretary for Environment and Forests changed and there were real concerns about a consistency of approach with new officials in post. To our amazement and relief, within a week of delivering the usual letter of request to the Chief Wildlife Warden to switch off the mast lights, we were

informed that he had managed to get a Government Order passed stating that the mast lights on this stretch of beach from the Adyar estuary to Neelangarai covering the Elliot's, Thiruvanmiyur and Kottivakkam beaches, would be switched off from 11 pm till 5 am from January to April every year! Hopes are high that other stretches of the beach will follow suit.

Letter to the Minister of Environment & Forests, Government of India

Biswajit Mohanty

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Dated: 22nd October, 2010

Shri Jairam Ramesh,
Hon'ble Minister for Environment and Forests,
Government of India,
Parayavaran Bhavan, CGO Complex,
Lodhi Road, New Delhi - 110003

Please reply to email: kachhapa@gmail.com

Hon'ble Sir,

Re : Violation of CRZ regulations and Forest (Conservation) Act, 1980 by Essar Steel Orissa Ltd at Paradip, Orissa

Erosion of sea turtle nesting grounds at Gahirmatha Marine Sanctuary due to large scale sand dredging in Mahanadi river

Essar Steel Orissa Ltd (ESOL) is setting up a steel pellet factory at Paradip, Orissa with an annual production capacity of 6 million tonnes along with a captive power plant of 225 MW at a project cost of Rs.10,721 crores over a total land area of 1,925 acres. The factory shall be supplied iron ore in slurry form by a pipeline from Keonjhar district. This pipeline shall pass through both forest and non-forest areas.

ESOL was accorded environmental clearance on 29th May, 2008. The Company had suppressed and concealed material information while obtaining Environment Clearance as it has not disclosed that the project involves CRZ clearance. A part of the plant site is CRZ area and ESOL has dredged sand in CRZ area of Mahanadi river. The Forest and Environment Department, Government of Orissa has confirmed that no application for CRZ clearance has been received from ESOL for their Paradip project. (*Copy of RTI reply dated 1.1.2010 is attached – Annex I*).

State enforcement agencies though being aware of the violations have neither informed the MOEF nor have taken any penal step to stop work and prosecute the company for such violations.

The steel and power plant site is located on banks of the river Mahanadi whose mouth is only 8 km away. As there is tidal effect in these areas, this portion of Mahanadi river including the applicable shoreline lands are CRZ areas. We attach letter dated 3rd December, 2008 issued by ESOL to IDCO which reveals that the proposed site is CRZ. They have requested IDCO not to acquire private lands in the village of Udayabata since some plots had "*already gone under the water of Mahanadi*" (*Copy of letter dt 3.12.2008 is attached – Annex II*).

The state government is fully aware that CRZ land is involved since at a high level review meeting held on 11.1.2010 and 12.1.2010, the Secretary of Steel and Mines Department, Govt. of Orissa, had directed the company to seek CRZ clearance.

Quoting from the minutes... "*The Commissioner-Secretary advised the Company to obtain forest clearance without breaking the area to forest and non forest land and to obtain CRZ clearance*" (*A copy of the minutes is attached – Annex III*).

The Company started work in 2008 by filling up the site with sand dredged from the adjacent Mahanadi river. As per local reports, at least **12,00,000 cum of sand** has been dredged from the river. Two dredgers are working night and day for the last two and half years to excavate sand in CRZ areas and fill up the land, most of which is CRZ area. The local Tehsildar of Kujang has been receiving royalty on the sand dredged by the company since the last two and half years.

Mahanadi river washes down a huge quantity of sediment during monsoons, which is critical to the beach building process on the turtle nesting beaches of the Gahirmatha Marine Sanctuary. As the ocean currents flow for eight months of a year in a northward direction, such sediment load flushed out from the Mahanadi mouth is deposited on the shores of the marine sanctuary which lies to north of the river mouth.

