



Kachhapa

A newsletter for the Indian subcontinent on sea turtle conservation and management

The GOI UNDP Project

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HELP US WITH OUR MAILING LIST

Since this newsletter hopes to serve as a link for coastal and marine conservation, the more people we can reach, the more effective it will be. You can help by passing the newsletter around to people and organizations who are interested, and by helping us build up our mailing list. Please send us names and addresses of individuals, NGOs, research institutions, schools and colleges and anyone else who would be interested in receiving Kachhapa.

Call for articles

Kachhapa, the newsletter, was initiated to provide a forum for exchange of information on sea turtle biology and conservation, management and education and awareness activities in the Indian subcontinent. The newsletter also intends to cover related aspects such as fisheries and marine biology. In the first issue, Kachhapa provided a compilation of organisations working on sea turtles in the subcontinent. From the second issue on, Kachhapa has included articles on the above subjects. While the Editors have done all the 'editing' thus far, we hope to initiate a review process for articles in upcoming issues. For the moment, Kachhapa will come out twice a year, sometime at the beginning and sometime at the end. We request all our contributors to continue sending us information from their part of the subcontinent, including notes, letters and announcements. We welcome casual notes, anecdotal accounts and snippets of information.

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Cover Photographs: Kartik Shanker

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Editorial: Kachhapa - Ashoka's most accomplished ambassador

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Accounts of Ashoka's prowess as an empire builder, visionary leader, and promoter of Buddhism are well known, but why do we hear so little of Kachhapa in relationship to the last and most renowned king of the Mauryan dynasty? Ashoka, in his later, more illuminated years, represents the noblest of quests - to unite humanity in collaboration and peace; and Kachhapa is his greatest ambassador.

Kachhapa, or olive ridley sea turtles, that nest in Orissa migrate to Sri Lanka, underscoring their role as Ashokan ambassadors. But that is only the start: marine turtles have tremendous capacity to migrate and disperse over vast distances. Green turtles that feed in the Gulf of Kutch nest in Pakistan; leatherback turtles that nest in the Nicobars most likely circulate throughout most of the Indian Ocean basin, possibly venturing even into the Red Sea to feed on seasonal concentrations of their favourite food – jellyfish. During certain stages of their life cycle marine turtles may enjoy Kalinga's world famous beaches, or the once tranquil feeding grounds at the doorstep of Krishna's palace, or the remote islands of far flung territories once inhabited by cannibals, but the rest of their lives are spent in other territories – and often on the high seas. "India's marine turtles" are only "India's" for a part of their life history, otherwise they are not Indian at all. These are, after all, *marine* turtles, and the oceans are their home. It is nothing for a turtle to cross an ocean basin while it is growing into an adult, or to make migrations of thousands of kilometres between feeding grounds and mating grounds.

No matter how hard India's cadre of dedicated conservationists labour to conserve these intriguing animals, their efforts - if carried out in

isolation - will be incomplete. The best marine protected areas in Gahirmatha, the most enthusiastic community support for nest protection in Goa, the longest running student programme in Madras, none of these alone will be sufficient. We must make full use of Ashoka's ambassadors, and develop efficient and comprehensive programmes for regional international cooperation.

Over the past few years there have been numerous initiatives uniting marine turtle specialists from the Indian Ocean in workshops, seminars, and other events, in order to enhance communication and collaboration. Now, an international agreement is being developed to promote and strengthen cooperation between nations: *The Memorandum of Understanding on the Conservation and Management of Marine Turtles and their Habitats in the Indian Ocean and South East Asia* ("IOSEA"). Between October 19 – 22, 1999 representatives from 22 nations in the Indian Ocean and South East Asian region, as well as specialists from half a dozen other organizations, met in Perth, Australia to discuss needs and mechanisms for developing regional conservation and management of marine turtles. This was followed by the first round of inter-governmental negotiations from July 11 – 14, 2000 in Malaysia. Attended by representatives of 24 countries, and observers from regional and international agencies, the delegates at the meeting in Malaysia adopted a text Memorandum of Understanding.

The preamble of the MOU sets out a series of considerations, recognising that marine turtles in the region are endangered and that the protection of these animals and their habitats are clearly stated priorities for conservation in various

instruments, both regional and international. Numerous human activities are acknowledged as posing threats to these animals, including various forms of direct exploitation, modification and destruction of habitats, coastal development, pollution, fishing activities, mariculture, tourism and inappropriate conservation actions. Recognising that marine turtles disperse and migrate over vast distances, and depend on a variety of marine and coastal environments, the preamble emphasises the need for integrating conservation and development activities, as well as effective international cooperation. Because the support and collaboration of a wide variety of stakeholders from different sectors of society, and various organisations – governmental and non-governmental – is essential, the preamble is written to be all inclusive. A fundamental recognition is that marine turtles are often under threat because of human actions on the high seas, particularly modern fishing activities, and that these issues need to be addressed. It is acknowledged that states from both inside and outside the Indian Ocean and South East Asian region have responsibilities toward the conservation of marine turtles and their habitats in the region, and they should be encouraged to cooperate and contribute toward the overall goal of marine turtle conservation.

The objective of the MOU “is to protect, conserve, replenish and recover marine turtles and their habitats, based on the best scientific evidence, taking into account the environmental, socio-economic and cultural characteristics of the signatory States.” Among the actions that are described in the agreement are: promoting cooperation among signatory states, harmonising national legislation, joining other international instruments related to marine turtle conservation, establishing a Secretariat, establishing an Advisory Committee, designating national authorities for each signatory, providing regular reports to the Secretariat on the implementation of the MOU, and evaluating the question of funding. A critical action will be the development, and subsequent implementation, of a Conservation and Management Plan that will

adequately address measures for the conservation of marine turtles and their habitats, management of direct exploitation and trade, reduction of threats – with fisheries bycatch specifically named, research, education, information exchange and capacity building.

The next round of negotiations is planned for early 2001, and this is when the Conservation and Management Plan (CMP) will be developed through a process of negotiation. Because it is the CMP that will provide guidance on specific measures to be carried out by the signatory states to the IOSEA, these negotiations will be critical, for they will set the tone for how effective the MOU will be.

Other international agreements for marine turtle conservation include the *Inter-American Convention for the Protection and Conservation of Sea Turtles* and the *Convention on Migratory Species Understanding Concerning Conservation Measures for Marine Turtles of the Atlantic Coast of Africa*. The former is the only legally binding international treaty focused on marine turtle conservation, and it is expected to come into force in early 2001. Known as the “IAC”, this treaty has served as a model for developing other related agreements, including the IOSEA. Even with the advantage of having had a model to follow, the IOSEA presents a huge challenge: the region under consideration is comprised of scores of sovereign states, with tremendous diversity of cultures, religions, environmental, political and social conditions. Sadly, there are also long and contentious histories of conflict between some States of the IOSEA region. Can we put aside these differences and work towards a common goal ?

Time will tell! The Indian delegation has participated actively in both meetings to develop the IOSEA, and clearly India has all the potential to play a critical leadership role as this important agreement develops and is implemented. What nation could speak better to the vision of Ashoka, and show the true role of Kachhapa as his venerated ambassador?

Turtles and Tourists – A coastal village in Goa shows the way

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Goa – the name evokes an image of sun, sand, sea and hordes of tourists. Tourists, who bring in their wake mounting garbage and destruction of the local ecology. This picture is true for most of the sandy beaches that Goa is famous for. However, there is a new awareness spreading, especially among the locals and a section of the state government, that this kind of tourism does not last long. That it only leads to the proverbial killing of the goose that lays the golden eggs, and that there are other ways of bringing tourists in.

Morjim beach is one such example of the new kind of tourism taking root in Goa. A little known beach, sandwiched between the more famous Vagator and Harmal beaches in Pernem taluka of North Goa, Morjim is relatively undisturbed - one of the reasons why the olive ridley turtles come to nest here every year. But there have been other contributing factors to this “minor miracle”, as the locals put it. Protecting the gravid turtles and the eggs from being poached, round the clock vigilance by the locals, over the beach to see that the nests remain undisturbed are some of them.

The situation then

Turtle eggs were poached heavily by the locals in Morjim and turtle meat was sold in the local market. It is in this scenario that Capt. Gerard Fernandes came back to settle in his village – Tembawado which fronts Morjim beach and is now in the news for turtle conservation in Goa. Capt. Fernandes decided to settle in his native village after taking voluntary retirement from the Armed Services. He is presently leading the turtle conservation movement, though he intends to slowly allow others to take over. “The movement will not sustain long if the second rung leadership is not allowed to take over”, he explains.

