

SAILING THE FLAGSHIP FANTASTIC: Different Approaches to Sea Turtle Conservation in India

Kartik Shanker* and Roshni Kutty**

* Ashoka Trust for Research in Ecology and the Environment

kartik@atree.org

** Kalpavriksh

roshi73@rediffmail.com

ABSTRACT As a part of mythology, sea turtles are worshipped in many parts of India. In recent times, they have also become flagships for conservation, with champions amongst wildlife conservationists as well as local communities. Sea turtle conservation in India by the state and non-governmental organisations is about thirty years old. What started with a conservation programme by a group of dedicated individuals in Madras and a research programme by the state Forest Department at the mass nesting beaches in Orissa has now spread to most coastal states in India. While some turtle conservation projects are still run by the respective state Forest Departments, many are run by non-governmental organisations, ranging from students to animal activists to local communities. Of particular interest is a students' group in Madras, which has survived despite the lack of formal structure, principally due to the attraction of working with sea turtles. Of even greater interest are the fishermen of a small hamlet in Kerala, who started with a sea turtle conservation programme, and thanks in part to its success, are now leaders of their community on a number of social and environmental issues. On the other hand, the very visibility of sea turtles in Orissa may have promoted the creation of a rift between diverse communities of fishermen and conservationists; and the species has, instead of being a source of pride and valued heritage, become a bone of contention in a highly polarised and politicised battle. Hence, the use flagships can sometimes drive conservation and social change, and at others, be a detriment to both environmental and social development.

Introduction

Sea turtles have captured the attention of both biologists and lay persons, attracted by the astonishing ability of these animals to migrate across oceans and dive thousands of feet, as well as other remarkable features of their lives. Many people have been fascinated by these creatures, that appear briefly on land to nest, and then disappear mysteriously into the oceans. This fascination with these reptiles is not new; one of the earliest written records of marine turtles in India is from southern India in Tamil Sangam literature (circa fourth century A.D.), in a poem which describes a nesting turtle (Sanjeeva Raj 1958). Sea turtles have also been intensely exploited over centuries for their meat (mainly green turtles, *Chelonia mydas*), shell (hawksbill turtles, *Eretmochelys imbricata*) and eggs (all species) in the Indian Ocean (Frazier 1980a) and elsewhere, and this has led to drastic declines in many populations (Pritchard 1997).

Five species of sea turtles are found in Indian waters, and four of them nest on either the mainland or offshore islands, but only the olive ridley turtle (*Lepi-*

dochelys olivacea) nests along most of the mainland coast. Although they are the smallest of the sea turtles, in recent times olive ridleys have attracted much attention because of extensive media coverage of their extraordinarily large numbers both nesting and also stranding dead, particularly in the state of Orissa. Olive ridley turtles nest along both coasts of India and the offshore islands, including the Lakshadweep off the west coast, in the Arabian Sea, and Andaman and Nicobar islands in the Bay of Bengal, off the east coast (Kar and Bhaskar 1982). Low density nesting (one to five nests with eggs/km/season) probably occurs along the entire coast wherever sandy beaches are available. On the east coast, a few thousand turtles nest annually in both the states of Tamil Nadu (Bhupathy and Saravanan 2002) and Andhra Pradesh (Tripathy, Shanker, and Choudhury 2003); and over a hundred thousand turtles nest most years during mass nesting events, or 'arribadas', at Gahirmatha in Orissa (Shanker, Pandav, and Choudhury 2004). There is evidence that fishing intensity throughout India has more than doubled over the last two decades (Rajagopalan *et al.* 1996), and while intentional take of turtles has declined, incidental mortality seems to have increased substantially (Pandav 2000; Shanker, Pandav, and Choudhury 2004). Rajagopalan *et al.* (1996) report a threefold increase in mechanised craft in India from 19,210 in 1980 to 47,706 in 1994. During the same period, non-mechanised craft remained almost constant at about 150,000, and motorised craft (traditional boats with outboard motors) increased from just a few to 36,000. Each season for nearly two decades, thousands of dead olive ridleys have washed ashore on the coast of Orissa, drowned in fishing nets (Silas *et al.* 1983; Pandav 2000; Wright and Mohanty in press). Several hundreds of olive ridley carcasses also wash up every year south of Orissa, on the coast of Andhra Pradesh (Tripathy, Shanker, and Choudhury 2003), and also in Tamil Nadu (Bhupathy and Saravanan 2002). In addition to fishery related mortality, olive ridley populations are threatened by pollution, habitat destruction (for example, sand mining, beach armouring, and lighting), and depredation of eggs (see Shanker and Choudhury 2001).

In many parts of the Indian subcontinent, adult sea turtles have not been intentionally harmed because of Hindu religious beliefs that turtles are an incarnation of Vishnu, one of the Gods of the Hindu 'trinity', though they were killed for oil in Gujarat and Lakshadweep, and for meat in Tamil Nadu, West Bengal, and the Andaman and Nicobar Islands (Frazier 1980a; Kar and Bhaskar 1982). Muslims in the region generally do not eat turtle meat products because Islamic custom does not approve of it, although eggs are often consumed and other products may be used for a variety of purposes (Frazier 1980a). Christian and ethnic tribal communities do eat turtle meat and eggs, and one group in Tuticorin, Tamil Nadu, was even organised for drinking fresh turtle blood (Valliapan and Pushparaj 1973). In the past, when turtle eggs were exploited, many communities would leave a few eggs (two to five) in the nest, in theory to ensure the perpetuation of the species (Madhyastha, Sharanth, and Jayaprakash Rao 1986; Giri 2001; Shanker personal observation), though it is unlikely that so few eggs would hatch or emerge or contribute to the survival of the species.¹ In any case, this tradition appears to have disappeared, or at least reduced (Giri 2001; Shanker personal observation).

Modern-day sea turtle conservation in India began almost simultaneously in Orissa and in Madras. While the former was a government driven programme with the Forest Department at its helm, the latter was initiated by wildlife enthusi-



Figure 1. Map of India showing locations of the states of Orissa and Kerala and Madras city.

asts and has remained largely a voluntary, non-governmental effort. More recently, a fishing community has led a turtle conservation programme in the state of Kerala. These three programmes are diverse in geographical location, cultural representation, and conservation issues addressed, and in their impacts on turtles, on the principal actors involved with turtles, and on other members of their respective broader societies. They each involve representatives from government, non-governmental organisations and local communities at diverse levels and in diverse ways. Some of these programmes, and others that have since sprung up around the country, have explicitly and implicitly used sea turtles, in particular the olive ridley, as a flagship to motivate and mobilise interest and conservation actions.

In this paper, we describe the three cases listed above, and discuss a few important issues related to the nature of each programme, the people involved, the impact of these programmes on sea turtles and conservation, and the repercussions at a broader level in the communities involved. Key questions are: How did different communities and agencies use sea turtles as flagships? What were their impacts on sea turtles and conservation? Are there successful models of conservation that can be extended to other areas? Are there important lessons to be learned from these examples? We hope that understanding some of these issues will lead to the refinement of ongoing conservation programmes and initiation of new, appropriate projects for sea turtle conservation, as well as greater citizen participation in the overall process of nature conservation.

Madras: Turtle Walks and Turtle Talk²

Background

Madras (now known as Chennai) is in some sense the birthplace of sea turtle conservation in India. Madras is situated on the thirteenth north parallel and eightieth east longitude on the Coromandel Coast in the southern part of the Indian peninsula (Figure 1), and is one of the major metropolises in India. In the nineteenth century, the city became the capital of Madras Presidency, the southern division of British Imperial India. After independence in 1947, it became the capital of Madras State, which was later renamed Tamil Nadu. In 1971, a few dedicated wildlife enthusiasts began walking the beaches of Madras to document the status of and threats to sea turtles. Amongst these were S. Valliapan and Romulus Whitaker, the latter who was the founder of both the Madras Snake Park and the Madras Crocodile Bank. They were joined in 1974 by Satish Bhaskar, a pioneer field biologist who surveyed thousands of kilometres on foot, including most of India's beaches, mainland and island, in search of sea turtles and their spoor.