Since the last two years, we have noticed a surprising and unprecedented erosion of the Kendrapada district coastline especially at Ekakula Pentha and Agarnasi areas which are known sea turtle mass nesting sites. Though sand isotope irradiation studies will reveal how much sediment from the Mahanadi bed ultimately lands up at the nesting beach, *prima facie*, there appears to be sufficient grounds to link the beach erosion with the enormous quantity of 1.2 million cum of sand which has been excavated since the last 30 months from the river bed by ESOL.

The Company has also violated the Forest (Conservation) Act, 1980. A total of 18.83 hectares of forest land is required (12.69 hectares for the steel plant and 1.42 hectares + 4.72 hectares for the pipeline). The company has illegally started work since 2008, on non-forest lands without obtaining forest clearance. The forest clearance diversion proposal and application was filed only on 7th December, 2009 (*Copy of covering letter is attached – Annex IV*).

The forest diversion proposal is yet to be forwarded to the Ministry as revealed by a recent letter dated 5th August, 2010 issued by the CCF, Nodal (*Copy of letter dated 5.8.2010 of the CCF, Nodal is attached – Annex V*).

Similarly, the pipeline construction has already been almost complete in the non forest areas of Keonjhar and Jajpur district and the forest patches are only left to be completed. This again violates guidelines issued under the Forest Conservation Act, 1980, since no work can be done on non forest land till forest clearance is obtained for the forest land comprised in the project.

We pray your honour to kindly consider our above

submissions and....

- a) Direct your officials to carry out a site inspection and use appropriate satellite imagery to uncover violations of CRZ, Forest Conservation Act, 1980 and the Environment Protection Act, 1986 and rules, guidelines and notifications framed thereunder;
- b) Consider a study by a reputed oceanography Institute to assess the impact of excavation of the huge quantity of sand from the Mahanadi river on the sea turtle nesting beaches of Gahirmatha Marine Sanctuary by carrying out radio isotope irradiation studies to assess dispersal of river sediment and role in beach building;
- c) Consider imposing penalties on the company for restoration of the illegal land use change of CRZ areas and loss of turtle nesting beaches;
- d) Direct the state government to provide the names of the officers who failed to enforce the CRZ regulations and the FC Act, 1980 provisions so that appropriate steps can be taken by the Ministry.

We further pray that based on the preliminary findings of the enquiry ordered you may be pleased to pass orders

- to keep in abeyance the environment clearance granted to Essar Steel Orissa Ltd. for their Paradip Steel Plant, captive power plant and slurry pipeline;
- and
- to issue a stop order to the project proponent till these violations are addressed.

With kind regards,

Yours sincerely,

Biswajit Mohanty, Secretary
Mobile No. : 9437024265

(Enclosed: Annexures I to V as referred above)

Students' Sea Turtle Conservation Network: A victory for volunteerism!

V. Arun

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Rising to the challenge

The Students' Sea Turtle Conservation Network (SSTCN) has risen to the challenge of a bumper turtle season in 2011 that has seen nest numbers matching highs last seen in the early 1990s. Being a voluntary group working with youngsters, this meant a quantum leap in terms of work and commitment, but it is a testament to the volunteers that the beach was patrolled every single night during the last season.

In 1991, SSTCN volunteers found 206 nests and released 12,465 hatchlings and in 1992, 175 nests resulted in the release of 16,643 hatchlings. However, nest numbers declined through the 1990s and just 17 nests were found in 1997. Although numbers started rising from 2000, volunteers were thrilled when a season yielded 5,000 hatchlings. The 2010 season, with 90 nests and 7,008 hatchlings, was the best in the previous decade. But 2011 has exceeded expectations. SSTCN volunteers collected 185 nests over a 14 km stretch and managed to release 14,238 hatchlings.

Table 1 provides a summary of the nests collected/protected and hatchlings released over the past 23 years.

