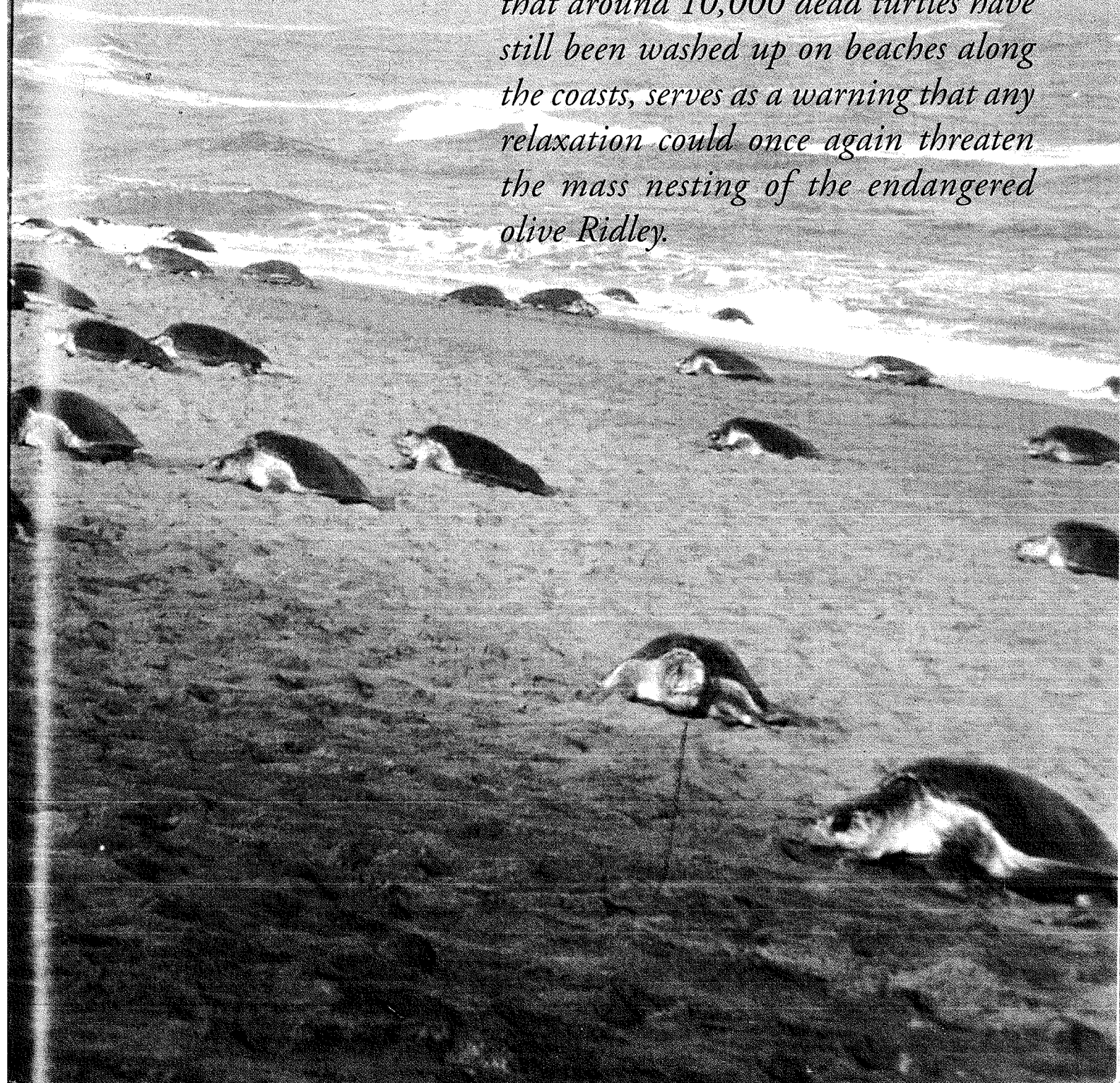


By Kartik Shanker

Birth & Death

The olive Ridleys of Orissa

After an absence of three years, tens of thousands of olive Ridley turtles returned to the beaches of Orissa to nest. The author suggests that this is on account of a massive protection exercise launched by government departments, scientists and NGOs. However, the fact that around 10,000 dead turtles have still been washed up on beaches along the coasts, serves as a warning that any relaxation could once again threaten the mass nesting of the endangered olive Ridley.



"Olive Ridleys are unique amongst sea turtles in their mass nesting behaviour.