When he moved back, Capt. Fernandes was aghast to see that the village of his childhood memories was fast disappearing under the onslaught of what he terms as “the disease of uncontrolled greed”. Migration to the towns in search of casual labour by once self-supporting families disturbed him, as did the changing traditions and the increasing pressure on the natural resources of Tembawado by the construction and trawler lobby. What alarmed him even more was the increased poaching of turtle eggs from the beach during the nesting season of the olive ridleys on Morjim beach.

The beginning of the participatory protection

The turtle conservation movement in Morjim began in 1995-96, thanks to Capt. Fernandes, his wife, brick layers Domio D’Silva and Prakash Saptoji, and shack owners Gilbert and Dominic Fernandes. There are several other locals, mainly fisherfolk, who are also involved. The conservation movement was a gradual process that involved the Fernandes couple making the locals aware of the importance of conserving sea turtles and how they could use conservation to turn the area into a potential tourist spot. The release of sea turtles from the protected nests in 1995-96 marked a beginning in the turtle conservation movement and subsequently it was reported in the local newspapers. The publicity caught the interest of the State Forest Department, especially the present Deputy Conservator of Forests (Wildlife), Mr. C.A. Reddy, and their participation boosted the movement in the subsequent year.

The turtle eggs, which are softer and rounder than poultry eggs fetch a local market price of Rs 3 – 4

per egg while a poultry egg costs one rupee in the same market. Hence it is more lucrative for the fishermen to poach turtle eggs and sell them in the market during the nesting season. Capt. Fernandes decided that if he needed the co-operation of the local villagers to protect the turtles he would have to offer them an economic alternative and not mere rhetoric about wildlife conservation. So he pooled in an amount of Rs. 5,000/- from his personal savings for awards to individuals who reported turtle nesting sites. This weaned the villagers, especially the youth, away from poaching turtle eggs, directly and indirectly. Those who were reported poaching were discouraged from repeating the offence as it led to disgrace in the small community. A breakthrough was achieved when once-expert-poachers such as Bautis Fernandes, late Benjamin Fernandes, Anand Pednekar and Ratnakar Halankar, all fishermen from the village, started reporting on nesting sites that needed to be protected.

The fuss created around the olive ridley turtles caught the attention of the rest of the villagers, apart from some tourists who visited Morjim. "The villagers," says Capt. Fernandes, "have been quick to cash in on this and the shack owners especially have been astute enough to recognise that the quality of foreign tourists coming to the beach has improved." According to him, the tourists seek solitude and peace at Morjim beach away from the crowds of heavily visited spots. The shack owners have responded by not blaring music, keeping the beach clean and thus preventing stray dogs. Turtle conservation is now a means of attracting tourists to this beach. Apart from turtles, dolphins are another source of attraction as also a sizeable number of migratory birds that flock to this area.

Joint wildlife management emerges

The Forest Department joined the effort in 1996-97 by deploying two guards to patrol the beach during the nesting season and assist the village youth in nabbing the poachers. These guards along with 30-40 youth volunteers of the village

have helped in arresting the increase in poaching incidence. The Forest Department has also continued with the award-giving scheme to locals who report nesting sites. Presently an award of Rs. 500/- is given to each volunteer. In recognition of his efforts, Capt. Fernandes was awarded a plaque by the Government of Goa in October 1998 for wildlife preservation. Mr. Reddy's enthusiasm to sustain this effort has taken shape in the form of Project Turtle of the Forest Department of Goa that pays six of the local youth on a daily basis to watch over the beach and report nesting and hatching. A 'Turtle Study Centre' has been set up at Pernem within the campus of the Range Forest Officer, Mr. Phadte, who has also been deeply involved with this movement.

Continuing problems

However, the movement, now in its fifth year, is yet to battle the real threat to the turtles. This is from the construction lobby on the landward side, and the trawler lobby on the seaward side. Capt. Gerard Fernandes had himself faced violence from these forces initially. Now, however, because of the local support that he enjoys, these lobbies have become more cautious.

The adjoining village, Vithaldaswado, shares the same beachfront with Tembawado and hence has turtle nesting sites right up to Ashvem and Harmal village, further north in Pernem taluka. However, the villagers from Vithaldaswado have not responded to the turtle conservation programme in the same manner as those in Tembawado. The landowners along the beachfront fear that the turtle conservation programme would attract stricter implementation of the Coastal Regulation Zone Notification, 1991, here. This could mean that they would not be able to sell their land, especially to the hotel lobby, as the real estate price would go down. Capt. Fernandes has been trying to convince the villagers not to sell their land. Instead, he proposes that they could add an extra floor to their houses, which could be let out to tourists and thus earn good revenue. This way they could

manage to retain their ancestral lands, secure an income through good quality tourism and preserve their environment. The villagers from Tembawado are convinced, but not those from Vithaldaswado.

Although the incidence of nesting appears to be increasing, the past year has witnessed high mortality of hatchlings due to flooding of seawater over the nests. Villagers believe that this could be a fall-out of the global warming phenomenon, which is also leading to increased erosion of sand dunes in Morjim by high tides.

The villagers are aware that this is only the beginning and that they will have to face bigger threats in trying to protect the olive ridley turtle. However, they take heart from the fact that they have become the leaders of the turtle conservation movement that is catching on in Goa. Galgibag beach in South Goa has started following in Morjim's footsteps since last year and the number

of hatchlings that have been released from Galgibag this year has touched 573 hatchlings from seven nests so far. A great beginning!

(This article is based on the current study that is being carried out by Ms. Roshni Kutty as part of a Directory of Community Conserved Areas in India)

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A preliminary survey of sea turtles along the coast of Maharashtra and Goa

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A preliminary survey was carried out along the coast of Goa and Maharashtra from May 13 –31, 2000. Twenty five localities in Maharashtra and nine in Goa were visited. The objective of the survey was to collect information from secondary sources such as local people, fishermen, forest officials, fisheries department, trawler owners and workers and local non government organisations. The survey commenced from the Goa coast. Most of the sites visited in each district represent the southern and northern limits of that district which gives the idea of distribution pattern of marine turtles in that district.

Status in Goa

The Forest Department has created awareness regarding the sea turtles through media and newspapers. Thus the people in Goa were aware about this group. While interviewing various people in Goa, it was noticed that they were willing to talk about all the marine fauna other than the sea turtles. In Goa, there are two main nesting sites of olive ridley turtles (*Lepidochelys olivacea*): one at Morjim, North Goa and another at Galgibag, South Goa. Both these sites are protected by the forest department with the help of local people. Apart from these sites, two less populated sites at Querim and Palolem may be potential breeding sites of marine turtles and are

to be surveyed during the breeding season. The main threat to marine turtles in Goa is egg poaching by humans and incidental catch in trawler nets.

Status in Maharashtra

A total of 25 localities from three coastal districts of Maharashtra were visited. In Maharashtra, the marine turtles nest on the entire coast. All the sites visited have recent nesting records. As per the information gathered from the locals, the population of turtles has drastically declined in

the last 10 years. At most of the sites the locals informed us that earlier 15 to 20 turtles used to visit each beach for nesting every year but now the number is reduced to less than five. A site at Harehwar in Raigad district has good potential. Besides this, beaches at Shiroda-Aravali and Motemal have good nesting records and these are to be surveyed during the forthcoming breeding season. The population of the marine turtles in Maharashtra is under serious threat due to indiscriminate poaching of eggs by humans and incidental catch in fishing nets.

News from Orissa

There was both good and bad news during the 1999 – 2000 season in Orissa. The supercyclone in October, 1999 crippled much of the state's machinery and many conservation organizations including Operation Kachhapa were involved in providing cyclone relief. Consequently, conservation of sea turtles was not exactly a priority. It is believed that more than 20, 000 olive ridleys died during this season as a consequence of trawling related mortality. (*The Orissa high court in its May 14, 1998, judgement in a case of WWF India Vs. State of Orissa had ordered that all fishing trawlers be equipped with*

turtle excluder devices (TEDs) to avoid turtles being caught in their nets). However, in late March, mass nesting did take place at the Nasi islands off the Gahirmatha coast. This again is no cause to celebrate as the islands have become even more fragmented and narrow after the supercyclone and much of the nesting area is constantly inundated, resulting in very low hatching success. Conservation initiatives and enforcement of nearshore mechanized fishing bans have to be implemented with greater vigour in the coming season if mortality is to be reduced.