The SSTCN

Established in 1988, SSTCN now works with a pool of around 30 volunteers. Some stay for several years while some work with the group for only a single season or even just part of a season. Some volunteers join the patrols or 'turtle walks' once in a fortnight, while some are willing to patrol three times a week. In general, volunteers are advised

not to patrol more than twice a week.

The group holds a meeting before the beginning of the season to draw up a schedule for the volunteers. Each volunteer commits to patrolling on a particular night or two nights in a week, though schedules can change during exams for student volunteers or other pressures for those who work. Detailed discussions are held about the rules to be adhered to including various 'Dos and Don'ts', especially for the benefit of fresh volunteers.

Every year, student volunteers graduate from college and may leave the city or have new responsibilities, leaving the group with fewer volunteers at the beginning of the season. During the last season, ten of SSTCN's best volunteers graduated from Anna University. However, the group was confident that if it could survive 22 years as a voluntary group, it could surely survive the 23rd year. However, at the time, we were not aware that we would be covering a new stretch of beach.

The SSTCN establishes a sea turtle hatchery each year on the Chennai coast. The group has traditionally covered the stretch of beach south of the Adyar estuary, a distance of about 7 km from Besant Nagar to Neelangarai. Some years, with additional volunteers, stretches of beach further south have been covered. Marina beach, north of the estuary, has not been covered in the past, as it is the oldest and largest public beach in Chennai, in the heart of the city, and with large numbers of people and lights, has not been known to receive significant nesting in the past.

The SSTCN starts its patrols at 12:30 am and if

volunteers do not find nests or tracks in the first two kilometres, they take a break and continue the walk after a couple of hours, thereby increasing coverage. At Marina beach, the patrolling is conducted around 3:00 am rather than at night. Both timings have their advantages and

limitations. Due to the high levels of disorientation of emerging hatchlings caused by lights on the beaches, volunteers have often stayed to patrol the beach the entire night over the last couple of seasons to ensure that all nests are relocated to the hatchery.

Table 1. Number of nests collected/protected and hatchlings released between 1989 and 2011

Year	Distance (km)	No. of nests	Density	No. of eggs	No. of hatchlings	Hatching success (%)
1989	6 - 15	68	~8	8,625	5,727	66.4
1990	15	55	3.7	6,635	4,240	63.9
1991	15	206	13.7	24,586	12,465	50.7
1992	15	175	11.7	19,626	16,643	84.8
1993	6	27 ^h + 33 ^w	10.0	3,198 ^h	2,974	93.0
1994	6	66 ^h + 20 ^w	14.3	7,621 ^h	4,938	64.8
1995	6	41 ^h + 26 ^w	11.2	4,920 ^h	3,134	63.7
1996	6	40	6.7	4,782	3,936	82.3
1997	6	17	2.8	2,166	1,488	68.7
1998	6	15	2.5	1,785	1,428	80.0
1999	6	47	7.8	5,664	4,871	86.0
2000	6	67	11.2	7,722	6,332	82.0
2001	6	105	17.5	12,705	7,623	60.0
2002	6	67	11.2	8,194	5,408	66.0
2003	6	57	9.5	6,580	4,982 (4,199 ^h + 783 ^w)	63.8
2004	6	56	9.3	6,656	4,828 (4,181 ^h + 647 ^w)	62.8
2005	7.5	65	8.7	7,061	2,207 (1,695 ^h + 512 ^w)	24.0
2006	7.5	51	6.8	5,656	3,077 (2,624 ^h + 453 ^w)	46.4
2007	7.5	66	8.8	7,483	2,461 (2,068 ^h + 393 ^w)	27.6
2008	7.5	69	9.2	8,015	5,473 (3,903 ^h + 1,570 ^w)	48.7
2009	7.5	64	8.5	6,991	5,552 (4,582 ^h + 970 ^w)	65.5
2010	14	90	6.4	10,223	7,008 (5,808 ^h + 1,200 ^w)	56.8
2011	14	185	13.2	20,204	14,238 (14,046 ^h + 192 ^w)	69.5

w- wild nests; h – nests in hatchery

In some years, a larger percentage of sterile eggs, high temperatures, or unexplained fungal attacks or attacks by a species of blind ants, caused low hatching of eggs.