The process, involving hundreds of thousands of turtles migrating en masse to the breeding grounds to mate and then nest simultaneously, is called the arribada, or arrival."

The moonlight glistens on their wet backs as they haul themselves out of the water. Thousands of small mounds spread across the beach like a battalion of armoured tanks. On the beach, the turtles crawl over each other, their flailing flippers throwing sand indiscriminately over already nesting turtles. Many are virtually buried by sand with no more than the neck and top of the carapace visible. When the moon vanishes it becomes difficult to walk on the beach. Even with a torch, we must weave across the beach to avoid turtles. Still, sooner or later someone trips over one of the pre-historic reptiles we are here to observe.

Bivash, Dipani his research assistant, Utsav a helpful visitor, and I are in Bhitarkanika, Orissa. We had set off at 5 p.m. on March 25, 1999, for Nasi 2, to count turtles through the night. We were accompanied by Bivash's local assistants some of whom, like his boatman Subash, had been working with him for years. Immediately upon our arrival, we saw a large number of turtles on the beach, though not many had started nesting.

The counting procedure we followed was specially developed for the turtle *arribada* and has been adapted by Bivash for the conditions at Gahirmatha. There are wooden posts every 100 metres, which divide the beach into sectors. During the *arribada*, smaller poles, ten metres away on either side, flank each of these poles. From 6 p.m. to 6 a.m. the following morning, hour after hour we counted turtles that laid their eggs within the 20 metre strip marked by the poles over the entire beach. There were 20 such poles on the two kilometre long beach, and we divided the beach equally amongst us. Even so, it was exhausting work and when we met between sampling sessions we would sit leaning against a pole, or curl up in the sand to catch some shut eye... our backs to the sharp wind. Such sleep was inevitably fitful. Sooner or later, a turtle would crawl by, throwing sand into our faces. Dipani was once rudely awakened when a turtle scratched her eye, fortunately without doing too much damage.

By midnight, we were able to witness the full impact of the *arribada*. In some sectors, more than 100 turtles crawled around the 20 metre strip from the high tide mark towards the riverine side of the island, a distance of 60 or 70 metres. By and large there were 20 to 30 turtles nesting at any given time during peak nesting. This translated to 10,000 turtles/hour/km. at peak nesting. A truly astonishing nesting density. We spent the entire night trying to keep a count of wave after wave of turtles.

By the time morning came, our exhaustion was complete and we met up with the other group of Bivash's assistants who had spent all night tagging thousands of turtles. A very specialised technique, tags are only put on to turtles by experts. The monel tags, which are clipped to the flipper, help in identifying the turtles if they return to nest on these or other beaches in Orissa. Tag returns from other areas provide invaluable information on turtle migration routes. We were in more ways than one a small part of a global network working to save marine turtles.

The arribada phenomenon

Olive Ridleys are unique amongst sea turtles in their mass nesting behaviour. The process involving hundreds of thousands of turtles migrating en masse to the breeding grounds to mate and then nest simultaneously, is called the *arribada*, or arrival. (*Sanctuary Vol XVII. No. 3, 1997*). The Orissa coast is blessed with three mass-nesting rookeries, with Gahirmatha being the largest in the world. However, there was no mass nesting at this site in 1997 and 1998. Something about the nesting beach was obviously not suitable and on top of this, the turtle had to contend with the mass mortality caused by trawlers.

Conservationists, researchers and everyone following the turtles fortunes were extremely pessimistic about the prospects of mass nesting at this site in 1999. Bivash Pandav, a researcher from the Wildlife Institute of India (WII), who has been working on the sea turtles of the Orissa coast for the past five years, was responsible for monitoring the nesting beach with his assistants. To their lot fell the task of counting the large number of dead turtles washed ashore and the smaller number of solitary nesting females. On March 22, 1999, while they were patrolling the nesting island off the coast of Gahirmatha, to their delight the turtles began to swarm ashore in tens, then hundreds, then thousands. Suddenly weeks of effort was worth it. Each ocean wave brought in dozens of females, who then began crawling around the beach looking for a nesting site. Some would pick a spot straight away and the nesting process would start. Others would crawl around searching in vain for a suitable site, only to be forced to return dissatisfied. They would probably try again when they came ashore later.

The nesting continued through the night and much of the next day and by the end of a week, something in the vicinity of a quarter of a million turtles had nested on the two small islands. The stretch of beach that supported this phenomenal spectacle was a mere 2.5 kms. long and less than 100 metres wide.