More news from Dhamra

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On 22nd September, a division bench of Honourable Orissa High Court consisting of Honourable Mr. Justice P.C. Naik and Justice Mr. P.K. Mohanty after hearing the submissions of Sri Raj Panjwani, Advocate issued notices to:

- Ministry of Surface Transport, Government of India,

- Ministry of Environment, Government of India
- International Sea Ports Pvt. Ltd., Chennai
- Forest and Environment Dep't., Government of Orissa
- Chief Wildlife Warden, Orissa

on a joint petition filed by Biswajit Mohanty and the Wildlife Protection Society of India seeking review of the environment clearance given to the proposed Dhamra Port Project. The said project had been cleared by the Ministry of Surface Transport under the Coastal Regulation Zone Notification without going for formal clearance to the Ministry of Environment of the Government of India. In an earlier petition the court's attention had been drawn to the lack of implementation of orders passed by the Orissa High Court on 14th May, 1998 regarding directions to the state government to regulate fishing activity by mechanised fishing trawlers for protection of sea turtles off the coast of Orissa.

The petition expressed apprehensions on the impact by the proposed Dhamra Port Project on the habitat and breeding of olive ridley Sea turtles and how migratory and reproductive patches of turtles could be affected. The petitioner further drew attention to the fact that there was reduction of the area of Bhitarkanika National Park from 367 to 145 sq. kms in the final notification by which important ecological sensitive areas were excluded. The EIA report prepared by Kirloskar Consultants, Pune and Aquaculture Foundation of

India, on the port project did not sufficiently take into account the effect on the migration routes and reproductive activities of olive ridley sea turtles. The petition discussed the effect of artificial lighting and also on the movement of large cargo ships ranging from 60,000 DWT to 1,20,000 DWT on turtle activity. The largest nesting ground of sea turtles in the world is located at Nasi Islands close to the Dhamra Port. It may be recalled that the National Environment Appellant Authority had also upheld the environmental clearance given earlier by the MOST, and the order of this Authority has also been challenged.

The most interest aspect is that the Bhitarkanika National Park consisting of 367 sq. km was constituted on 3.10.1988. The state government entered into a contract with International Sea Ports in October, 1997 for construction of Dhamra Port and in September, 1998 the State government issued the final notification constituting the Bhitarkanika National Park whereby the National Park area was reduced to 145 sq. kms allegedly to enable the construction of the port which fell right in the centre of the proposed National Park .

Conservation genetics of olive ridleys on the east coast of India

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Introduction

The study of sea turtles has largely been confined to the brief period in their life cycle when they come ashore to nest. In recent times, molecular genetic tools have played a major role in answering questions of biological and ecological interest in marine turtles. While field based tagging studies of several thousand turtles over thirty years merely provided clues of natal

homing behaviour in turtles (i.e. the return of nesting adult females to the beach where they hatched), studies using genetic markers were able to prove the theory conclusively in green turtles and other species (Bowen, 1996). Molecular genetic markers have been widely used in studying global population structure of sea turtles, in tracing the source of turtles caught in deep sea and other fisheries, and in tracing the long distance migratory routes of these species.

Olive ridleys are circumglobal in distribution, and are particularly well known for the phenomenon of mass nesting. The Orissa coast has three major mass nesting sites, of which Gahirmatha is the largest in the world with 100 to 500, 000 turtles nesting each year. In the past five years, there has been serious cause for concern due to marine fisheries related mortality on the Orissa coast (Pandav *et al.*, 1998; Shanker & Mohanty, 1999). Since 1994, more than 75,000 turtles have been counted dead on the Orissa coast and actual number dead is certain to be much higher (Pandav & Choudhury, 1999; B. Mohanty, Pers. Comm.)

Methods

We studied the population genetic structure of olive ridleys on the east coast with a view to evolving conservation strategies for these turtles. The study was a collaboration between BC Choudhury and Kartik Shanker, Wildlife Institute of India and Dr. Lalji Singh (Director) and Dr. Ramesh Aggarwal, Centre for Cellular and Molecular Biology, Hyderabad. Tissue samples were collected from three sites in Orissa and one site in Tamil Nadu. Various molecular genetic techniques - RAPD, multilocus fingerprinting, Microsatellite analysis, and Mitochondrial DNA sequencing- representing different approaches, were used to analyse DNA polymorphism. The multilocus fingerprinting showed a high degree of variation polymorphism between individuals. The microsatellite analyses did not point to any population structuring along the coast. Low population structure may point to weak natal homing in olive ridleys on the east coast of India.

Results

Mitochondrial DNA sequencing revealed the presence of five haplotypes, of which two have been previously reported from Sri Lanka by an earlier study by Dr. Brian Bowen and colleagues in the USA (Bowen *et al.*, 1998). However, we found three new haplotypes, which could be specific to the east coast of India. The dominant haplotype (K) in our study is the most ancient

lineage in ridleys suggesting that olive ridley population on the east coast of India could be the source for contemporary global populations of ridleys. This increases the conservation importance of this population. This study has raised more important questions which can be addressed using molecular genetic techniques. Specifically, the population genetic structure of olive ridleys in Indian waters needs to be addressed using more microsatellite analyses. The documentation of mitochondrial DNA sequence haplotypes for various species in Indian waters would form part of a long term global effort to trace migratory routes and to identify sources of turtles killed in deep sea fisheries.

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(The study was funded by the Wildlife Institute of India, Dehradun. The detailed study report can be obtained by writing to the WII. A research paper is in preparation)

RESOLUTIONS ON ORISSA AT THE SEA TURTLE SYMPOSIUM IN MARCH 2000

The following resolutions were proposed at the 20th Annual Sea Turtle Symposium at Orlando, Florida, in March 2000. Both resolutions were passed unanimously by the floor.

Resolution on the urgent need to reduce trawling related mortality of olive ridley sea turtles on the Orissa coast, India – March 2000

**20th Annual Sea Turtle Symposium
March 1-4, 2000, Orlando, Florida, USA**

Symposium Resolution 2000-4
Passed by the Membership on March 3, 2000

Considering that unregulated mechanised trawl and gill net fishing has resulted in large-scale annual mortality of olive ridley sea turtles with more 50,000 dead turtles counted along the Orissa coast in the past five years; and

Considering that nearly 10,000 dead turtles have been counted during the 1999-2000 season despite repeated assurances by the state government that there would be adequate patrolling of coastal waters and enforcement of existing laws for the prevention of turtle mortality; and

Considering that the number counted dead on the beach are only those turtles washed ashore and the total mortality is most likely to be much higher; and

Considering that mechanised fishing has also adversely affected the traditional and small scale fishing communities on the coast of Orissa, leading to statewide protests by these fisherfolk against mechanised fishing; and

Considering that there exists legislation, the Orissa Marine Fisheries Regulation Act (1982) and Rules (1983), which bans all mechanised fishing within 5 km of the coastline; and

Considering that no mechanised fishing is allowed within 20 km of the Gahirmatha coastline, which was declared a marine sanctuary by the Orissa Government in 1997; and

Considering that both the above laws are flagrantly violated by mechanised trawlers, due to the total lack of, or at best, poor enforcement and patrolling by the concerned government agencies; and

Considering that none of the mechanised trawlers operating in Orissa's coastal waters are using Turtle Excluder Devices (TEDs) and thus continue to flagrantly violate the provisions of the Orissa Marine Fisheries Regulation Act, 1982 and the directions issued on 14.5.98 by the Honourable Court of Orissa in OJC No. 3128/ 94 (WWF India Vs. State of Orissa and Ors) ; and

Considering the fact that the olive ridley sea turtle enjoys the highest level of protection under the Indian wildlife laws since it is protected under Schedule I to the Wildlife Protection Act, 1972 as well as is listed under Appendix I to the CITES ; and

Considering that, since 1983, there have been recommendations by leading Indian scientists,

environmentalists, and government officials, as well as non-Indian experts for mechanized trawlers in Orissa to use TEDs;

It is hereby resolved that:

The members of the 20th Annual Sea Turtle Symposium, Orlando, Florida

Entreat the Forest Department, Fisheries Department and Coast Guard to work together in Orissa to strictly enforce the ban on mechanised fishing within the Gahirmatha Marine Sanctuary and the 5 km nearshore fishing ban, both of which would drastically reduce sea turtle mortalities with immediate effect; and

Request the Fisheries Department of Orissa to evolve a plan to ensure the use of TEDs by

mechanised trawlers in Orissa coastal waters by no later than 2002; and

Request the Fisheries Department of Orissa to safeguard the livelihood of the traditional country fishermen by enforcing the provisions of the Orissa Marine Fisheries Regulation Act, 1982 and rules framed thereunder which bans off shore mechanized fishing for a distance of 5 kms from the coast.