Meet the volunteers

Prem, a weekend ‘turtle walker’ for two years, offered to walk twice a week through the entire season. He also offered to bring another volunteer. His friend **Vinod** and his wife – a young couple working in the IT sector played a very critical role this season, particularly on the Marina beach stretch, during both the nesting and hatching period. It would have been quite a struggle without them.

Harish joined the group on a public walk and subsequently offered to be a volunteer. Though the group gets many such offers each year, few of them deliver. Harish, however, while completing his final year in Engineering from the Regional Engineering College in Trichy, traveled 300 km every chance he got to join the ‘turtle walks’ – often every week. Straight out of the college, on to a long distance bus and straight off the bus for an all-night walk!

Shravan has been a regular volunteer with the group for five years now, from school days through college. He has remained fully involved and committed while playing high level cricket at the first division of Tamil Nadu State. Despite all the practice and matches, he has attended to the Besant Nagar hatchery for a large part of this season.

Karthikeyan has been involved with the group through school and several years of college while obtaining graduate and post graduate degrees. He committed an entire three months to sea turtles this season before beginning work. He was particularly instrumental in managing the patrols of Marina beach.

Ashok, an employee of IIT Chennai, had joined the group before on walks, but appeared mid-season with a group of colleagues and an offer to help, particularly when there was a crisis.

Diary of the season

By way of celebrating a successful season and reflecting on our experiences, we have created a diary of the season, which we hope will inspire other groups to share their experiences as well.

January 2011 – Total nests 27

SSTCN had a slow start to the year with only a few nests, apparently due to the unusual topography of the beach. Instead of the usual gentle slope, emerging turtles were confronted with a wall of sand running parallel to the water – in some places a foot high, but in most places more than three feet high. This accounted for about 80% of the beach covered by the group, making successful nesting impossible in all but a few short stretches. As January progressed, we noticed that a number of turtles were emerging, encountering the wall, crawling along it for a stretch, failing to find a way to get on the beach, and returning to sea. We wondered how the turtles would respond, and how long they would be able to hold the eggs before possibly abandoning them in water. We waited for the tides to smooth the profile of the beach, but we had to wait nearly a month before the beach returned to normal again.

Meanwhile, at Marina beach, after ongoing problems with recruiting paid staff to work alongside volunteers, we returned to our tried and tested formula of relying solely on volunteers. This meant we would need twice the usual number of volunteers every night, but we persevered and were successful to our great satisfaction.

February – Total nests 124

In the beginning of February, the high tides smoothed the beach and for the first two weeks, we collected a few nests as is usual during this part of the season. This was little warning for the bonanza that lay ahead.

On February 18th, we were joined by students of Asian College of Journalism and found 10 nests. This was the beginning of a very busy few days. 72 nests were collected in a matter of just 10 days – 36 on each side of the Adyar estuary.



Figure 1. A volunteer releases hatchlings.
Photo: SSTCN

Adhith Swaminathan, a long time SSTCN member and volunteer, who had just returned from a 3 month stint in Little Andaman Island tagging leatherbacks, encountered 11 nests on one of his first walks of the season. He suggested that this might be an indication of mass nesting in Orissa, and within a few days, mass nesting did begin in Orissa.

On weekdays, there are usually two volunteers on the patrols, but with such high nesting numbers, this could be a daunting task for volunteers. To compensate, volunteers worked additional nights and were available to help with the load. In addition to carrying multiple nests to the hatchery, relocation is time consuming and volunteers were often working well into the following morning. In addition, there were often nesting turtles to measure and collect data on. After two weeks, the euphoria of large numbers of nests began to wane and volunteers almost began hoping for a return to the normalcy of one or at the most, two nests a night. However, nesting did subsequently decrease, giving the group time to carry out the much needed expansion of the Besant Nagar hatchery.