Turtles mate in the off shore waters. The male mounts the female, holding her with the claws on his fore flippers, and the large claws on his hind flipper, the female may receive bites to the neck and flippers during this time. He then curls his long tail to bring their cloaca into contact and erects his penis into her cloaca.



The nesting beach at Nasir 1, Gabirmatha. This is a fragment of the island, which originally broke away from the mainland during a cyclonic storm in 1989. The beach is currently two kilometres long and about 100 metres wide. The beach could be further fragmented as sea water has formed an inlet and a small water body within the island.

Marine wanderers

Olive Ridleys are one of eight species of sea turtles worldwide, of which five are found in Indian waters. Marine turtles range from the leatherback, which grows to over two metres in length and weighs over half a ton, to greens (globally hunted for meat) and loggerheads which are about 200 kg, to hawksbills (hunted for their beautiful scutes for making tortoiseshell souvenirs) and Ridleys which grow to just over one metre in length and weigh about 50 to 100 kg.

All these turtles live out their lives entirely in the sea, except when they come ashore to nest. The breeding and feeding grounds are usually far apart and the turtles have to undertake migrations involving distances of thousands of kilometres. Most turtles do not breed annually, though it was believed that Ridleys were an exception to this rule. After they migrate to the breeding ground, the males and females mate after which males return to the feeding grounds. The females then come

ashore (solitarily in all other species, and mostly solitarily in the olive Ridley) at night, and crawl above the high tide line. After clearing off the surface sand, they dig a flask-shaped hole about 45 cms. deep and lay 100-150 soft white ping-pong ball sized eggs. This done, they cover the nest and return to the sea. Turtles may nest several times during a season following which they too return to the feeding grounds. They do not exhibit parental care. The eggs hatch after about 7-8 weeks (the sex in turtle hatchlings is

determined by the incubation temperature) and the hatchlings emerge from the nest simultaneously, usually at night. They immediately crawl towards the sea, locating it by the brighter horizon (moon and starlight reflecting on the water) and swim out into the open sea. At this time, they are also magnetically oriented to the earth's magnetic field, which enables them to find the breeding grounds when they are adults. As juveniles, they then float in seaweed rafts and are carried by currents over the next few years, until as sub-adults, they find their feeding grounds and join the other adults.

We do not know where the olive Ridleys that nest in Orissa come from. Visual sightings along the coast and tag returns from Sri Lanka and Kerala, suggest that they visit different parts of the southern Indian ocean upto the tip of the peninsula, swimming along the coast to their nesting grounds. Only olive Ridleys nest on the east coast of India. In Orissa, the three known mass nesting



KARTIK SHANKER

An illegal trawler is pursued by a patrolling tern trawler, the main cause of turtle mortality on the east coast of India.

"Even under natural conditions, it is believed that only one in a thousand hatchlings survives to adulthood. To these odds must be added the exploitation of turtles for meat, scutes and eggs."

sites are Gahirmatha in the North, the Devi River Mouth near Puri, and Rushikulya in Ganjam district in the south, where nesting has ranged from 8,000 to 60,000 turtles since 1994. This year, mass nesting also occurred at two sites near the Barunei mouth, 30 kms. south of Gahirmatha, with about 8,000 turtles nesting in March and 20,000 turtles nesting in April.

When I reached Gahirmatha, mass nesting had already been going on for a couple of days. We took the boat to Nasi 1 at 3 p.m. and could see the sand flying over the top of the dunes. As we crested the dune, an amazing sight greeted us - 3,000 or so turtles had occupied the beach. This was unusual because, with the exception of the Kemp's Ridley, all other turtles nest almost exclusively at night. Though an exceptionally large number of eggs are laid on the beach, less than 20 per cent may be viable. Many are destroyed by turtles that dig up existing nests. A large number of turtles dig very shallow nests or lay very

close to the high tide line causing nests to be inundated with sea water, or exposed when the sea erodes the beach.

It is still not clear how or why this particular mass nesting behaviour evolved, or even how it works. Do the turtles all respond to the same climatic conditions? In other words is there an external stimulus or stimuli that causes them all to nest at the same time? In Orissa, experts usually observe mass nesting during the half-moon and when there is a very strong south wind. On the other hand, turtles may be signaling each other, a hypothesis which is supported by the presence of infra marginal pores found only in Ridelies. This is, of course, all conjecture. There is no conclusive proof of any form of communication between the turtles prior to mass nesting.