Strongly recommend that effective long term conservation strategies should involve all stakeholders including the Forest and Fisheries Department of the Government of Orissa, Non Governmental Organizations, Research Institutions and most importantly, the traditional coastal fishing communities, whose support and involvement would be crucial to the survival of the olive ridley and its marine habitat in Orissa.

Resolution on 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– March 2000

**20th Annual Sea Turtle Symposium
March 1-4, 2000, Orlando, Florida, USA**

**Symposium Resolution 2000-5
Passed by the Membership on March 3, 2000**

Considering that the proposed construction of a large all weather, deep water, modern bulk terminal port at Dhamra threatens the Gahirmatha olive ridley sea turtle rookery, the largest in the world, with over 200,000 turtles nesting in 1999; and

Considering that the port will have a 550 m berth length and will occupy a total of 900 acres, and is merely 10 km north of the nesting beach at Gahirmatha; and

Considering that the 62.5 km rail corridor to Bhadrak - 200 metres wide, and including a railway, a highway and land development - will

occupy 3000 acres, and is adjacent to the Bhitarkanika Wildlife Sanctuary; and

Considering that this port will cater to bulk cargo such as coking coal and iron ore and the ultimate capacity will be 25,000 tonnes per annum; and

Considering that the project proposal has only been cleared by the Ministry of Surface Transport and NOT by the Ministry of Environment and Forests, due to a loophole in the Coastal Regulation Zone rules; and

Considering that the proposed off-shore crude oil terminal at Kantiagoda threatens the mass nesting

ground at Rushikulya, which is the second largest in Orissa with 60,000 turtles nesting in 1996; and

Considering that the terminal has a capacity of 18 million metric ton per annum for giant oil tankers from the Gulf and other oil producing countries; and

Considering that the pipelines will be connected to Kantiagoda village, which is virtually on top of the Rushikulya turtle mass nesting site; and

Considering that the Environmental Impact Assessment Report [interim], which was prepared by the National Institute of Oceanography of Goa, has not adequately addressed the presence of turtles in the area and has also ignored the fact that the seacoast off Rushikulya is a proposed marine sanctuary which is awaiting government notification; and

Considering that the report actually states that "sensitive and fragile ecosystems...are absent in the project area", and briefly mentions the potential for crude oil spills: "in very rare events of tanker accidents or subsea pipeline rupture, large spill may occur"; and

Considering that the oil spill from a similar Single Buoy Mooring in Gujarat in 1999 has

resulted in substantial damage to marine life and to marine ecosystems in the area: and

Considering that the mass nesting beaches at Rushikulya, where more than 60,000 turtles nested in 1996, enjoys no legal protection so far;

It is hereby resolved that:

The Members of the 20th Annual Sea Turtle, Orlando, Florida

Request the Government of India to review the Dhamra port project, subject the proposal to objective Environmental Impact Assessment and have the proposal passed through the proper channels of the Ministry of Environment and Forests; and

Request that since other sites for the construction of the port have been identified, these sites are objectively considered and evaluated as alternatives; and

Request the Government of India to reassess the Crude Oil Terminal at Rushikulya which threatens one of the most important nesting beaches of olive ridleys in Orissa.

Offshore studies on olive ridley sea turtles in Gahirmatha, Orissa.

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Introduction

The largest known population of the Olive ridley sea turtles (*Lepidochelys olivacea*) occurs along the Orissa coast (Bustard, 1976, Limpus, 1995). Enormous arribadas have been observed over the past decades and as many as 600,000 turtles have

nested in the course of two weeks (Dash and Kar, 1990). The *L. olivacea* population that occurs along the Bay of Bengal has suffered severely over the past decades. Apart from the threats faced while nesting, marine turtles are particularly vulnerable when they aggregate offshore (Richard & Hughes, 1972; Pers. Obs.).

The interactions between turtles and the fisheries is inevitable in a region like Orissa, the outcome of which has not always been favorable for both turtle or man. The ever-increasing human induced mortality of several thousand breeding individuals along the coast of Orissa has been an alarming concern over the past several years (Pandav et al., 1998). Incidental capture and mortality resulting from such capture are currently recognized as important threats to sea turtles (Hillestead et al., 1982). It is believed to account for more deaths than all other human activities combined (Henwood and Stunz, 1987, National research council, 1990, Robins, 1995). Mortality in the last 5 years alone has exceeded 50,000 turtles (Pandav, unpublished data). Large scale mortality of olive ridleys in Mexico and the subsequent collapse of three large breeding assemblages in the 1970's & 1980's clearly illustrates the consequences of such actions (Cliffon et al., 1982).

While much of the conservation efforts have focused on protecting nesting habitats, protection in the marine environment has been overlooked, as enforcement is difficult and problematic. However, since turtles spend nearly all of their lives at sea (Owens, 1997), it is imperative that conservation efforts be directed in this region. Information on the offshore ecology of sea turtles is hence very crucial during the phase in their life history. Despite two decades of sea turtle research in Orissa (Bustard, 1974; Dash and Kar, 1990, Pandav et al., 1998), hardly any have studied them away from the nesting beach. Pandav et al. 2000 presented the first such account from this region. In order to shed more light on this aspect of sea turtle biology and also to aid in the conservation effort, I carried out a study in Gahirmatha during the 1999-2000 season. The survey period coincided with the mating period of the olive ridleys for this area that is spread over a maximum period of 90 days (Dash and Kar, 1990, Pandav, pers comm.) My objectives were to determine the spatial and temporal distribution of these turtles during the period prior to nesting and to get an idea of the intensity of mating that occurs in the vicinity of the rookery.

Methods

L. olivacea sighting data was collected between December 1999 and February 2000 using Line transects. The study area was surveyed in a country boat powered by a 10-hp diesel engine at an average speed of 8 km/hr. The bearing and radial distance of turtles sighted was measured using an 8 x 50 binoculars with a built in magnetic digital compass and a range finder (Leica Vector, Leica Corporation 1994). Environmental factors that were likely to affect detectability were also recorded.

Apart from the sightings, pairs were also captured and tagged during the study period. Locations from these captures were used for determining the extent of distribution in these near shore waters. Latitude and longitude position of each capture and sighting was recorded throughout the study period using a hand held Global Positioning System (Garmin Inc.). A depth profile of the study area was also constructed along representative lines. The distribution was determined by plotting capture locations on the map using arc view.

Results

The estimated surface density of pairs was 26 pairs km⁻² (CV 11.4 %) and the encounter rate was 3.9 pairs/km. The influence of various environmental factors on transects was found to be statistically insignificant but the sea state clearly affected detectability. Individuals tagged while mating exhibited some degree of inter-rookery movement. 1524 adults stranded in the first 3 weeks of the mating period and the overall mortality was over 3000. Sex ratios of the stranded turtles were skewed more towards males (1.47:0.68). Capture locations pooled over a 3 year period seems to suggest that the area used for breeding did not exceed 57.98 sq. km. The reproductive patch was situated at a depth of 8-65 feet.

The density of pairs even when extrapolated fails to account for the intensity of nesting that occurs

at Gahirmatha. It is possible therefore that females from several such assemblages aggregate during arribadas. The extent of offshore distribution seems to be consistent with observations off Nancite where individuals in the reproductive patch although transitory were found within 5 km offshore during the breeding period. These mating pairs also tend to occur in much shallower waters than do other species of sea turtles (Heather Kalb, pers. comm.) A possible explanation for such assemblages appears to be the one provided by Richard and Hughes (1972). They attribute assemblages of ridleys to near shore environments to the effects of river effluents, which may influence recognition of the same site at a later stage. The location of the aggregations in the present study is close to the mouth of the river Maipura where considerable deposition takes place. Although the size of the patch is quite variable both within and between seasons, the location has remained the same. Another explanation may involve the role of near shore currents.

Incidental capture and threats other the offshore waters to this highly endangered group is cause for great concern. As this study clearly shows, turtles suffer significant mortality when they aggregate in nearshore waters prior to nesting. An effective conservation strategy needs to incorporate these findings in order to protect the ridleys of Orissa.

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Indian Fisheries over the past 50 years (Part II)

Coastal Industrial Aquaculture

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The first part of this article (*in Kachhapa #2*) covered the impact of mechanisation on Indian fisheries. Here, I try to cover the effects of coastal industrial aquaculture on traditional fishing communities and on fisheries.