Raising public awareness

The term ‘turtle walk’ is well established in Chennai today. Started by Romulus Whitaker and the Madras Snake Park Trust, it has been conducted by several groups over the years including WWF-India and other local NGOs. Hatcheries have been maintained over this period by the Madras Snake Park, Central Marine Fisheries Research Institute and the Tamil



Figure 2. SSTCN volunteers collect nest and egg data. Photo: SSTCN

Nadu Forest Department. The SSTCN established its first hatchery in December 1988 and has conducted these ‘turtle walks’ each season since then.

The group takes people with them on the patrols on Friday and Saturday nights throughout the season. Over the years, more than 25,000 people have joined the SSTCN on turtle walks, and this year, over 1,500 people participated in the walks.

In the last few years, the hatchery has become a place for education for the younger children who are unable to join the late night patrols. This year, more than thousand excited young children and their families visited the hatcheries and watched hatchlings being released.

March - Total nests 56, total hatchlings released 3,800

In the hatcheries, the first hatchlings of this year emerged on March 1, 2011 and emergences continued until May 16, 2011. Hatchlings do not always emerge from nests in the chronological sequence that nests were laid. Volunteers prepare by placing baskets over the next ten nests (or nests laid over the next week) that are expected to hatch. By mid-March, the Marina beach hatchery was also expanded and both hatcheries were covered with jute, which appears to have a positive effect on hatchling survival, perhaps by reducing temperatures towards the end of the season. The base of the hatchery walls was lined to ensure that no hatchlings escaped from the hatchery.



Figure 3. School children watch SSTCN volunteers in action. Photo: SSTCN

At this time, the workload increased on nightly patrols. Volunteers not only had to look for nests but also for hatchling tracks from 'wild' nests that had been missed and were not relocated to the hatcheries. This year, 192 'wild' hatchlings were located compared to 1,500 hatchlings two years ago. This may be due to improved strategies to reduce the number of nests missed.

Another huge achievement for the SSTCN this year was the passing of a Government Order requiring floodlights on the beach to be switched off during the sea turtle season (see Akila & Arun, this issue). This at least reduces the impact of one of the major threats to the hatchlings.

April – Total hatchlings released 7,953

Nesting appeared to have ended by April 1, 2011. At this time, the public 'turtle walks' were stopped to focus on the safe release of hatchlings. 185 nests had been relocated to the two hatcheries by this time and effort was required to ensure the careful release of hatchlings. A team was assigned to each hatchery on either side of the estuary to check on the emergence of hatchlings from 5:00 pm every few hours till the morning. This was in addition to two paid assistants from local fishing hamlets.

7,953 hatchlings were released in April. Rain showers during this period may have contributed to higher hatchling survival rates. In very hot years with no April showers, the survival rate of nests hatching later in the season is very low, probably due to very high sand temperatures.



Figure 4. Expansion work underway at the Besant Nagar hatchery. Photo: SSTCN

May – Total hatchlings released 2,278

When hatchlings began emerging, we hoped that we would cross 10,000, but the final numbers exceeded our expectations and we released a total of 14,238 hatchlings. By the third week of May, the volunteers dismantled the hatchery and stored materials safely for use again next year. The hatcheries are made of bamboo and the same material is used for about five years.

All the volunteers shared a sense of satisfaction and an understanding that the achievements resulted from the successful team work of people interested in sea turtles and the environment. Kudos to our volunteers and to volunteering!

Despite the positive story from this season, the beaches of Chennai continue to be vulnerable to major threats:

First, there is a proposed ten kilometer long elevated expressway (a thousand crore project) along the Chennai nesting beaches which is likely to have serious consequences due to vehicular movement and pollution, lights, destruction of habitat, displacement of fishermen and destruction of their homes and livelihood.