Mass mortality in Orissa

When Bivash started surveying the coast of Orissa in 1994, he walked and later cycled along the entire coast, walking up to 50 kms. on a single day and sleeping on the beach at night. The first year was exhilarating with the discovery of the Rushikulya rookery, though the death of about 500 turtles due to drowning in trawl nets was disturbing. The situation worsened over the next few years and in 1998 nearly 14,000 dead turtles were washed ashore along the coast of Orissa. In all, over 40,000 turtles have been found washed ashore over the past five years, all drowned in trawl nets. Since not all the turtles that do die in trawl nets are washed ashore, the total mortality off the Orissa coast is likely to be even higher.

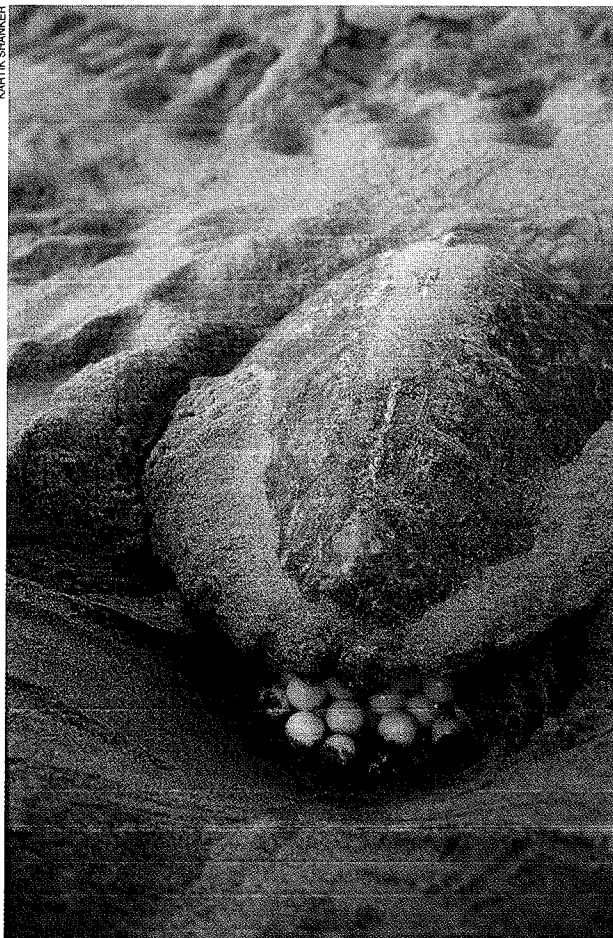
Turtles face many natural predators in their life cycle. Jackals and crabs predate eggs, and young hatchlings are picked off by birds before they can reach the sea where a host of marine predators await them. They take their toll on the turtles but have a significantly lower impact during the *arribada*, because of what is called predator satiation (they can eat that many eggs in a given time period and no more!). Even under natural conditions, it is believed that only one in a thousand hatchlings survives to adulthood. To these odds

must be added the exploitation of turtles for meat, scutes and eggs. In Orissa and West Bengal, thousands of olive Ridelies were captured in the 1970s to be sold in the meat markets of Calcutta. When the Ridley began to be protected under the *Wildlife (Protection) Act, 1972, Schedule I*, turtle killing was reduced drastically.

Turtles along the Indian coast, however, are still threatened by egg poachers, particularly on unprotected beaches. Sand mining adds to their woes, as does the usurpation of nesting beaches by communities building homes. Beach lighting is another problem. The hatchlings and adults tend to head towards a light source (starlight reflecting over the open sea). Even a glow from towns and cities in the distance can disorient hatchlings which head the wrong way, only to be eaten or to die of desiccation by morning. Developmental activities along the coast such as the construction of new ports, aquaculture farms and other industries result in a tremendous loss of habitat and they dramatically increase the amount of land-light on beaches. Even well-intentioned 'environmental programmes' like the planting of *Casuarina* along much of the coast has been detrimental to sea turtle nesting habitat.

Without a doubt the single largest cause of adult mortality is shrimp trawling. There are more than 500 trawlers and nearly 3,000 mechanised boats of various sorts operating along the coast of Orissa. The trawl nets cause the greatest damage, since turtles that get caught in these are unable to escape. Olive Ridley sea turtles usually dive for about an hour, and though longer voluntary dives take place, the stress of being trapped in nets (along with energy expended trying to escape) causes them to drown. Frequently, turtles removed from trawl nets are in an anoxic state and comatose. Even if no sign of life is visible, many of these turtles may revive if they are not thrown back into the water. They should therefore be placed in the shade and closely observed for several hours.