The Coastal Regulation Zone Notification

When Shrimati Indira Gandhi was the Prime Minister she wrote to all the chief ministers asking them to protect the coastal zone ranging from 0-500 m area of the coast from sea. In 1991, the GOI issued a Notification called CRZ Notification under section 3(1) and section 3(2)(V) of the Environment (Protection) Act, 1986. For the first time, it recognized the right of traditional fisher people over the coast. There were 13 prohibitions in this zone like Industrial pollution, dredging, constructions etc. Though initially the GOI did not see the implications, it later wanted different amendments because of the pressure from the Hotel and Industrial lobbies. But the fisher people resisted this move and the SC insisted upon the strict implementation of CRZ Notification without diluting it.

Industrial Aquaculture - CRZ violation

On one hand, the GOI came out with the CRZ Act, but on the other, it was also encouraging activities against its own law. The Marine Products Export Development Authority (MPEDA) with the Ministry of Commerce took the lead in promoting shrimp industries violating all the protections to the coastline enshrined in the CRZ. The economic policy of the GOI, which was desperately looking for foreign exchange, also invited multinational corporations and other capitalists to establish industrial

aquaculture all along the coastline, with the sole purpose of export. Now aquaculture has become a big business not only in India but in many developing countries in Asia and elsewhere.

The "Rape and run" approach

India has an estimated area of 1.19 million hectares of brackish water, of which 8,25,000 hectares are now under shrimp culture. According to official reports about 6,046 prawn ponds covering about 10,860.93 hectares of coastal land were used for shrimp culture by October 1994. But as per non-official estimates, more than 20,000 hectares of coastal land came under shrimp culture. The MNCs have had no qualms in acquiring prime agricultural lands and converting them into intensive shrimp ponds which have maximum life of only 5 to 10 years. Abandoned farms can no longer be used for shrimp farming or for agriculture. The shrimp industries then move on to other areas, continually leaving devastated people and lands behind them.

Development for whom?

Aquaculture has been hailed as holding "much promise for meeting increasing food demands" and as providing "important economic and nutritional benefits to many regions of the developing world". The questions that need to be asked are:

1. For whose nutrition is the food produced?
2. Who benefits from the sale of the produce?
3. How does it affect agriculture and marine fisheries?
4. What are the ecological hazards?
5. How are human rights (of small farmers and

fisher people) upheld or violated ?

Ecological Degradations

Salination of ground water

One ha. of industrial shrimp farm requires 120,000 cubic meters of sea water annually. This 12 meters of saline water over and above the water in coastal ecosystems creates serious problems of ground water salination, resulting in drinking water famine. Women are forced to walk long distances to secure drinking water. A study carried out by the Central Institute of Brackish Aquaculture (CIBA) in 1995, in Nellore district, found the salinity figures to range from 410 to 4900 PPM.

Salination of land

The seepage from the aqua farms creates salination and water logging of neighbouring agricultural farms. Nellore, which is named after "nello" which means rice in Telugu, is now totally destroyed through the impact of shrimp farms. The Cauvery delta is another fertile area in which agricultural land is being converted into shrimp farms.

Pollution, destruction of mangroves and coastal Forests

Factory farming of shrimp requires 4-6 tons per hectare of artificial feed. Only 16.7% of this feed is converted into shrimp biomass. The rest is converted into pollution, which deteriorates water quality inside the pond and in the ecosystem. It is this build-up of pollution that is responsible for the collapse of shrimp production in a short period and for the destruction of the productivity of estuarine and coastal waters. The cumulative pollution over a production cycle can be devastating. Mangroves are the nurseries of marine life. Shrimp farms destroy the mangrove ecosystems, not only by the waste being sent into the sea but also by direct conversion of mangroves into shrimp farms. The destruction of mangroves increases the risk of cyclones and

floods.

Depletion of marine fisheries

Marine fisheries are destroyed in three ways by industrial shrimp farms;

1. Wild fry is the major source of seed in shrimp farms. For every single fry of commercially desirable *Peneaus monodon* (Tiger prawn) caught, several other marine species are wasted as "fry by catch".
2. Fish caught at sea is a major source of shrimp feed. Each ton of industrial shrimp requires ten times its weight in marine fish for conversion to feed.
3. The pollution from shrimp farms, also kills fish life and destroys marine resources.

Human Rights Violations

Displacement of traditional fisher people, small farmers and agricultural labourers

People have a right to work and live in their own place. While they also have a right to migrate where they want to, they should not be forced to do so. For centuries the small fisherfolk, farmers and agricultural labourers have been living in harmony with nature while at the same time providing food for themselves and for others. They are skilled people by their own right. They should be helped to develop appropriate technology to improve their work and life. Instead, industrial aquaculture has created conditions by which they can no longer survive in their own place. They are forced to leave their homes and hire themselves out as unskilled labourers.

Creation of unemployment

Aquaculture can provide direct employment to only 2 persons per hectare and 110 man days per hectare for initial construction. The World Bank Aqua Project in India with a 3 billion Rupee outlay creates employment for only 14,000 people. Most of these jobs go to outsiders (skilled

persons), leaving the bulk of the local people unemployed.

The struggles against industrial aquaculture

The people who were affected by the shrimp culture came together and protested. The movement got strengthened by many organizations like Campaign Against Shrimp Industries, PREPARE, PROFAM, the Orissa Krushak Mahasangh and many others, both at the grassroot level and at the level of scientific research and legal aids. They waged a war both in the land and in the court. Finally the Supreme Court in its landmark judgement in December 1996 ordered the demolition of all the aquaculture farms because it was a violation of CRZ notification of 1991 (details of the judgement can be obtained from the author).

The Aquaculture Authority Bill

Instead of carrying out these directions of the Supreme Court, the Agriculture Ministry drafted an Aquaculture Authority Bill (AAB). This Bill was tabled in the Rajya Sabha on March 19, 1997 and passed at its last session on March 20, 1997 without keeping in mind the judgement of the Supreme Court. The Aquaculture Authority Bill is one of the most anti-people legislation ever introduced in the Indian Parliament. It is contrary to the Environment Protection Act and to the Environment Policy of the Central Government reflected in the CRZ Notification. It is also contrary to the welfare of the rural population living in the coastal areas. Whether the Shrimp industrial aquaculture farm is large or small, the livelihood of more than a 100 million people living in the coastal areas and who were given protection by the Supreme Court judgement will be adversely affected by the introduction of Aquaculture Authority enactment.

The struggle continues

The demands of the present agitation (from July 1, 1998) of the fisher people include:

- That the Aquaculture Authority Bill of

1997 pending before the Lok Sabha be withdrawn.

- That the Notification dated July 9, 1997 issued by the Ministry of Environment & Forest amending the CRZ notification of February 10, 1991 be withdrawn.

- That steps to implement in total the Supreme Court judgement of December 11, 1996 on Aquaculture be taken.

- That all the existing Joint / Lease licenses be cancelled and that the Government should continue holding meetings with the National Fisheries Action Committee Against Joint Ventures (NFACAJV) for the implementation of all the recommendations of the Murari High Power Committee.

- That there should be a monsoon trawl ban in all the coastal states at the same time for the conservation of fish resources.

Misleading "Success Stories"

Often the industrial and export oriented fisheries and related sectors publish their "Success Stories" with impressive figures. For example the Marine Products Export Development Authority (MPEDA) has reported its achievement of having crossed US \$ 1 billion mark for the fourth consecutive year. It further says that in 1972-73, the year of its inception, the total volume of marine products exported from India was 38,903 tonnes valued at Rs. 59.72 crores which have by 1997-98 touched 3,85,818 tonnes valued at Rs. 4,697.48 crores. What is suppressed under these 'achievements' is the plight of the workers, mostly women, engaged in the sea food export industry. Around 1 lakh women, mostly contract and migrant workers are enslaved in these processing industries. Their extremely strenuous and hazardous work conditions violate all labour laws. And this maximization of work-time combined with meagre cost of maintenance of the confined migrant labour force, goes to form the "success story" of MPEDA.

True development and progress

True development or progress should include the

following factors:

- It should lead to fulfilling the basic needs of the poorest.
- The prior rights of the local people and their natural knowledge should be respected
- The developmental activity should involve the people who are already traditionally engaged in fishing and are dependent upon it for their livelihood.
- It should be sustainable.
- It should respect the environment and eco-balance.