Second, as in previous years, numerous dead turtles were encountered, totaling nearly hundred this season. This of course is a larger problem along the east coast of India and needs to be addressed at a larger scale.

Profiles

Green Life Rural Association Devi Coast, Orissa

Sovakar Behera

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Orissa on the east coast of India is fast becoming ground zero in India's battle for a sustainable and just way of life. Faced with issues of displacement, malnutrition and environmental degradation, the state has experienced a spurt in the number of organisations working on environmental as social issues. Green Life Rural Association (GLRA) is different from most of these organisations in that it relies on funds generated at the grass root level, and still relies mostly on the voluntary efforts of its members.

GLRA was formed in 1993 by a group of thirteen committed village youth who were then working on the Wildlife Institute of India's sea turtle project. Members of GLRA also worked with Operation Kachhapa when it was launched, at the time as a joint operation with the Orissa Forest Department and Wildlife Protection Society of India.

GLRA's activities are focused in the Devi river mouth region. The mass nesting of the olive ridleys was first discovered in the Devi region in 1981. However, little attention has been paid to this area, with the mass nesting beaches of Gahirmatha to the north and Rushikulya to the south hogging most of the limelight. Devi suffered from the lack of attention paid to it. By 1993, much of the nesting space at this rookery had been lost to *Casuarina* plantations, ironically planted by the forest department, which is supposed to protect the interest of wildlife species such as the sea turtle.

Although significant turtle congregations have been observed in the area, mass nesting at this beach is infrequent, possibly a result of the

heavy illegal trawling that takes place in the area. However, the area remains significant on account of the sporadic nesting that takes place every year, though a majority of such nests are subject to predation. With the right amount of protection, it is hoped that the turtles will once again to return to Devi en masse.

Every November, members of GLRA commence a seven month long rigorous schedule of monitoring of the nesting beaches from Devi to Chilika mouth of Puri District and Devi to Paradip of Jagatsinghpur District. Walks are conducted on a daily basis from Devi to Kadua and on a weekly basis from Kadua to Chandabhaga. Twice a month, walks are also conducted from Devi to Paradip and once in month from Chandabhaga to Chilika mouth. An accurate count of dead turtles washed ashore is maintained, with care taken to avoid duplicate counting.

The sex of dead turtles is also recorded based on physical characteristics and sexual organs, where distinguishable. GLRA members have received threats of physical violence from some members of the trawling community, who do not wish to adhere to the no-fishing regulations in place from November onwards. This however has not deterred these individuals.

In 2002, GLRA started a project called "The Turtle Friends", identifying strategic sites for sea turtle nesting along the coastline to focus monitoring and protection in these areas. During the nesting season, records of nesting are also maintained. The main strategy adopted by the organisation



was to create awareness among, and mobilise the support of, Devi's considerable traditional fishing community to protect the olive ridley turtles. GLRA also helps in educating children in the traditional fishing villages. It has also set up self-help groups to generate funds for needy villagers and members of groups interested in taking up part time work. Among its associated activities, GLRA has also helped educate the villagers on the hygienic preparation of dry fish for sale.

GLRA has prepared a comprehensive action plan to protect turtles along the coastline and has also constituted monitoring groups that will help ensure effective implementation of the work. Education and awareness programmes have been instituted in coastal villages by GLRA aimed at involving and mobilising the local fisher folk. As a result of GLRA's efforts, residents of several nearby villages (Gundalaba, Sudhikeswar, Sahana, Ainsinian, Dealuakani and Chandrabhaga) have joined the organisation as full time supporting members.

With the cooperation of traditional fisher folk, in the 2005-06 turtle season, GLRA managed to convince the traditional fishing community that protection of the turtle is in their best interest. Common ground has been built with the traditional fishing community since they are also at the mercy of Orissa's huge trawler fleet, which leave little for the smaller fishermen.