A few years ago, the USA imposed a ban on Indian shrimp



Some turtles start laying before they can dig their nests properly, laying their eggs in very shallow nests which are easily exposed or predated.

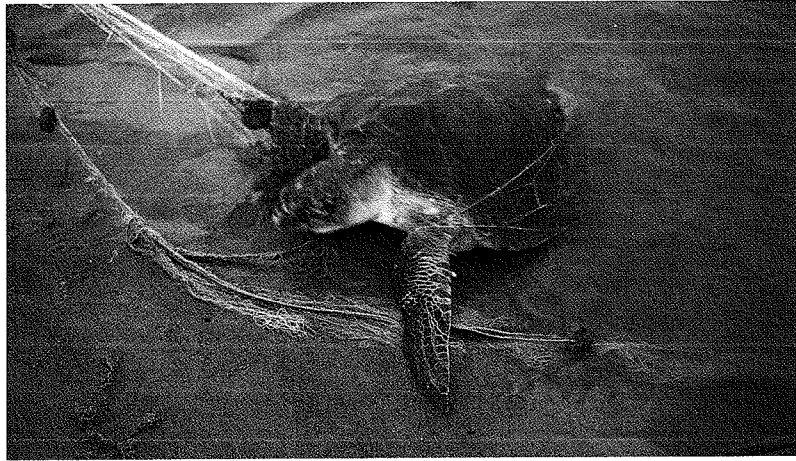
because the trawlers were not using Turtle Excluder Devices (TEDs). These are essentially trap doors attached to the trawl net that enable only turtles to escape. However, when Indian 'experts' testified at the WTO meeting in 1997, that Indian shrimp trawlers were not causing turtle mortality, the ban was lifted. Even today, trawlers do not want to install TEDs because they believe that there is a loss of shrimp catch. In fact, even in countries where the use of TED is mandatory, it has recently been found that many trawl fishermen tie the door of the TED to avoid the loss of catch.

In Orissa, the trawlers are largely owned by rich individuals from inland areas, sometimes as far away as Delhi. They care neither for the turtles they kill, nor the fish and prawn stocks they deplete. As for the traditional fisherfolk whose livelihoods are being destroyed, and who are often forced to work as manual labour for the exploiters, they are perhaps on the lowest rung of priority for the get-rich-quick brigade.

This is not to deny that there is, to a lesser degree, some problem with the impact of traditional fisherfolk along the coast. Turtles get caught in small gill nets and prawn seedling fishing nets, which are spread along the entire coast. These prevent the turtles from coming ashore to nest. Small scale fisherfolk find themselves caught between conservationists and trawlers. Both seem to come in the way of their earning a secure livelihood. If we want to save the marine environment in the long run, the point of view of local fisherfolk will have to be taken on board. Alternate sources of income during the turtle breeding season must, for instance, be found. Additionally, one must ensure that the near-shore waters (five kilometres from the coast) are reserved only for small fishing craft. We must also share our sea turtle conservation objectives with them and enlist their support in the monitoring and management programmes.

Operation Kachhapa

The Orissa Forest Department and the Wildlife Institute of India, Dehradun, have had monitoring and



Turtles also get caught in gill nets, and are injured before they are freed.



A turtle hauls its way back to sea after laying her eggs

research programmes on the Orissa coast for the past several years. However, the sudden increase in mortality by trawling demanded a drastic response. In 1999, *Operation Kachhapa* was launched by the Wildlife Protection Society of India, Delhi, in collaboration with the Wildlife Society of India, the Orissa Forest and Fisheries Departments and the Wildlife Institute of India. The project involves the monitoring of the coast, patrolling of offshore waters, research on the nesting behaviour of the turtles and widespread information and awareness programmes for the coastal residents of Orissa. This is a good collaborative programme but will take some time for results to show.

What could yield immediate results is the implementation of existing laws for the protection of the turtles. The *Orissa Marine Fisheries Regulation Act (OMFR), 1982 and Rules, 1983*, already prohibit fishing within a distance of five kilometres from the shore by mechanised boats

of any kind. We need to declare Gahirmatha a marine sanctuary, with the coastal waters off the Devi River mouth and Rushikulya as no-fishing zones during the turtle breeding season. Since nesting has now been found to occur at several other sites, these areas too need to be accorded some legal status and protection.