The Early Years

In northern Tamil Nadu, nesting occurs primarily along a fifty kilometre stretch from the mouth of the Adyar River, Madras, to Kalpakkam to the south (Valliapan and Whitaker 1974; Shanker 1995; Bhupathy and Saravanan 2002). The first sea turtle hatchery was established in the backyard of one of the volunteers, under the auspices of the Madras Snake Park. A total of about 200 clutches were collected during the first four years (Whitaker 1979). In 1977, the Central Marine Fisheries Research Institute became involved and established a hatchery for research at Kovalam until 1982 (Silas and Rajagopalan 1984). As the idea of sea turtle conservation and hatcheries became more fashionable, from 1982 to 1988, the Forest Department set up several hatcheries along the Tamil Nadu coast, three near Madras and two near Nagapattinam (Moll, Bhaskar, and Vijaya 1983). Not all of this development of new hatcheries and projects was necessarily to provide better coverage; in some cases it was a means of the state taking control. In the 1980s, 'turtle walks' for the public quickly gained in popularity; at first they were organised mainly by the Madras office of World Wide Fund for Nature (WWF), but a number of other smaller, local groups soon became involved. Often, the groups would collect eggs during their walks and relocate them to one of the Forest Department's hatcheries. Some of the members of this informal group decided to constitute an organisation when the Forest Department closed down its hatcheries in 1988.

Methodologies

The Students Sea Turtle Conservation Network (SSTCN) was formed, and established its first hatchery, in December 1988. Its activities included beach monitoring, hatchery management, protection of clutches left in the beach ('*in situ* nests'), and education and awareness campaigns; the programme has continued from 1988 until present (see Shanker 2003 for a review). Each season, the group establishes a hatchery at Nilankarai, and every night from end-December through mid-March, the same seven kilometre stretch of beach has been patrolled. Some years, when there are enough volunteers, the patrolling extends an additional five to ten kilometres

beyond Nilankarai to the north. Due to egg predation by feral dogs and people, most nests along this stretch are highly vulnerable. Consequently, most egg clutches that can be found are relocated to the hatchery. At the hatchery, nests are monitored and a few days prior to expected emergence of hatchlings they are enclosed with plastic or thatch baskets to restrain the hatchlings from crawling on to the beach, where chances of predation are high. Hatchlings are released at the edge of the sea the same night of emergence, and the respective nests are excavated to evaluate hatching success. Experiments with nest spacing and shading have been conducted to improve hatching success, which has remained over eighty per cent during most years since 1992 (Shanker 1995, 2003). Average densities on the beach range from ten to fifteen nests with eggs per kilometre, and the group has collected between fifty and two hundred clutches per year (now totalling some 120,000 eggs) and released about 80,000 hatchlings over the past fifteen years (Shanker 2003). Since 1988, the SSTCN has also been conducting education and awareness programmes. Every weekend during the season, members of the general public and students from Madras accompany the SSTCN on 'turtle walks' when they are educated about sea turtles and conservation.

Method in the Madness

Remarkably, the SSTCN has mainly been organised and operated by students, aged sixteen to twenty-five. While a few 'non-students' (lawyers, biologists, conservationists, business professionals, et cetera) have advised, the leadership, organisation, and manpower have principally been from this age group. Once students finish courses, they routinely leave Madras after participating in, or leading, the organisation for two to three years, so the SSTCN has seen a high turnover of both membership and leadership. It is surely common to have a voluntary student workforce, but to have a constantly changing leadership that has also been consistently young and inexperienced (with little prior organisational skills) is unusual. Although these students come from different institutions, and the organisation and transition processes have been informal to the point of being chaotic, the organisation has survived, which shows how powerful an idea can be once it has taken root. In fact, every two or three years there is usually some concern about whether the group will survive, and some introspection about what their objectives are and what they actually achieve in terms of sea turtle conservation.

Two points are notable about these transitions. First, individuals have often been replaced by groups. When an individual who has grown into a role of leadership leaves, it has often been a collective that has had the courage to take over the organisation. From this collective, often a single person has then evolved to take on a leadership role. Second, over the years the group has also often resisted efforts by older members and participants to give the SSTCN better organisation and greater stability. It seems unlikely that this was out of any conscious decision to keep the organisation at the level at which it was founded; rather, it seems that the short terms of any managing group prevented them from taking any actual steps to effect reorganisation. In recent years, the SSTCN has functioned around the leadership of a schoolteacher and, while bringing continuity to the leadership, much of the beach work and education activities are still carried out by the students.

How did this group with limited experience, no training on turtles, and limited access to technical literature, become so motivated that they worked against

these limitations to inform themselves and then put into practice the best techniques that they could find out about? Informal training came from a number of sources. Since there had been some form of turtle conservation (and hatcheries) in Madras since the 1970s, the methods were passed on from year to year. The founders of the SSTCN had interacted with WWF and other groups that conducted turtle walks in collaboration with the Forest Department. Even more important, Satish Bhaskar was based in Madras from 1988 to 1991, serving as mentor for the students and working for the SSTCN during the 1989-90 season. He was thus able to inspire and inform the students through his participation in the activities. Others, such as Romulus Whitaker and Harry Andrews of the Madras Crocodile Bank, were also available to provide support.

Another important development in the history of the group was the initiation of the beach management programme in 1994. What made the group take the decision to stop doing what is so attractive -- to save every egg and move it to the protected environment of a hatchery? How did the group recognise and develop more adequate management practices? (see Mortimer 1999). It is not clear how this idea originated, but discussions among members of the group indicated that there was a recognition of the need for long-term solutions. The hatchery was seen as a short-term measure, and it was generally agreed that a wild species could not (or should not) be indefinitely dependent on human support. The hatchery and hut (a thatched temporary structure) were seen as necessary for: (1) having a physical presence on the beach for the fishing communities to identify the group with; (2) having a physical structure that the 'turtle walk' participants could associate the group with; (3) providing shelter for the group members, and storage of equipment; and (4) perhaps most importantly, providing hatchlings for display to the public. Hence, it was recognised to some degree that the hatchery was an educational/public relations device. However, even in an educational programme, it was suggested that the right models of conservation should be conveyed, and that beach management was a more suitable long-term option than hatcheries. In the mid-1990s, an attempt was made to start *in-situ* conservation, where a certain proportion of clutches were left in the beach exactly where they were found, and subsequently monitored (Sivasundar *et al.* 1994, 1995). This programme was discontinued in subsequent years, due to loss of eggs, and the greater effort required for monitoring these *in situ* nests.

A question that has often provoked heated debate both within and outside the group is the utility of such hard work and dedication just to release a few thousand hatchlings each year. This result comes after much effort in organisation, long nights walking beaches and never seeing a turtle, and sacrifices to time that could be otherwise spent in studies, with family, or in more conventional hobbies, not to mention the expenses often incurred to each participating student. When the problems that face the hatchling are seemingly insurmountable -- it has been suggested that one in 1,000 or less survive to reach maturity (Frazer 1986) -- it is often questioned if all the effort is really helping the turtles. Perhaps the answer lies in viewing the SSTCN as an outreach programme rather than strictly as a wildlife conservation programme (something that many members of the group, but not all, do realise). Thanks to the students' network, thousands of people in the Madras area have been on a turtle walk, many have seen hatchlings -- which are indisputably amongst the most charismatic ambassadors of conservation --, and a few have even had the for-

tune of seeing a nesting olive ridley. Many student members have been motivated to pursue careers in ecology, ecotourism, wildlife management, and conservation. Even if they are doomed, and sea turtles on the Madras coast do not survive the coastal development, fisheries, and other threats, these turtles (and hatchlings) still help conservation through their singular contribution to education and outreach programmes. They help motivate and shape young ecologists and conservationists who might go on to save turtles or other species of wildlife elsewhere. Notably, in 1999 and 2000, two out of three research projects that were carried out on olive ridleys in Orissa (Ram 2000 and Shanker *et al.* 2004) were led by biologists who earlier were involved with turtle biology and conservation through the SSTCN.