A key aspect of GLRA's turtle conservation work is the awareness programme it has launched in the coastal villages of Puri District, using a group of seven musicians and singers. Through creatively designed songs and dances held before village audiences, the group throws light on the basics of turtle biology, the importance of the species in the ecosystem and the recommendations of the Central Empowered Committee of the Supreme Court, which has recognised the important role to be played by the traditional fishing communities of Orissa in turtle protection. This is perhaps one of the few examples in the country where small village level groups are explaining the orders of

the highest court in the land to those most affected, at the grass roots level. In the near future, the group plans to include the villages of Jagatsinghpur District in this programme as well.

In the year 2007-08, GLRA started a programme to control the stray dog population in the Devi mass nesting area with the help of Blue Cross of Hyderabad and Department of Animal Husbandry, Government of Orissa. Also, as part of our green campaign in the same year, GLRA distributed 500 fruit tree saplings (mango, coconut and lemon) among 1,000 fisherman families on the Devi coast as an alternative source of livelihood of the fishing community.

In the year 2009-10 GLRA built an artificial reef with the help of the local fisher community and funding support from the Orissa Marine Resources Conservation Consortium (OMRCC) to create fish reserves in some parts of the mass congregation area in Devi. This artificial reef (made of concrete blocks) will stop net fishing in the area and may provide shelter for fish and marine life. Fisherman can catch fish in this area by hook and line and this also opens up a potential avenue for ecotourism

through angling.

GLRA has also started a new programme with the help of FSL-India to bring volunteers to work in Devi on the Turtle Friends project.

GLRA is an example of how a small, grass roots level organisation with limited funding and manpower can still make a difference to the planet we live on.

Any individuals or organisations who are interested in working with GLRA to help protect the endangered sea turtles are welcome. To find out more about GLRA and how you can help them in their mission, contact:

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James N.J.

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The organisation “Habitat” was formed in 2001 by a group of high school science teachers in Guruvayur. These individuals decided to further extend their activities for the conservation of the environment and thus evolved a branch “Green Habitat” in 2002 which subsequently became an independent organisation. The organisation pilots activities for wildlife and environmental conservation in Chavakkad taluk in Kerala. Our areas of focus include the mangroves of Chettuwai, nesting turtles of Chavakkad beach, birds of Enamakkal Kole lands and house sparrows, among others. A

major part of our efforts towards conservation is directed towards environmental awareness and education among local communities in the area.

We work hand in hand with local bodies and local self-government institutions like the Mullassery Block Panchayath, Pavaratty Grama Panchayath, Chavakkad municipality, Seethi Sahib V.H.S.School, Edakkazhiyur, Open Scout Group of Enammakal, and various voluntary and other local clubs. The community readily accepts and acknowledges our activities.



Activities:

Our main activities include:

1. Protection to nesting turtles and eggs during the nesting season at Chavakkad. In 2010, following the completion of ten years of the establishment of the organisation, we started the Kadalamakale Samrashikkuka (or “Save

the sea turtles”) programme.

2. Planting and protection of mangroves in the backwaters of Pavaratty – we have thus far planted twelve thousand seedlings.
3. Protection of common sparrows – we built and distributed 50 nests and guarded them during January and December 2010.



The organisation currently consists of ten members. We organise our awareness and other programmes in collaboration with other organisations and institutions like schools, colleges and local youth clubs. Our turtle conservation programme is run primarily in collaboration with the Seethi Sahib V.H.S. School in Edakkazhiyur. The school's National Green Corps members are our main volunteers, some of whom are also our associate members. A majority of these members belong to the local fishing community. Through their involvement in our activities, we are able to reach out to the local community at large.

Plans for the future:

Having gained recognition in the area and being successful in involving local communities, we would like to extend our current activities to include the following:

1. Establishing a hatchery at the Chavakkad beach area and setting up a turtle exhibition centre.
2. Involving local communities and government agencies in making the beach in Thrissur

district 'turtle friendly'.