World Forum of Fish-harvesters and Fishworkers (WFF)

The problems of the fisher people all over the world is similar. The United Nation's Food and Agricultural Organization's reports of 1995 and 1996 have found unequivocally that the fisheries of the world are undergoing the most serious crisis ever recorded. At least seventy-five percent are in or verging on a state of collapse due to the ravages of over-fishing, destructive fishing gears - most particularly by factory trawlers - and the effects of coastal industrial aquaculture, industrial and domestic pollution, and the myriad consequences of global warming. The fishing communities all over the world are under the threat of extinction. So the fisher people's organizations from 35 countries came together in New Delhi from November 17 – 21, 1997 and

formed the World Forum of Fish-harvesters and Fishworkers (WFF). The objective of the Forum is to protect the fish resources and the fishing communities by promoting sustainable development of fisheries through eco-friendly gears and methods and to work for a global ban against all destructive fishing (particularly factory trawlers), coastal industrial aquaculture and coastal industrial pollution. India has been chosen as the co-coordinator. The WFF has declared November 21, the foundation day of the WFF, as World Fisheries Day. On this day, every year, all over the world, actions, campaigns, studies, etc will be organized with a view to protecting the fish resources, and the fishing communities through sustainable small fisheries and to evoke public awareness.

Conclusion - The challenges before us

We need to continue our struggles against all kinds of destructive gears and methods of fishing in order to conserve fish resources. We need to step up struggles against coastal industrial aquaculture and against all kinds of coastal pollution. We need to see that the fisher people who are solely dependent on fishing should own the sea and the water bodies and gear. The ocean is a living organism. The life of the planet and the dependent health and welfare of humanity must not be sacrificed to the greed of the few.

SYMPOSIUM 2001 ANNOUNCEMENT

The 21st annual symposium for sea turtle biology and conservation will be held at Philadelphia, Pennsylvania, USA from February 24 – 28, 2001. Details are available at <http://www.seaturtle.org>. Symposium announcements can be obtained by post mail by contacting the Symposium Registration Coordinator, Donna Broadbent (**E-mail:** zenith@citlink.net ; **Tel:** + 1-304-947- 5366, **Fax:** +1-304-947-5364, 480 Williamsport Pike, Suite 3, Martinsburg, West Virginia, 25401, USA). Registrants who cannot access the Internet and who require a personal invitation letter to attend can request this letter by contacting the Symposium Secretary, Sheryan Epperly-Chester (**Email:** sheryan.epperly@noaa.gov; **Tel:** +1-305-361-4207; **Fax:** +1-305-361-4478; **Address:** NOAA/NMFS, 75 Virginia Beach Drive, Miami, Florida 33149, USA).

The GOI UNDP Sea Turtle Conservation Project

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The Government of India – UNDP Sea Turtle Project is a national sea turtle conservation project which is being executed by the Ministry of Environment of Forests, with the Wildlife Institute of India, Dehradun coordinating the various sub-programmes within the project. The project, initiated in late 1999, has various components including extensive surveys along the coast, reviews of legislation and community based conservation, education and awareness, GIS studies of key nesting areas, TED demonstrations and implementation and training for wildlife and fisheries managers and field biologists.

Surveys

While there is scattered literature for the entire coast on sea turtle nesting, no systematic survey has been carried out and many areas have been ignored. One of the objectives of this program was to extensively survey the entire coast for sea turtle nesting and mortality with intensive sampling of key areas. Another objective of the survey is to build a coastal network of organisations and individuals involved or interested in marine conservation and fisheries issues who can serve to disseminate and collect information. Surveys have been initiated in most of the states by the following organisations:

- **West Bengal** – *Nature, Environment and Wildlife Society, Calcutta.*
- **Orissa** – *Forest Department, Government of Orissa, Bhubaneshwar.*
- **Andhra Pradesh** – *Wildlife Institute of India, Dehradun.*

- **Tamil Nadu** – *Salim Ali Centre for Ornithology and Natural History, Coimbatore.*
- **Kerala** – *THANAL Conservation Action & Information Network, Thiruvananthapuram.*
- **Maharashtra and Goa** – *Bombay Natural History Society, Bombay.*
- **Gujarat** – *Gujarat Institute of Desert Ecology, Bhuj.*
- **Andaman and Nicobar islands** – *Andaman and Nicobar Environmental Team, Port Blair.*

Other projects

The Wildlife Institute of India, Dehradun conducted a Rapid Assessment survey of the impact of the supercyclone (October, 1999) with special reference to sea turtle nesting habitats. A review of legislation is being undertaken by Enviro Law, New Delhi. Kalpavriksh, Pune is conducting a study of community based conservation in Kerala, Goa and Orissa. Orissa Remote Sensing Application Centre, Bhubaneshwar is using GIS and satellite imagery for the characterization of sea turtle nesting habitats in Orissa. The Centre for Environmental Education, Ahmedabad will be conducting a workshop to facilitate education and awareness programmes in various states.

The Orissa Forest Department and the Wildlife Institute of India, Dehradun plan to conduct a national workshop for sea turtle conservation and management in November, 2000. The project began in late 1999 and currently extends till December, 2001.

Current marine turtle situation in the Andaman and Nicobar Islands – An urgent need for conservation action

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Introduction

The four species of marine turtles that occur in the Andaman and Nicobar Islands are the Leatherback (*Dermochelys coriacea*), the Hawksbill (*Eretmochelys imbricata*), the Green sea turtle (*Chelonia mydas*) and the olive ridley (*Lepidochelys olivacea*). Blyth in 1863 in Monat's paper first reported only three species, the olive ridley, Green and Hawksbill to occur in the Andaman and Nicobar Islands. In the late 1970's and up to early 1980's, there were several reported of Loggerheads nesting on these islands. However there is absolutely no evidence of this species nesting in the Andaman and Nicobar Islands now.

Status surveys and studies in the Andaman and Nicobars have recorded India's best nesting beaches for three species, the Leatherback, Green and Hawksbill sea turtles. The presence of Green turtles and Hawksbills feeding grounds are also confirmed (Bhaskar, 1993). Evidence of the decline of sea turtles in the islands has been reported (Bhaskar, 1993) and the need for conservation and recommendations has also been discussed (Bhaskar, 1993, Bhaskar and Andrews, 1993 and Sivasunder, 1996). In 1978 the notification of 94 islands in the Andamans as sanctuaries includes 30 islands as confirmed sea turtle nesting sites. There are at least 24 sites reported for the Nicobar group of islands (Bhaskar, 1993 and Tiwari, 1991). Currently all the best viable nesting sites are either in Tribal Reserves or in uninhabited islands. This report reviews literature and includes new nesting sites and observations made during crocodile and wetland surveys over the past seven years.

Leatherback (*Dermochelys coriacea*)

This unique animal, the largest marine reptile, occurs only in the Andaman and Nicobar group of islands and in Sri Lanka for the Northern Indian Ocean region. There are sixty four known nesting sites in the world and 23 sites have been reported for these islands and currently only 21 sites are utilised by these large reptiles for nesting (Andrews and Whitaker 1996, Bhaskar, 1993 and Tiwari, 1991). The last reported nesting on Karamatang No. 9 beach in Middle Andaman Island was in 1974 and the last nesting at Cuthbert Bay also in Middle Andaman was in 1978 (Bhaskar, 1993). There are incidents of one or two turtles nesting in Cuthbert Bay during some years and the last report was in 1997 of one female nesting. These two areas were the northern-most distributional range for this species in the Andamans. This is a typical example where too much human disturbance on the beach such as sand mining, cattle, predation of eggs by humans and feral dogs, and settlements and camps on the beach, can affect nesting intensity and deter females from nesting. These causes and examples must be considered for management planning. Most of the Leatherback rookeries in the Nicobars were found only in 1990 (Bhaskar 1993 & Tiwari, 1991) and nesting on the east coast of Rutland only in 1997 when nests were found in May.

Leatherback sea turtles nest 4.9 times on an average, per season, ranging from 1 to 7 times depending on the female's reproductive status for that year (Bhaskar, 1993). During the 1991 – 92 season 166 females nested in the Great Nicobar island. This may be an under-estimate, being for only 8 of the 9 nesting sites, and of these 8, some

sites were surveyed well after the nesting season in March (Bhaskar,1993). However, this was the first time that a figure for the Leatherback nesting population on Great Nicobar Island was reported and possible only through tagging females after they came up to nest. In 1981, 10 nests in South Bay in Little Andaman island was reported by Bhaskar and in 1984 he counted 84 nests on the West Bay beach of Little Andaman Island. During mid March 1999, 34 nests were counted on the West Bay beach during a crocodile survey and no nests or tracks were found on the South Bay beach. Juvenile leatherbacks have been observed off the southern coast of North Sentinel Island, an island north west of Little Andaman island.