One of the major lacunae in SSTCN's programme has been its inability to involve local fishing communities in sea turtle conservation. The *in situ* approaches that were initiated briefly in the 1990s were to have been coupled with education and awareness programmes for the fishing youth, but the programme did not take off. Another failing of the SSTCN has clearly been that it has addressed primarily an urban, middle class, English-speaking audience. This is probably because of the initial composition of the SSTCN and the manner in which it perpetuates itself, which is largely by recruiting peers and juniors from the same institutions which the current leaders and members attend. Interestingly, the founder members had amongst them a young Ph.D. student from a fishing family, and the hatchery also employed a retired fisherman and interacted regularly with his family. However, interactions with the fishing community did not extend further, and representation of this sector of society has not continued in the SSTCN.

It is notable that another citizens' organisation, TREE (TRust for Environmental Education), has now involved the youth from four fishing villages along the Madras coast in sea turtle conservation near their respective villages (Dharini 2003). The youth are involved in patrolling and monitoring their beaches, protecting nests *in situ*, relocating endangered clutches, and spreading awareness within their respective community and others about the necessity for sea turtle conservation. Another new group has been formed further south along the coast near Nagapattinam, called the Students Sea Turtle Network, Tranquebar (S. Bhupathy pers. comm.). Thus, it seems that the Madras students network has inspired other groups in the country, but most notably a group of young fishermen in Kerala that we discuss in the next section.

Though nesting along the Madras coast has been extremely low in some years (2.5 nests/km), there does not appear to have been an overall decline over the last fifteen years (Shanker 2003). While the long-term conservation programme may have prevented a drastic decline thus far, the intensity of threats has increased (Shanker 2003). The main threat to adult sea turtles along much of the Indian coast is fishery-related mortality, with about ten to twenty dead ridleys washed ashore every season on the northern coast of Tamil Nadu. Fishing villages dot the entire coastline of the state, and opportunistic egg poaching by members of the fishing community and other communities living on the coast, as well as depredation by feral dogs, are major problems (Shanker 1995). Furthermore, as residential, middle class colonies spread along the coast, beachfront lighting and subsequent disorientation of hatchlings is becoming a serious problem along a greater stretch of this coast each year (Shanker 2003).

Given the threats to this nesting area, there has probably been a lurking suspicion in the minds of most SSTCN members that this is a 'doomed population'. Yet the group has resisted many odds to stay active and carry out the programme year after year. This dedication probably has a great deal to do with the charm and mystery that surrounds sea turtles. The operational difficulty of working at night is probably an added attraction. In that sense, the olive ridleys of Madras have been extraordinary flagships, in that they have promoted conservation even though there may be little chance of their own survival.

Kolavipalam: From Turtles to Communities³

Background

The turtle conservation effort by the fishing community at Kolavipalam, Kerala, has, in a short time, achieved a great deal, not only for the conservation of the turtles and coastal ecosystems of the area, but also for social mobilisation in other spheres, including bringing basic amenities to the village. Kolavipalam is a small fishing hamlet (an 'election ward' in local administrative terms) located in Iringal village, near Payyoli, in Kozhikode District, north Kerala. The community-conserved area is an eight kilometre stretch of coastal village, extending from the Kottapuzha River mouth in the north, to Payyoli in the south (Figure 2). Excluding a one kilometre stretch from the river mouth to the south, a sea wall has been erected along the coast, with intermittent gaps left for beaching traditional fishing boats. Olive ridley turtles crawl through these openings to nest on open, sandy beaches, and they also nest on the narrow sandy stretches between the sea wall and the sea. Human habitation is present very close to the shoreline along this beach, and private coconut plantations occupy the space between these habitations and the sea wall. The buildings are mostly of the traditional style of mud and wattle houses with tiled roofing. Around 140 families (ninety-seven per cent Hindus and the rest Muslims), with a population of approximately 840, inhabit this area.

The Kottapuzha Estuary is roughly in the shape of a cross, with its mouth facing west. The Kottapuzha River forms the eastern arm, and the Arabian Sea lies to the west. The tidal waters of the estuary flow back in either a north or south direction up to a distance of roughly six kilometres. Kolavipalam is located near the southern portion of the brackish water arm (Figure 2), and mangroves grow in the brackish estuarine regions. A sea wall has also been constructed with granite boulders north of the estuary, from the river mouth to Chombal, the nearest landing centre fifteen kilometres to the north.

Although fishing at sea continues to be the major occupation in the Kolavipalam community, many in the current generation of fishermen have either changed their occupation or supplemented fishing with other sources of income. This is due to both depleted fish resources and aspirations for a better living standard. The men work as self-trained electricians, autorickshaw (three-wheel scooter) drivers, and casual labours, or run bakeries and other kiosks selling general household items and snacks. Dry fish export was earlier a major source of income for this village and employed around 500 fisherwomen. Due to beach erosion, space is no longer available for the women to dry large quantities of fish and most of them are now unemployed.

SCHMATIC DIAGRAM OF KOLAVIPALAM

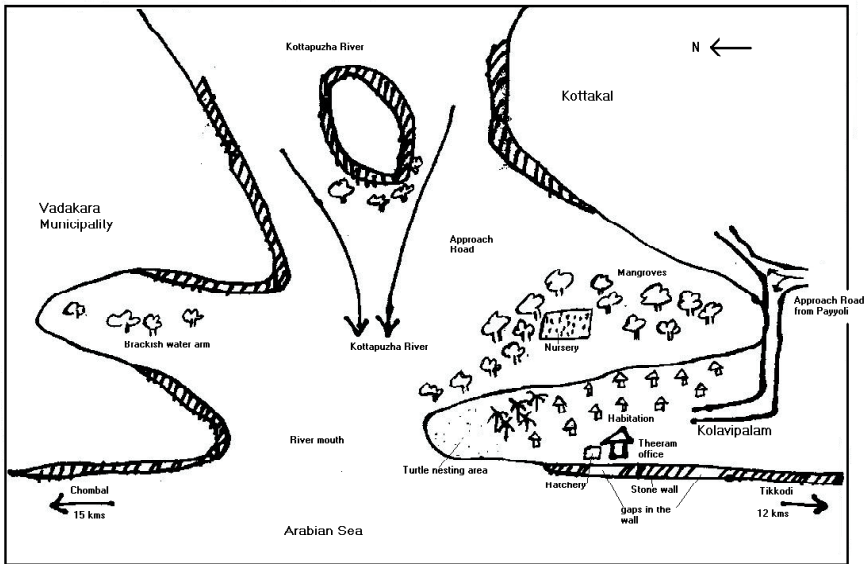


Figure 2. Schematic Diagram of Kolavipalam, Kerala, showing Kottapuzha River, Estuary, and surrounding area.

Turtle Conservation in Kolavipalam

In 1992, some of the village youth came across an article in *The Hindu*, a major national newspaper, about the endangered status of olive ridley turtles. Realising that the marine turtles which nested on their beach, and whose eggs were consumed locally, were the same endangered species, they initiated efforts at understanding and protecting them. They formed a group called *Theeram Prakriti Samrakshana Samiti* (Coastal Ecosystem Protection Committee) with twelve founding members. The group was later supported by the state Forest Department. By 1997, the Divisional Forest Officer encouraged the local youth to keep watch over the beach through the payment of wages to six members during the nesting season from October through March. Remarkably, these members pooled their wages and used them to fund *Theeram's* conservation activities (see Kutty in press).