The *arribada* has failed twice in the last 25 years in Gahirmatha, but last year was the first time it failed two years in succession. The main cause for the failure of the *arribada* is probably the poor beach conditions, mainly on account of inundation by sea water. The mass nesting beach has been fragmented and has become narrower over the past few years. The turtles may eventually be forced to nest elsewhere. The nesting of 25,000 turtles at a new site in Barunei indicates that this might happen. There is a mistaken notion that the occurrence of the *arribada* this year means that turtles in Orissa are now safe. This is far from true. Turtles continue to die in trawl nets and the

"Turtles along the Indian coast are still threatened by egg poachers, particularly on unprotected beaches. Sand mining adds to their woes, as does the usurpation of nesting beaches by communities building homes. Beach lighting is another problem."

nesting population needs to be protected regardless of where they choose to nest.

S. K. Patnaik, the Chief Conservator of Forests, and other forest officers from Bhubaneswar, arrived in time to see the *arribada*. Everyone was thrilled that the turtles had returned. But it was necessary to strike a note of caution. After all, more than 10,000 dead turtles have still been counted on the coast this year. Bivash in particular has been stressing the need to enforce the *OMFR* laws more strongly, but the Forest Department labours under a lack of funds and resources. They have been using a trawler (hired by *Operation Kachhapa*) to monitor the offshore waters, but there is a limit to what a single patrolling vessel can do. Even so, several trawlers have been apprehended and fined and cases have been booked against some.

The offshore waters of Gahirmatha and other nesting areas must immediately be declared as no-fishing zones during the turtle season, which extends from October to May. In this context, the role of the DRDO becomes important; officially, a six kilometres radius around the missile testing range at Wheeler island is off-limits without the permission of the DRDO. If this rule alone is implemented the turtles automatically receive protection. Dr. A.P.J. Abdul

Kalam has always expressed his support for the turtle conservation programme and his commitment to helping in the protection of the breeding ground at Gahirmatha. The Forest Department also reports that there has been some dialogue with the Fisheries Department this year and that the latter has agreed to monitor certain coastal belts. This cooperation must grow and be extended to include the Coast Guard.

Irrespective of what the official government stand may be in international fora, all conservationists know that TEDs will have to be used by trawlers if turtles are to be saved. Chitta Behera of Project Swarajya has been working to design indigenous TEDs at affordable prices, and to educate trawler operators in their use. If the TEDs are used properly there is a minimal loss of fish catch and a substantial drop in turtle mortality. Belinda Wright, the coordinator of *Operation Kachhapa*, is gloomy about the efficacy of TEDs, because, she points out, even in the West, trawler owners tie the trap-door of the TED with wire to prevent the loss of fish catch, and given the difficulty of monitoring here, it is hard to see TEDs as the magic solution. Biswajit Mohanty, of the Wildlife Society of Orissa, has initiated an excellent education and awareness programme along the coast, as a part of *Operation Kachhapa*. B.C. Choudhury, of the

Wildlife Institute of India, and I have been shouting ourselves hoarse that the long-term solution to turtle conservation in Orissa lies in empowering traditional fisherman and helping them regain their fishing waters. Many others also believe, as we do, that enabling them to live in security and dignity will ensure their living in harmony with the turtles. Trawling has harmed turtles and has adversely affected the lives of traditional fisherfolk who pose relatively little danger to turtles.

We all recognise that a ban on trawling near the shore is imperative. But Bivash, who has slept, thought and lived turtles for the past five years, is willing to press any programme, try any strategy, work with any group, as long as the future of the turtles is assured. The rest of us are inclined to agree.

GAHIRMATHA, off the coast of Orissa, is a part of the Bhitarkanika Sanctuary and lies at the mouth of the river Maipura near Dhamra. The original nesting beach was a wide sandy stretch about ten kilometres long, which was a part of the mainland. In 1989, during a cyclonic storm, the tip of the beach broke away from the mainland to form an island four kilometres long and about 500 metres wide.

Over the next few years, the island, called Ekakulanasi, moved further and further away from the mainland towards the Outer Wheeler Island, where the Defence Research and Development Organisation (DRDO) has its missile testing range. This is part of a group of three islands off the coast, including Coconut Wheeler and Long Wheeler, where the WII has its research camp. In 1997, the island, which had become much narrower, split into two, now called Nasi 1 and Nasi 2. In 1999, Nasi 2 had moved to the point where it touched Outer Wheeler island! After the formation of this island, mass nesting was restricted and when it was further fragmented, nesting largely took place in the northern half only. Since the discovery of this rookery in 1974 by Dr. Bustard as a part of an FAO project, researchers have documented the nesting of 100,000 to 500,000 olive Ridley sea turtles each year.



Many turtles dig up the nests of early nesters leading to a large loss of eggs