Australian tagged Leatherbacks have been observed to nest on the Galatha beach in the Great Nicobar Island on the South-East coast. However, no information has been reported for these turtles which is a loss of extremely valuable data on the biology of the species.

The estimated nesting population for Andaman and Nicobar Islands is 198 females (Bhaskar, 1993) and there has been no other effort to estimate populations. Nesting season for this species has been discussed by Bhaskar, (1993) and Sivasunder, (1996). The nesting season for the Nicobars, from observations at the Galatha beach, starts in November, peaks in late December and January. In some years, it spills into April and there are records of turtles nesting in October in some years. Maximum nesting in South Andaman on Rutland Island is from September through December. Bhaskar (1993) has reported nesting all year round except in May. However there are records of Leatherbacks nesting in May on Rutland island as per the Forest Department records and from observations in May 1997 on the east coast of Rutland.

Threats to nesting populations, nests and nesting beaches has been discussed by several authors, Bhaskar, (1993); Bhaskar and Andrews, (1993); Misra, (1993); Sivasunder, (1996) including the evidence of decline in populations. The various

threats for the leatherbacks are mainly predation of eggs by humans and feral dogs at the Galathea in Great Nicobar Island, South bay in little Andaman Island, Jahazi beach and the east coast of Rutland Island. Currently Jahazi beach on Rutland is under immediate threat due to tourism development plans and a road leading to this beach. This area is a part of the Mahatma Gandhi National Park. The other main threat which cannot be quantified is the amount of plastics floating around the Andaman and Nicobar Islands. This is mainly due to the direction of currents and wind that brings plastics from close by South Eastern countries and a large amount of plastic has been generated within the Islands over the past six years. It is known that leather back turtles swallow plastics mistaking it for jelly fish and deaths have been reported world wide.

Hawksbill Turtle (*Eretmochelys imbricata*)

The Andaman and Nicobar has been recorded as the best nesting beach for this species in India (Bhaskar,1993) and hawksbill favour small isolated island beaches for nesting. There are twelve reported hawksbill nesting sites in the Nicobar group, three beaches on little Andaman Island and 27 nesting sites on 26 islands in the Andaman group of Islands. South Reef Island in middle Andamans and North Brother and Snark Islands in the south are considered the most important hawksbill nesting sites (Bhaskar 1993 & 1996). Although there are no records of hawksbills nesting on the west coast of Middle and South Andaman Islands, these areas come under the Jarawa Reserve and can not be surveyed. Hawksbills have been observed year around in the sea and in the bays along the west coast and Bluff Island seems to have a perfect hawksbill nesting beach. Hawksbill feeding grounds are found all around the Andaman and Nicobar Islands.

The nesting population for the Andaman Islands is estimated as 205 and for the Nicobars, 45. However this requires further surveys and assessments with a big team of researchers considering the number of sites in both the island

groups and the logistics. It is near impossible to land on several islands during the monsoons which happens to be the main nesting season for several species. Previous records have reported nesting through out the year except in June, the start of the season being July and peaking from September to October and tapering off in December. Hawksbills turtles nest 2.85 times within a season and renesting intervals for this species on South Reef Island has been reported as 12-17 days, averaging 14.06 (Bhasker,1996).

The main threats to this species in the Andaman Islands is poaching by settlers for meat and eggs. This species is the most commonly hunted turtle, mainly because it is found in shallow reefs or in the reefs during low tide and can be easily speared. Feral dogs are a major threat to turtles in the Andaman and Nicobar Islands, where they not only dig up nest for eggs but also kill nesting turtles. Interviews with fishermen indicate that an estimated of 50- 80 turtles on an average are killed annually by drowning in shark and gillnets. The south western corner of Rutland Island had one of the best hawksbill nesting beaches in the Andamans until the early 1980's after which sand mining destroyed the beach. Currently Smith and Ross Islands off North Andaman Island are under severe threat due to tourism and related developments. The amount of plastics could also pose a major treat to this species.

Green turtle (*Chelonia mydas*)

This is the most common species found along the Andaman and Nicobar coasts and they also nest year around. However main nesting occurs from June to November, peaking in July and this species nests four times within a season. Bhaskar (1993) had reported 37 nesting sites for green turtles in the Andamans including Little Andaman Island and 12 sites for the Nicobar group of islands. During crocodile surveys in march 1997, three nesting sites were found on the east coast of Baratang Island in Horsford, Rawlen's and Grieve Bays, besides other sites such as north of Outram Island, Long and North

passage Islands on the east coast. The new sites on the west coast are Petri and Bluff Islands and a beach in Robert bay in Middle Andaman Island. During March 1998, a total of 58 nests were counted on South Sentinel Island. 33 turtles nested between a ten day period and in one night 13 turtles nested on three different beaches. This island has been reported as important for green turtle nesting (Bhaskar, 1993) and other authors too have reported nesting on this island in 1973 and 1974 (Davis and Altevogt, 1975). During March 1997, 19 nests were counted on a beach north of the Jarawa creek in Rawlin's Bay on the east coast of Baratang Island.

Previous assessments and nest count for his species were mostly carried out just before the main nesting season or just after. This clearly indicates that we still do not have a proper estimate of the nesting population for this species. There are indications that turtles from other regions can some times be found in the Andaman waters. In September 2000, some fishermen found a U.S. tagged turtle in their shark net, south of Little Andaman Island.

Feeding grounds for the green turtle are all around the Andaman and Nicobar Islands and some of these sea grass beds are under threat mainly due to degradation through siltation. Other threats to this species are poaching for meat and eggs, drowning in nets, impact of tourism and sand mining. Sand mining is definitely going to effect nesting grounds of this species in Madhuban on the south east of South Andaman Island, Rutland and Baratang Islands. Tourism and related development will have an impact in Long, North Passage, Rutland, Smith, Ross and Havelock Islands. Havelock already has very few turtles nesting due to extensive poaching, tourism, drowning in nets, and predation of nests by humans and dogs. Lack of turtles nesting in Corbyn's Cove, south of Port Blair in South Andaman Island and North Cinque Island has been due to the development of infrastructure for tourism and lights on these beaches.

Olive ridley (*Lepidochelys olivacea*)

This species nests both in the Andamans and the Nicobars during October to April, the peak season being January to February. Ridleys nest only on the east coast of the Andaman Islands and 12 sites have been confirmed besides three sites in the Nicobar group. The main sites for this species are Madhuban in South Andaman Island, Cuthbert Bay and Karamatang in Middle Andaman, Ramnagar and Coffeederia beaches in North Andaman Island, Smith, Trlby and Hump Islands. The major site however is Cuthbert Bay, where annually most number of ridley turtles nest at the beaches on either side of the Betapur creek. In 1988/1989, 338 nests were reported (Misra, 1990). It is an area where mini arribadas occur, 60-125 turtles nesting in one night (Sajan Paul pers. comm.). This phenomenon however needs to be recorded and quantified through two seasons at least. The other sites are three beaches on the west coast of Little Andaman island. The major ridley nesting location is Great Nicobar Island which has four nesting beaches and 280 nests were found on three sites during the 1991-1992 survey (Bhaskar, 1993). The other island in the Nicobars is Teresa. The nesting population for this species in the Andaman and Nicobar Islands has been reported as 445 with females nesting on an average of 1.5 times per season (Bhasker,1999). There is a possibility that olive ridleys nest on North Passage and Long Islands and this needs to be investigated.

The main threats to this species are drowning in shark nets, poaching for meat and large scale nest predation by humans and dogs on most major beaches. Sand mining in Madhuban, Karamatang and Cuthbert Bay is affecting nesting as well.

Discussion

The current trend of tourism development activities on Smith, North passage, Long and Rutland Islands will, in the next two or three years, have an impact on sea turtle nesting. Rutland has already lost one very important leatherback and hawksbill turtle nesting beach

due to sand mining in the 1980s. The peak leatherback nesting season is also the tourist season and tourism is going to have a major effect on Jahazi beach in Rutland Island. Leatherback turtles stopped nesting in Karamatang and Cuthbert Bay due to sand mining and other human activities. In the near future tourism will impact green and olive ridley nesting on these two beaches.