The conservation efforts at Kolavipalam include two main activities: (1) protection of the eggs of olive ridley turtles, and (2) reforestation of mangroves in the Kottapuzha Estuary. During the nesting season, the group members monitor the beach each night for nesting turtles. The eggs of all nests that are encountered are relocated to a locally constructed hatchery made of thatch with a fence about two metres high to provide protection from stray dogs and jackals. The members record details such as the clutch size and hatching dates. On emergence from the sand, the hatchlings are released into the sea. Before the involvement of the Forest Department, funds for paying a watchman to guard the hatchery were generated by donations in cash and kind from within the group and the community.

Theeram members convene their meetings in a small thatched structure, about four by four and a half metres, that has been constructed with financial aid from the Kerala Forest Department. It is located close to the hatchery and is also used as a storage space and a shelter where the patrolling members rest at night

between beach sorties during the nesting season. Exhibits of turtles, hatchlings, and a photo album of their activities are displayed. A glass tank with a few hatchlings and juveniles is kept for display to visitors. These captive hatchlings are released into the sea after a few weeks. On one occasion, *Theeram* members tried to rescue and rehabilitate a badly injured turtle. In this case, it was the womenfolk from the community who nursed the turtle. Though the animal did not survive, it attracted public attention and helped spread the conservation message. Over the years, the number of turtle nests that have been protected by *Theeram* members has increased. This is partly due to increased awareness among the village fishermen who report freshly made turtle nests when they return at dawn after fishing. Increased media publicity about *Theeram's* protection efforts has also helped spread awareness among the neighbouring coastal villages. Fishermen from as far as Thikkodi, twelve kilometres to the south, call *Theeram* members or bring turtle eggs to Kolavipalam for protection. *Theeram* members encourage these fishermen to protect the nests *in situ* and advise them on protection measures. Where *in situ* protection is not possible, the eggs are transferred to the *Theeram* hatchery.

Initially, the group was completely ignorant of basic facts concerning sea turtles and their biology. *Theeram* members relate how they 'discovered' the hatching time for turtle eggs. They kept watch over the eggs for thirty-two days (assuming that it took a similar hatching time as a poultry egg) and then extracted an egg every week to see the stage of development as well as to ensure that the eggs were still alive. It was the motivation to protect the turtles that prompted these youth to find and read related literature, and to conduct successful hatchery operations. This investment in reading environment-related literature led *Theeram* members to realise the importance of mangroves in protecting turtle nesting habitats and their own village, which was being threatened by coastal erosion. Thus, the initial goal of turtle protection prompted them to go beyond merely protecting these animals to try and conserve their coast. To engage students from both within and outside the village, *Theeram* members used the attraction of turtles to create interest in the younger generation, and motivate them to participate in the mangrove reforestation programmes that were carried out with the help of the Forest Department.

Mangrove Reforestation

Having realised the important role of mangroves in the coastal ecosystem, the group started a mangrove reforestation programme in about five acres of the estuary. This activity began in 1998 with nature camps conducted by the Forest Department in collaboration with local non-governmental organisations to educate the residents of the village. Through the course of these interactions, *Theeram* members and village residents were made aware of the role of mangroves in protecting their coast, which was -- like the rest of Kerala coast -- subject to rapid erosion. Illegal sand mining in the Kottapuzha Estuary by the residents of Kottakkal village compounded the erosion. *Theeram* members took up the issue of illegal sand mining with the government agencies and also in court. They also started a mangrove nursery and organised children from the village to help them reforest the estuary. *Theeram* members concluded that through mangrove reforestation they would be able to reduce the damage caused by erosion on their coast.

The Forest Department supplied *Theeram* members with the initial batch of mangrove seedlings. Some money was also donated by the Gram Panchayat (the local governing council of the village) to buy mangrove seedlings from private sources. *Theeram* members now encourage and involve local residents, as well as local school children, in planting seedlings. At the same time, they also negotiated a ban on cutting the original mangrove trees, felled mainly by the local residents in Kolavipalam, who used branches or entire trees to meet their timber and firewood requirements.

Sand Mining

Sand mining poses the biggest threat, not just for olive ridley turtles but also for the future of the beach and the village itself. Although coastal erosion is common along the Kerala coast, beach erosion has reached a critical stage in Kolavipalam, which may be because of illegal sand mining in the Kottapuzha Estuary. A recent study suggests that unabated sand mining may destroy this nesting site within a short time, aggravate beach erosion and subsidence, and deplete mangroves (Gopi and Radhakrishnan 1999). Over the last few years, the nesting beach has become narrower, leaving little area for sea turtles to nest. Because earlier efforts to control sand mining had failed, *Theeram* decided to take legal action -- an expensive effort for the villagers. Despite several strictures and restrictions⁴ laid down by the Kerala High Court, as well as by state government agencies, sand mining continues, although not as openly as before (see Kutty 2001b; 2002; in press). The fight to bring about a complete ban on sand mining and implementation of the various rules laid down by the authorities continues to this day.

As a result of *Theeram*'s petition appealing for a ban on sand mining in Kottapuzha Estuary, the Kerala High Court has issued orders that restrict extraction of sand from Kottapuzha Estuary to a certain demarcated area, and for a certain period of time during the year. The failure to implement these orders, which in fact contradict already standing orders for a complete ban on sand mining in demarcated coastal areas, as established in the Coastal Regulation Zone Notification (CRZ), 1991 under the Environment Protection Act, has led to repeated court battles between the sand mining lobby and *Theeram*. The estuary and the coast falls within the purview of the CRZ, and as per the approved Coastal Zone Management Plan of Kerala, this estuarine area is in CRZ-I (extremely vulnerable area; see Upadhyay and Upadhyay 2002). While a total ban on sand mining in the inland rivers of Kerala was imposed by the courts in 2001, mining of sand along the estuarine portion of the rivers still continues, aggravating coastal erosion. Unofficially, government authorities admit that political interference has forced them to submit scientific reports that do not conclusively prove that the severe erosion of the coast in Kolavipalam is due to illegal sand mining.

Conclusion

The protection effort has had many positive consequences, for both the villagers and the turtles. There has been an increase in the number of turtle nests protected by *Theeram*. Observations by amateur bird watchers from neighbouring areas, supported by villagers' observations, indicate that the diversity and population of birds in the mangrove ecosystem have increased as a result of greater tree cover. Young boys, who fish by simple hook and line in the mangroves, claim that fish yield has

increased in these estuarine waters. The shallow, drinking water wells located near the mangrove still contain sweet water, whereas wells in the rest of the village have become saline. During the course of time, villagers have observed this link between mangroves and fresh water wells and have therefore extended full support to the mangrove reforestation programme. The local governing body, the Gram Panchayat, has recognised the importance of *Theeram's* efforts and has set aside funds for planting mangroves. Considering that most Gram Panchayats allot their limited funds for 'priority' developmental work such as roads, electricity, drinking water, and bridges, this allotment of funds for mangrove reforestation demonstrates that *Theeram's* efforts at spreading awareness about coastal conservation have been truly effective. *Theeram* was honoured the P.V. Thampy award in November 2000 for environmental protection through community participation. This award, instituted by the P.V. Thampy Trust, hopes to boost individual and local community efforts towards preservation of their natural resources.

As a consequence of increased media publicity,⁵ the general public from within and outside the state have visited Kolavipalam specifically to meet with *Theeram* members. This has given the youth a wider perspective on their actions and they have learned about similar efforts elsewhere. As a result of their interactions with the Forest Department, as well as the local and national media, the youth are now treated with respect by various government officials, which is otherwise rare. The community has taken advantage of its improved relations with government agencies and has submitted a proposal to the Irrigation Department (through the Forest Department) to install a drinking water pipeline for their village.

Theeram members hope to eventually open an informal education centre for children from within and outside their village. The aim of this education centre will be to expose the youngsters to various aspects of natural history such as bird watching, observing and studying varieties of marine organisms, learning about the ecological role played by other components of the coastal ecosystem, and learning to manage mangrove nurseries. *Theeram* members hope that such an education centre will encourage future generations within and outside the village to take up research (formally or informally) on natural ecosystems and thus create awareness and concern for the community's natural wealth.