3. Establishing a nursery for mangroves and facilitating the collection of saplings from various sites.

Role within the network (TAG):

Green Habitat became part of the Turtle Action Group in 2010. As part of this network, we seek general guidance and assistance with the design and execution of turtle conservation programmes. We now also have the opportunity to interact with other organisations, visit their field sites and discuss common issues and potential solutions.

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1st Announcement
32nd Annual Symposium on Sea Turtle Biology & Conservation
11 - 16 March 2012, Huatulco, Oaxaca, Mexico

Ana R. Barragán

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The Annual Symposium on Sea Turtle Biology and Conservation, conducted every year by the International Sea Turtle Society (ISTS), is a unique event that draws participants from around the world, from across disciplines and cultures to a common platform: sea turtle conservation. The symposium encourages debate, discussion and the sharing of knowledge, research techniques and lessons in conservation to address questions in biology and conservation of sea turtles and their habitats. The 32nd Annual Symposium will be held in Mexico for the third time, but will be its first visit to the beautiful state of Oaxaca, a wonderful region with strong cultural relationships with sea turtles; Bahías de Huatulco, where the meeting is convened, is a paradise located in the southern coast of the Mexican Pacific, with nine bays of brilliant cobalt blue waters. Bahías de Huatulco offers natural settings that invite visitors to alternative tourism, extreme sports and ecotourism activities. With the imposing South Sierra Madre as a background, 36 beaches compose this paradise isolated from the mainland by 21,000 hectares of dry forest that's part of a natural protected area.

Theme: *Time for Innovation*

This time the Symposium will be focusing on innovative aspects of sea turtle conservation: new techniques, new approaches and new actors. For conservation and research groups in many countries, Mexico included, it is time to revisit the objectives and conservation strategies that have been in place for decades, and go a step beyond the routine; it's time to open up to a new generation of players with new ideas and new energy, to learn from difficulties of the past and to adopt and reinforce the successes.

When and where?

Symposium dates: 13 – 16 March, 2012

Workshops and Regional Meetings: 11 – 12 March, 2012

Venue: Las Brisas Huatulco Resort (<http://www.brisashotelonline.com/huatulco>)

For 2012 we expect about 800 participants from 70 countries around the world. The Symposium's venue is located in Tangolunda Bay, about 5 km from the port of Santa Cruz Huatulco and a 30 minute ride from Huatulco International Airport.

Symposium agenda

The Mini-Symposium "The Sea Turtles of Mexico" will celebrate the conservation and research about these species in this country, home of one of the oldest sea turtle conservation programmes in Latin America. We'll also host numerous thematic oral and poster sessions to discuss the main subjects regarding sea turtle biology. Prior to the main academic Program, we will host several regional meetings and workshops that will enrich our knowledge and complement our capacities for reaching our conservation goals.

Travel and accommodation

Huatulco is an ideal destination that has something for everybody. Huatulco National Park offers a range of activities from fantastic diving spots to mountain trails for bird watching. La Crucecita and Santa

María Huatulco towns have all kinds of handcrafts shops and restaurants, where you can enjoy the great, world-renowned Oaxacan cuisine.

The hotel offers the All-Inclusive system, which means that all delegates that stay in the venue will have access to all the hotel facilities and meals and drinks covered. Las Brisas is a fantastic hotel with beautiful white-sand beaches, 20 hectares of lush gardens and many restaurants, meeting halls, swimming pools and outdoor spaces, so we hope that it will promote interaction with other delegates, networking and catching up with old friends. More information on registration and hotel booking will come soon.

Online symposium information

Information about the 2012 Sea Turtle Symposium will be available online at: iconferences.seaturtle.org.

By registering as a member of the International Sea Turtle Society (at seaturtle.org), you will be sent regular updates of symposium related information

including deadlines for submission of abstracts and applications for travel grants, symposium schedule and other related activities and announcements.

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Cover photograph: An olive ridley turtle crawls ashore to nest in Rushikulya, Orissa. (Photo Courtesy: Adhith Swaminathan).

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