The group also faces several serious obstacles. These include:

1. Lack of financial resources has limited the group's activities essentially to turtle protection and mangrove reforestation, although they would like to expand their scope of activities to establishing and managing a nature education centre.
2. During the nesting season, the members have to patrol the beach at night, but they earn their living during the day. This has limited their choice of occupation, in that only self-employment allows this kind of flexibility in working hours. It is encouraging though, that *Theeram* members insist that this is not a serious constraint, as they have chosen to undertake this responsibility themselves.
3. The Kottapuzha riverbed is leased out by the state government to rope makers for retting coconut fibres. Due to the leases granted, there is very little land available for reforestation of mangroves. This has restricted *Theeram* members from bringing more estuarine land under mangrove cover.
4. State politics plays a very important role in Kerala's social structure, and, as in other instances, has affected the success and direction of conservation initiatives.

So far, *Theeram* members have been successful in keeping politics from derailing their conservation activities. However, there has been increasing pressure from various political parties to have their representatives join the group to capitalise on the high media coverage that *Theeram* has received.

5. *Theeram* members have been unable to mobilise neighbouring coastal communities to fight against sand mining even though their beaches have also been affected by severe coastal erosion.

The conservation efforts at Kolavipalam have succeeded in bringing the attention of state and national media, as well as local authorities, to the illegal sand mining activity, which would have otherwise gone unnoticed or unaddressed. The receding beach has also brought into focus the very real threat that these coastal communities face throughout much of the state of Kerala. Ironically, this has also shown the inability of the local authorities to address the situation, so much so that, in spite of several rules and regulations instituted by local government authorities (after the Kerala High Court orders), illegal mining of sand continues unabated and the beach at Kolavipalam continues to become narrower. From a beginning of protecting the turtles and their eggs, to mangrove reforestation and coastal ecosystem protection, to education and awareness programmes, and now to saving their coastal village from severe coastal erosion, *Theeram* has come a long way. One of the main arguments, they have adopted in the legal petition against sand mining in the Kerala High Court is that Kolavipalam has been recognised by the Forest Department as an olive ridley turtle nesting site. Since olive ridley turtles are protected under Schedule 1 of the Indian Wild Life (Protection) Act, 1972, *Theeram* members are optimistic that they will win the fight against sand mining. For the villagers it is no longer a question of saving the turtles alone; it is also about saving themselves. If the turtles stop nesting due to a lack of nesting habitat, they realise that it may not be long before their own existence is threatened. To quote a *Theeram* member, 'We began by saying that we are protecting the turtles. Now, it is the turtles that are protecting us.'

Orissa: Turtles Versus Trawlers

Background

Though locals had been exploiting the turtle eggs at Gahirmatha beach for many decades, the occurrence of mass nesting on this beach was not known to science until J.C. Daniel and S.A. Hussain of the Bombay Natural History Society indicated its presence in 1973 (B.C. Choudhury pers. comm.). The following year, H.R. Bustard, an FAO crocodile consultant, was conducting a crocodile survey in Bhitarkanika National Park, which includes Gahirmatha beach, when he 'discovered' the mass nesting rookery in Gahirmatha and declared it as the 'world's largest' (Bustard 1974; 1976). Subsequently, two additional mass nesting sites were discovered farther south, one at the mouth of the Devi River near Puri in 1981 by C.S. Kar of the Orissa Forest Department (Kar 1982), and another at Rushikulya, just before the border with Andhra Pradesh, in 1994 by B. Pandav of the Wildlife Institute of India, Dehradun (WII) (Pandav, Choudhury, and Kar 1994) (Figure 3).

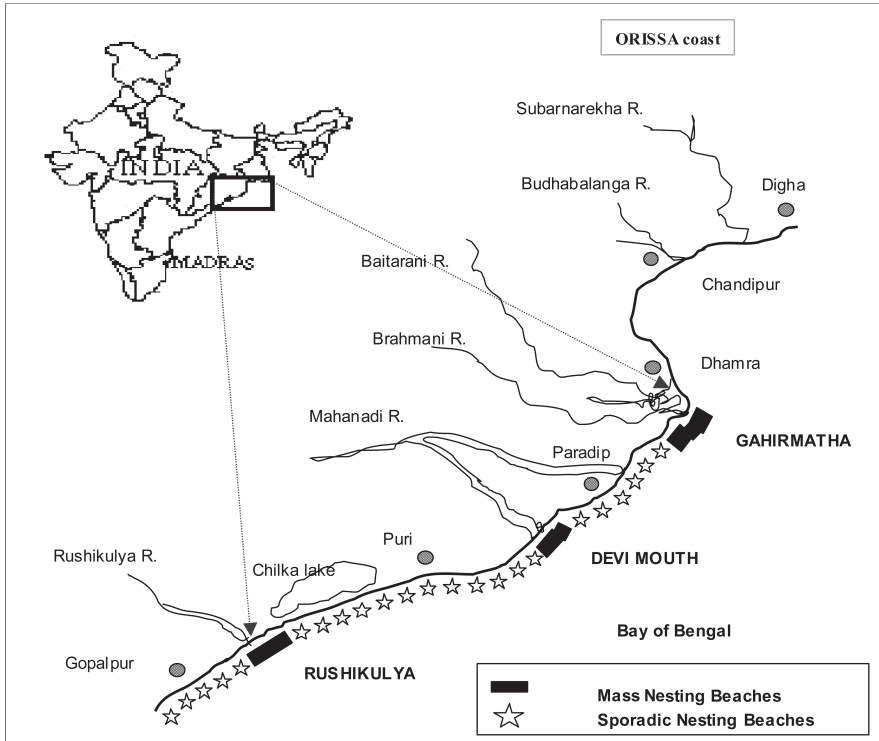


Figure 3. Map of Orissa showing the three mass nesting beaches, as well as beaches where solitary nesting of Olive Ridley sea turtles occurs.

Prior to independence in 1947, the local zamindar (landowner or collector of land revenue) levied a duty (called 'andakara') for the collection of eggs from the Gahirmatha mass nesting beaches (see Kar 2001 for a review), and between 1947 and 1975, the Orissa Forest Department issued licenses for egg collection. Eggs were sold in the riverside villages of Bhitarkanika and also transported in large numbers to Calcutta. Locally, in Bhitarkanika, turtle eggs were preserved in large quantities by sun drying and then used as cattle feed. The estimated legal take for just the 1973 season was 1,500,000 eggs (Bustard 1974). In addition, adult ridleys were hunted offshore of Gahirmatha for the meat market in West Bengal from at least the 1960s until the early 1980s (Kar and Dash 1984; Kar 2001). When mechanization of local fishing boats was introduced in the 1970s, the turtle take increased dramatically, and some authors estimate that over 50,000 turtles were shipped to Calcutta each breeding season (Biswas 1982; Das 1985). The implementation of the Wild Life (Protection) Act, 1972, from the late 1970s by the Orissa Forest Department, with the support of the Coast Guard, ended the legal meat trade by the early 1980s (Kar and Dash 1984).

Incidental mortality of turtles in trawl nets was first reported for Orissa in the 1980s, when the death of a few thousand turtles annually was documented (Silas *et al.* 1983; James *et al.* 1989) There would have been more strandings than this each year since only a relatively small portion of the coast was covered and surveys were

carried out for only a part of the season. In the 1990s, recorded carcasses increased from 5,000 in 1994 to 15,000 in 1999 (Pandav and Choudhury 1999); and since then, ten to twenty thousand dead turtles have been counted on the Orissa coast each year (Wright and Mohanty in press). In 2001/02, one portion of a gill net that washed ashore near Gahirmatha had over 200 dead turtles entangled in it (Wright and Mohanty in press), showing that the threat from this fishery also has to be addressed, though only a few instances of large gill net mortality have been recorded. Bearing in mind that the carcasses that wash up on the beaches are only a proportion of the animals that died at sea (Epperly *et al.* 1996), the numbers of turtles killed annually have been truly extraordinary.

Legal Status

Olive ridley turtles are listed in Schedule 1 of Indian Wild Life (Protection) Act, 1972, whereby they are accorded maximum protection under Indian law (Upadhyay and Upadhyay 2002). In addition, the Orissa Marine Fishing Regulation Act (OMFRA) (1982) and Rules (1983) prohibit all mechanised fishing within five kilometres of coast, and the provisions of the Gahirmatha Marine Sanctuary (1997) prohibit all mechanised fishing within twenty kilometres of the Gahirmatha coast, which extends thirty-five kilometres south from the mouth of the Brahmani and Baitarani Rivers. Recent amendments to the OMFRA (1997) prohibit mechanised fishing within twenty kilometres of the coast around both the mouth of the Devi River and Rushikulya, from January to May; and OMFRA (2003) makes turtle excluder devices (TEDs) mandatory for all trawlers operating in the state's waters. Yet, despite the very clear regulation for mandatory use, indigenous technological advances, and the free provision of the equipment, TEDs are not currently used in Orissa (Wright and Mohanty in press). Many other national and international instruments are relevant to the conservation of turtles and their habitats in Orissa and India as a whole (Upadhyay and Upadhyay 2002), but few appear to be actually implemented in Orissa or elsewhere in the country.

The Central Empowered Committee (CEC) of the Supreme Court of India, which was constituted in 2002 to examine the implementation of legislation pertaining to forest and wildlife issues, has been investigating the mortality of turtles in Orissa. Their recommendations to the state in 2003,⁶ and again in 2004,⁷ pertained largely to the better implementation of the existing legislation dealing with the mandatory use of TEDs and restrictions of fishing specified by the OMFRA.

Conservation Initiatives for Olive Ridleys in Orissa

The conservation of olive ridleys in Orissa has been discussed and debated since the early 1970s when the large-scale legal/incidental take of turtles from Gahirmatha was widely reported (Davis and Bedi 1978; see also Frazier 1980b). In the early 1980s, numerous petitions and letter writing campaigns were supported and endorsed through the *Marine Turtle Newsletter*, an international periodical (Mrosovsky, Pritchard, and Hirth 1982; Mrosovsky 1983a), and several hundred letters were in fact written to the Prime Minister Indira Gandhi (Mrosovsky 1983b). J. Vijaya, a young, adventurous field biologist conducted field surveys in the early 1980s and reported on the large numbers of turtles -- especially sea turtles -- being sold in fish markets near Calcutta (Vijaya 1982; Moll, Bhaskar, and Vijaya 1983).

This, along with her photographs of hundreds of turtle carcasses (published in *India Today*, 1982), brought even more attention to the extraordinary numbers of turtles being killed in Orissa. The subsequent (or consequent) support of Prime Minister Gandhi, and her initiative to involve the Coast Guard in protecting the marine area at Gahirmatha, helped drastically reduce the direct take to a point where it was thought to be negligible. However, even so, E.G. Silas, then Director of the Central Marine Fisheries Research Institute, considered incidental mortality to be major threat (Silas 1984). In the 1990s, another young field biologist, B. Pandav reported thousands of stranded carcasses on Gahirmatha and other neighbouring beaches. He attributed to high incidental mortality in offshore trawling, and he advised immediate remedial action (Pandav and Choudhury 1999; Pandav 2000). Beginning in 1999, Operation Kachhapa has provided continuous support for field surveys and media attention to the 'plight of the ridleys'. In 2000, the Annual Symposium on Sea Turtle Biology and Conservation passed two resolutions⁸ on this issue: the 'Urgent need to review coastal development plans in order to conserve olive ridley sea turtles as well as critical nesting habitat for the turtles and other endangered species on the Orissa coast, India' and the 'Urgent need to reduce trawling related mortality of olive ridley sea turtles on the Orissa coast, India' (Anonymous 2000). All told, there has been a tremendous amount of attention focused on the olive ridleys in Orissa, both nationally and internationally, which has directly involved the highest offices of the nation, and which has been ongoing for decades.

Given that the legal regime for the conservation of olive ridleys in Orissa seems adequate, lack of implementation was considered to be one of the major impediments to successful conservation (Wright and Mohanty in press). Both state and non-governmental agencies have worked towards improving enforcement of laws over the last five years. In recent years, the conservation of olive ridleys in Orissa has centred on Operation Kachhapa (see Wright and Mohanty in press for a review), which was coordinated by the Wildlife Protection Society of India, New Delhi, and the Wildlife Society of Orissa, Cuttack. The objectives of Operation Kachhapa are:

...to reduce turtle mortality and safeguard the future of the species by concentrating on three main activities: a) the prevention of turtle mortality by improving patrolling of no fishing zones and the protection of nesting sites; b) supporting legal action on turtle conservation issues and fishing law violations, and; c) building up public support and awareness of sea turtle conservation issues, including sensitising the media, enforcement agencies and the judiciary about the large-scale turtle deaths (Wright and Mohanty in press).

One of the mandates of Operation Kachhapa has been to reduce mortality by implementation of the existing legislation. Towards this end, Operation Kachhapa has supported the Forest Department by hiring private trawlers to be used for patrolling the nearshore waters off Gahirmatha, paid legal expenses, and provided legal advice for prosecuting trawlers caught fishing illegally. They have also raised awareness about turtle-related issues through the media, with articles on nesting, arribadas, hatching, and threats to sea turtles, mostly targeting mechanised fishing as the main problem that needs to be solved (Wright and Mohanty in press).

Why the Flagship Struggles to Stay Afloat in Orissa

Clearly, it is neither the absence of adequate legislation, nor a lack of concern locally, nationally or internationally, that has led to the failure to reduce mortality from turtle-fisheries interactions. TEDs, though proposed since the 1980s (Silas 1984) were first brought to Orissa during a workshop conducted by the National Marine Fisheries Service, USA in 1996. Since then, numerous agencies have been involved in the development and distribution of TEDs in Orissa including the state as well as non-governmental organisations (Behera in press). The Central Institute of Fisheries Technology (CIFT) has developed an indigenous TED (Boopendranath *et al.* in press) which costs as little as Rupees 2000 (equivalent to about fifty US dollars at the rate of exchange in mid-2004), and the Marine Products Export Development Authority has provided a few hundred free TEDs in Orissa and other states on the east coast of India (Choudhury 2003). Tucker, Robins, and McPhee (1997) examine the implementation of TEDs in the USA in the 1980s, and cite forced innovations, economics of the fishery, perception of the 'turtle problem', premature introduction of immature technology, lack of interagency coordination, and uncertain regulations, as reasons for the conflict. This resonates with the situation in Orissa in the 1990s (Behera in press), where trawler owners have complained about:

the absence of demarcation in the sea between the fishing and non-fishing zones, their treatment by the personnel of Coast Guard and Forest Department, increasing, multiple tax burdens ..., the price of raw materials, declining catch, the lack of proper international or local markets, the denial of diesel subsidies by the State Government.

Though experiments with the CIFT TED have shown that catch loss is less than ten per cent (Gopi, Pandav, and Choudhury 2002; Boopendranath *et al.* in press), trawler owners have not been convinced by the CIFT TED, and want an alternative device that would minimise catch loss (Behera in press). They have even designed a 'Trawl Guard', a net at the mouth of the trawl net (Behera in press), which, however, has not been subjected to any tests at all. Trawler owners and captains also want a revision of marine protected areas and other areas closed to them (Behera in press). Trawler owners argue that they have been subjected to unfair targeting as a principal cause of turtle decline, while equally significant threats such as habitat loss and beach lighting remain unregulated (Behera in press). Interestingly, trawler owners had similar complaints during the implementation of TEDs in the USA in the 1980s (Weber *et al.* 1995; Tucker, Robins, and McPhee 1997). In response to large-scale media reports of trawling-related turtle mortality, trawler owners have put forth suggestions that turtles die of 'migration fatigue, labour pains and toxic pollutants' (Shanker and Mohanty 1999).

Tucker, Robins and McPhee (1997) suggest that the top down approach to implementation of TEDs in the USA led to a polarisation that could only be solved by arbitration and legislation. In Orissa, a similar situation appears to have evolved. Neither the state (Forest Department) nor the conservationists (Operation Kachhapa most prominently in recent times) have engaged the trawlers in dialogue. Rather, most media reports, largely from Operation Kachhapa, have attacked the trawling community for being responsible for the turtle deaths. The Fisheries Department,

which has been responsible for monitoring fishing activities in the state, has not been sufficiently involved in implementation of TEDs and enforcement of no-fishing zones, reflecting the lack of coordination between state agencies (Wright and Mohanty in press). The lack of involvement of the trawling community in the design of the device may be a prime cause for their lack of faith in it. Jenkins (in press) shows that the only TEDs that are currently in use worldwide are those where the trawling industry was involved in their design and development.

One must also take into account the heterogeneity of the trawling community, which includes owners, operators and workers. Each of these sub-groups may need to be motivated differently, some by economic and others by social incentives.

In sharp contrast to the situation in Orissa, state fisheries agencies have so far encountered less resistance in the implementation of TEDs in Andhra Pradesh (Bavani Sankar and Anantha Raju 2003), where there has been less confrontation and polarisation on the issue of turtle conservation. Despite whether or not TEDs are currently in use in Andhra Pradesh, reports from this region suggest a more positive attitude towards TED implementation than those from Orissa. Trawl operators in Andhra Pradesh have even suggested changes to the design of the TED, which have been communicated to the CIFT (Bavani Sankar and Anantha Raju 2003). It remains to be seen whether this positive engagement of the fishing community by the State (namely the State Institute of Fisheries Technology, Kakinada) will continue and result in effective implementation of TEDs and reduction in turtle mortality, but there is at least dialogue between the resource users and state agencies.

In Orissa, on the other hand, even the traditional fishworkers associations have started parallel protests similar to those of the trawler owners.⁹ They too have begun perceiving turtle conservation as being anti-people, even though the OMFR Act is in fact designed to protect traditional fishing rights rather than turtles. Media attention on the OMFR Act as a tool for turtle protection has in fact promoted this being perceived as a bone of contention between traditional fishworkers and turtle conservationists. This is despite Operation Kachhapa's awareness campaign where wandering minstrels sang to the traditional fishers about turtles, conservation, and their fishing rights, and media campaigns which have come out in support of traditional fishing communities (Wright and Mohanty in press). Furthermore, the lack of clarity in legislation about what constitutes a traditional method of fishing has also allowed mechanised fishers to garner the support of other fishing communities. While OMFR Act is clear with regard to sizes of mechanised vessels, the definitions of what constitutes a mechanised craft or mechanised fishing is absent. There is also no mention of regulations for motorised craft, especially those with outboard engines. These can vary in size and capacity, and many small-scale fishermen use these to reach their fishing grounds. Regulation of net types and sizes is also not adequately addressed. Recent pronouncements by the government and the Central Empowered Committee of the Supreme Court have tended to lump all boats with motors together, thus including small-scale fishermen along with trawlers and large gill netters.¹⁰ This has also resulted in the harassment of these small-scale fishermen by enforcement agencies like the Forest Department, which has led to disillusionment among local communities with both the government and with conservationists.¹¹ However, based on comments from numerous individuals and organisations, including the Orissa Traditional Fishworkers' Union, the final report

of the CEC makes a distinction between mechanised, motorised, and non-mechanised fishing vessels.¹² Again, it remains to be seen whether this distinction will in fact be respected during enforcement.

Conservationists have certainly done much to ensure the continued survival of olive ridley turtles on the Orissa coast, for example, through the reduction of the meat trade in the 1980s (Vijaya 1982; Kar and Dash 1984) and legal action to prevent the construction of large ports in the vicinity of mass nesting grounds in the 1990s (still an on-going battle) (Sekhsaria 2004a). In recent months, the olive ridley has been used as a flagship to control oil exploration in offshore waters of Orissa (Sekhsaria 2004b). It is not yet clear whether these recent actions have been successful, and whether the olive ridley has been a useful flagship for marine environments and conservation. However, in addressing the contemporary problem that is the greatest direct threat to turtles, namely fisheries-related mortality, conservation actions have created more conflict than resolution. Both state and non-government agencies believed that enforcement of laws was the key. In fact, the three stated objectives of Operation Kachhapa were to facilitate patrolling, provide legal support, and raise awareness through media. The first two have contributed directly to the polarisation of fishing communities and conservationists, while the tenor of many media reports (with titles such as '200 ridley turtles die on Orissa coast everyday',¹³ 'Illegal trawlers mowing down Olive Ridleys',¹⁴ 'No respite from trawling for Olive Ridleys',¹⁵ 'Trawlers pose threat to Olive Ridleys: Report',¹⁶ 'Flouting of Act leads to turtles' death',¹⁷ 'Turtle death continues as fishing goes unabated',¹⁸ et cetera) has exacerbated the problem. The state has equally focussed on enforcement, and made recommendations to declare the mass nesting beaches at Rushikulya and the mouth of the Devi River as protected areas,¹⁹ which has aggravated traditional fishing communities. The focus on trawlers has also diverted attention from a host of other threats that sea turtles face. Light pollution and massive disorientation and mortality of hatchlings, habitat degradation and the conversion of vast expanses of nesting beach into forestry plantations of questionable value, and egg depredation by feral animals have not received nearly enough attention (Pandav 2000). This is not to mention the crass depletion of fisheries stocks, destruction of marine environments critical for fisheries, and the on-going favouritism given to over-capitalised, poorly regulated fisheries export ventures at the cost of countless marginalised, small-scale fishers -- a sector of the population that could be a major ally to turtle conservation initiatives.

Flagships or Gunboats?

Many large and charismatic species (mostly large mammals) have been singled out for special conservation attention. The logic for channelling large proportions of conservation funds to these species has been that these animals can be used as flagships to gain broad support for conservation. It has also been argued that protecting the habitats of these flagship species will indirectly protect a large number of smaller, less attractive species. Though there is much debate over the efficacy of flagship and umbrella species for conservation (Faith and Walker 1996; Simberloff 1998), and some studies have found that their use as surrogates for regional biodiversity may be

limited (Andelman and Fagan 2000), the flagship strategy works in some cases and not in others.

In the Kerala and Madras cases, the use of sea turtles as flagships has inspired and motivated a broad range of actions and a wide group of people. In Kerala, the members of the Coastal Ecosystem Protection Committee, *Theeram*, have cleverly used the turtle as a flagship species to bring about awareness among the rest of the villagers and students of the importance of marine life and the complex inter-relationships between the various components of a coastal ecosystem and human welfare. The problem of a receding coastline was brought to the attention of the general public -- as well as to the authorities who had until then been unresponsive -- by linking it with the issue of nesting habitat for turtles. Later, the illegal sand mining problem was highlighted and fought in the courts, again by linking it to the threat that the endangered turtles were facing as a result of a fast disappearing nesting beach. In Madras, the use of the sea turtle flagship to create awareness and achieve wider goals than turtle conservation and education was perhaps as much accident as intent, but it has nevertheless been successful. It has helped motivate students to pursue careers in ecology and/or conservation, created awareness amongst the urban community, and helped inspire other groups to take up turtle conservation both within the city and in other parts of the state and even the country.

The mass nesting olive ridleys of Orissa have certainly served to attract attention to wildlife conservation issues in India. The efforts of Operation Kachhapa in raising the profile of the species both within and outside the state have been fairly remarkable. However, in Orissa, the increased visibility of turtle issues may have created antagonism towards conservation in general, especially among local fishing communities who are the victims, or perceive themselves to be victims, of conservation action. Though conservationists agree that traditional fishing methods do not pose a problem for turtles, traditional fishermen are frequently victimised by the enforcement agencies. Nearshore fishing bans for mechanised vessels were instituted in many coastal states in India for the protection of traditional fishers, but these regulations have recently been invoked in Orissa in the name of turtle protection, so that it is now perceived as a 'people versus turtles' law.

We suggest that, just as charismatic species can be used as 'flagships' where they gain support for conservation, they can also be used as 'gunboats' where protection measures for these species can alienate people and negatively impact conservation. This usually happens when protection measures impact livelihoods or restrict access to areas. Grey though the boundaries are, protectionist policies may derive more from animal activism, or at least they may be philosophically closer to this mind set than they are to biological conservation. The biocentric approach that underlies animal liberation suggests that nature should be preserved because of its inherent right to exist. Though there is considerable debate, some authors suggest that animal liberation and environmental ethics have been distinguished as being based on different intuitions, principles and behaviour (Callicott 1980). If environmental conservation is indeed linked closely to human welfare (Western 1989), then animal liberation and conservation require very different approaches and actions.

In Ostional, Costa Rica, the community is allowed to collect a proportion of the eggs from the arribada and market them legally throughout the country; this exploitation is based on studies which show that the majority of the eggs laid during

the first day of a large arribada -- that can last for several days -- are destroyed by turtles nesting later (Cornelius *et al.* 1991). The possibility of legalising a proportion of the eggs laid at Gahirmatha was discussed in the 1980s (Silas 1984; Whitaker 1984), but this has not even been mentioned in recent times, despite the fact that local communities could benefit from access to additional resources and income. The general reluctance to consider egg harvests is probably due partly to the protectionist approach to turtle conservation, in particular the way the ridley has been used as a flagship for conservation. For the species to be used as an effective (= emotively provoking) flagship, it has been portrayed as highly endangered, which means that no use is possible, and strong protectionist approaches have been advocated. This has precluded (even considerations of) other approaches to conservation, impeding progress with alternative initiatives, and the possibility of nurturing greater, multi-sectoral alliances to support conservation programmes. At the same time, while the theory of scientifically-based, controlled exploitation of turtle eggs is highly attractive, in practical terms it presents numerous very complex problems: how to allow for a limited exploitation of an abundant resource when basic facilities and trained personnel are simply inadequate? Often, management authorities elect what they consider to be the lesser of evils: a blanket prohibition, which is straightforward to interpret, rather than a situation with different levels of legal exploitation, depending on certain conditions, that immediately present enormous challenges for distinguishing legal from illegal products.

In recent decades, some conservationists have advocated a shift in approach from government-managed protected areas to a broader, more inclusive, community-based paradigm (Ghimire and Pimbert 1997), though there are critics of this approach (Redford and Sanderson 2000; see Berkes 2004 for a review). Local communities, non-governmental organizations, and even state and national governments have suggested that although national parks and other officially designated areas are important contributors, they alone cannot achieve effective natural and cultural heritage conservation, especially in a highly populated country like India. This is acknowledged in the inclusion of a new category of protected area, the 'community reserve' in the latest amendment of the Indian Wild Life (Protection) Act, 1972.²⁰

Rushikulya is the southern-most of the olive ridley mass nesting beaches in Orissa (Pandav, Choudhury, and Kar 1994). Given the loss of nesting habitat in Gahirmatha, this more southern site may be of great importance for olive ridleys in the future. Unlike Gahirmatha, Rushikulya is not protected under the Indian Wild Life Act, though it is classified under Category one of the Coastal Zone Regulation Act, which forbids development on the beach. Its legal status (or lack thereof) has meant that it is accessible to NGOs, researchers, students, members of local communities, and to the general public. In the last five years, thousands of local tourists have visited Rushikulya (albeit in an uncontrolled fashion) to see mass nesting or mass hatching events. The local community at Rushikulya has been involved in turtle conservation through the projects of the Wildlife Institute of India, Operation Kachhapa, and now through their own initiative as the Rushikulya Sea Turtle Protection Committee. The prospect of a locally managed sea turtle conservation programme has been mooted, and if it could evolve with the support of multiple stakeholders, the ridleys may yet prove to be effective flagships in Orissa.

In summary, successful programmes have gone beyond their turtle focus to using the species to drive social and environmental change. This has particularly remarkable in the Madras and Kerala sea turtle programmes, since the turtle populations themselves may have little chance of survival. On the other hand, the most spectacular population in India, arguably the most important in terms of genetic distinctiveness (Shanker *et al.* 2004) and in terms of size, not to mention the biological and cultural value of the arribada, has had less success as a flagship, at least locally. It has perhaps served a flagship for conservation awareness amongst the urban elite in India, but has equally well become a gunboat to local fishing communities in Orissa. In addition to the three case studies described in this paper there are numerous other examples in India where sea turtles have served as flagships (for example, Kutty, 2001a; in press; Ramana Murthy 2001). However, lessons need to be learned in order to sail the flagship peacefully and successfully navigate the many shoals and storms of conservation and social development, rather than to create more turbulence that will in fact adversely affect conservation efforts and the societies involved.

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Notes

¹ Turtle eggs need metabolic heat for incubation; hatchlings hatch and emerge together, both to facilitate emergence and to swamp predators; finally, though population models suggest that sea turtles can withstand variation in egg survival (Crouse and Frazer 1995), the survival of less than five per cent of the eggs would place a substantial stress on the population.

² Based on Shanker's experiences with the SSTCN from 1988 to 2003.

³ Based on Kutty's study of community-based conservation at Kolavipalam, Kerala (see Kutty 2001a, in press).

⁴ Strictures are issued as a form of reprimand (such as the High Court castigating the state government for dereliction of duty and issuing orders that precisely limit a certain activity), while restrictions are the issuance of orders that restrict a certain activity (in this case sand mining).

⁵ A film 'Aamakaar -- The Turtle People' (see www.turtlepeople.com) documents their history and efforts. *Theerem's* efforts were recognised as a remarkable case of community-based conservation which was conceived and initiated completely from within the local community, and the film makers attempt to convey the motivation of this group and perhaps inspire other community groups towards similar action.

⁶ Central Empowered Committee, Interim Orders, 7th March 2004, Application No 46, Alok Krishna Agarwal versus Union of India, State of Orissa and others.

⁷ Central Empowered Committee, 2004, 'Visit of Central Empowered Committee to Orissa from February 10-14, 2004'.

⁸ Drafted by Shanker.

⁹ Letter from Orissa Traditional Fishworkers' Union (OTFWU) to P.V. Jayakrishnan, Chairman, Central Empowered Committee (CEC) 19 February 2004 titled 'Prayer of the traditional fishermen of Orissa for hearing on turtle issues'. The letter responds to the Interim Orders of the CEC dated 7 March 2003, and objects to the complete ban on fishing in several zones off the Orissa coast. The letter comments on various aspects, including gear and craft, fishing rights in the Gahirmatha Marine Sanctuary, and proposals to declare Devi and Rushikulya as sanctuaries. It recommends that 'traditional fishermen should be made partners in conservation at all levels', that decisions with regard to banning traditional gear should be based on scientific data, and should be taken in consultation with fishermen, and suggests other measures for managing these areas.

¹⁰ see note 6.

¹¹ see note 9.

¹² see note 7.

¹³ *The Asian Age*, 3 February 1999.

¹⁴ *The New Indian Express*, Bhubanewar, 3 February 1999.

¹⁵ *The New Indian Express*, Bhubanewar, 11 March 1999.

¹⁶ By Rajaram Satapathy, *The Times of India*, 4 February 1999.

¹⁷ *The Asian Age*, 3 May 1999.

¹⁸ *The Asian Age*, 30 January 1999.

¹⁹ Proceedings of High Powered Committee Meeting on Conservation of Olive Ridley Sea Turtles held on 10 October 2003 in Rajiv Bhavan Conference Hall, Bhubaneshwar, Orissa.

²⁰ The Wild Life (Protection) Act, 1972 as amended by The Wild Life (Protection) Act, 2000 (16 of 2003) (with effect from 1-4-2003).

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