Sand mining on the east coast of Little Andaman Island and Madhuban beach in South Andaman Island is going to effect green and ridley nesting in another years time. There is a possibility that leatherback sea turtles nest on Madhuban beach and it could also be a major ridley nesting site. This beach has never been previously surveyed for sea turtles and requires immediate assessment. Several beaches on the east and west coast of Little Andaman island need to be surveyed.

Impact of fisheries on sea turtles in the Andaman and Nicobars Islands requires a very urgent assessment. The feral dog problem in the Andaman and the Nicobars requires urgent action because they not only destroy nests, but they also kill and eat nesting turtles. These dogs in most areas do not belong to any person and can be shot systematically.

The remoteness and inaccessibility of most sea turtle nesting islands and beaches during the start of the nesting season makes it difficult for monitoring, surveys and protection.

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Coral reefs of the Andaman and Nicobar Islands

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For colour, sheer beauty of form and design, and tremendous variety of life, perhaps no natural area in the world can equal coral reefs. Their beauty has fascinated generations of people, both scientists and laymen, down through the years.

Over a vast region of the tropics, the shallow inshore waters are dominated by the formation of coral reefs and indeed, they are used to define the limits of the tropical marine environment. Coral reefs are one of the most productive ecosystems in the world. They are characterised by complex associations of plants and animal communities, rapid and efficient cycling of nutrients. In a way, they are an oasis in the nutrient deficient expanse of the warm tropical seas. These highly diverse marine ecosystems typically contain numbers of specialised species representing almost all groups of marine animals. The complex 'Mega City' like structure of a reef provides abundant shelter for fishes and invertebrates and provides safe places as fish nurseries. It provides a hard substrate in the highly dynamic marine environs on which many organisms such as clams, sponges, sea fans, anemones and algae colonise and grow. For many other species a coral reef is a critical habitat during a particularly vulnerable or critical stage of their life cycle. The different parts of the reef are used for feeding, for spawning, as nursery grounds and for shelter. Protecting such critical habitats from disturbance is essential in maintaining higher fisheries return. The coral reefs are associations of colonial animal like forms belonging to hard corals, along with other organisms that secrete calcium carbonate and calcareous algae. Reef building corals are of particular importance because they generate much of the three-dimensional shapes and structure that characterise the reef habitat. They are the foundation and origin of thousands of oceanic

islands. They are also of vital importance to many larger islands and continental margins for the protection of land from sea wave action and provide subsistence to millions of people. Coral reefs provide subsistence, security and cultural value to the human communities inhabiting islands and coasts of tropical nations.

The mainland coast of India has two widely separated areas containing reefs: the Gulf of Kutch in the northwest, which has some of the most northerly reefs in the world and Palk Bay (with a long fringing reef) and the Gulf of Mannar (with numerous fringing reefs around small islands) in the southeast. There are patches of reef growth on the west coast, for example at Gaveshani Bank. The Andamans and Nicobars have fringing reefs around many islands, and a long barrier reef (320 km) on the west coast. The reefs are poorly known scientifically but may prove to be the most diverse in India and those in the best condition. The Laccadives have extensive reefs but these are equally poorly known.

The Andaman and Nicobar Island chain constitute a string of the oceanic islands. These islands are separated by Andaman Sea from South East Asian coast to the east, Bay of Bengal to the west from the Indian peninsula, and by the Malacca Strait in the south from Sumatra. The Andaman and Nicobar Islands are situated in the Bay of Bengal within 6^o and 14^oN latitude, 92^o and 94^o E longitude. They are also called the Bay Islands. There are 349 islands in the Andaman and Nicobar Island group. Together they constitute a Union Territory (U.T.) of the Union of India, and are divided into two districts: Andaman, north of 10^o channel, and Nicobar to the south. The two are separated by about 160 km of sea. Being close to the equator and surrounded

by sea, the islands have tropical climate. Precipitation is heavy; with both northeast and southwest monsoons being received, it rains seven months in a year. Cyclones sometimes occur, at the change of monsoons.

These islands harbour the largest number of coral genera and species recorded from India with close affinity towards the East Asian reefs, which are considered as the centre of high coral diversity in the world. So far 64 genera and 164 species of corals have been reported from Andaman and Nicobar Islands. The total estimated coral reef area in these islands is 953.3 km² based on remote sensing data. The coral reefs in these islands are represented by patchy, fringing and barrier reefs. The coral reefs growth is known up to a depth of 40 meters and luxuriant coral growth occurs at 5 - 8 metres. Fringing reefs are wider on the west coast of these islands. Currently, pristine coral reef exists in remote islands which are away from human interference by direct and indirect means such as North Reef, Great Barren, Narcondum islands, Andaman and Nicobar. The administration showed its interest to protect coral reefs and adjacent ecosystems by declaring 2 marine National Parks and a number of sanctuaries.

Marine National Parks

- Mahatma Gandhi Marine National Park, Wandoor
- Rani Zansi Marine National Park, Richies Archipelago

Other protected areas which protect reefs

- Saddle Peak National Park
- Barren Island Sanctuary: active volcano, with coral communities
- Battimalv Island Sanctuary (Nicobars)
- Interview Island Sanctuary
- South Reef Island Sanctuary
- Megapode Island Sanctuary (Nicobars)
- Narcondum Island Sanctuary
- North Reef Island Sanctuary

- La Touche Island Sanctuary
- South Sentinel Island Sanctuary

Despite protection, there has been a noticeable decline in reef health over the years and several observers have reported the detrimental impacts of sediment loads in the water, outbreaks of the starfish *Acanthaster planci*, rise in sea surface temperature and overexploitation of reef resources in these waters

Factors affecting coral reefs in A & N Islands

Coral reef ecosystems, like the tropical rain forests, are among the most mature ecosystem on our planet. Such mature ecosystems are very sensitive to external impact, be they natural or man-made. During the last few decades, catastrophic acute natural events have affected coral reef systems, resulting in their destruction in vast areas of these islands; Storms, the warming of water by the *El nino*, current, extra low tides, *Acanthaster* plagues, and various kinds of anthropogenic stress were among the causes. The regeneration of thus degraded reef ecosystems takes decades. In these islands, close interconnection and cumulative effect of natural and anthropogenic stress factors and the processes of destruction of the reef system caused by them appears to be clearer and clearer.

Storms

Among the factors of physical stress which damage the corals are wave action, decrease in salinity, sedimentation, exposure and overheating during extra low ebbs. Sometimes the action of these factors reaches a catastrophic level, causing mass mortality among the corals. Most often, such events are connected with the monsoon season and passing of cyclones over the reef, which are accompanied by heavy rains causing decrease in salinity and massive sedimentation. In the open sea, the wind creates waves 8-15 m high. Near the reef edge such a storm raises waves 4-8 m high. Such waves smash the ramose corals, and especially susceptible are windward side reefs.

The massive coral and firm foliose corals are destroyed by storms to a lesser degree. The destruction during the storms proceeds mostly under the action of masses of rubble moving back and forth at high speed. They smash the ramose corals and irreversibly damage the massive ones. After an extra-strong storm the reef benthic communities cannot completely recover for several decades. Often they do not recover at all, remaining overgrown with coralline algae.

El nino

Recently, the phenomena of mass bleaching and subsequent mortality of corals were recorded on a global scale in vast areas of different reef regions mainly due to rise in sea surface temperature as a result of *El nino*. The phenomenon of bleaching of corals stressed by high temperature, oxygen deficiency or by the presence of toxic pollutants manifests itself in the expulsion of zooxanthellae by their polyps. High temperature stimulates the activity of lysosomes in the cells of zooxanthellae, triggering the process of their self-digestion in polyps. If the stress is prolonged for long periods then bleached corals most often die. The percentage of mortality among bleached corals is especially high in corals sensitive to stress, like some species of *Acropora* and *Pocillopora*. Nevertheless, some corals, like *Porites*, *Millepora* and *Psammacora* may survive bleaching and later on may recover. In May 1998, 65-90 % mass mortality of corals in these islands was reported, although these results are now accepted as exaggerated. But along with the global coral reef regions, these islands are also potential threatened by rise in sea surface temperature (SST).

Acanthaster planci

The “crown of thorns” starfish *Acanthaster planci* is a large specialised corrallovore echinoderm, which feeds exclusively on scleractinian corals. Massive infestation of crown of thorns was first recorded in 1989 in MG marine national park. This resulted in the catastrophic degradation of the corals. The subsequent recovery might take 10 – 40 years, depending on the degree of damage and

on not being attacked by starfish repeatedly. The attacks by this starfish on reefs could be considered as an ecocatastrophe on a large scale, triggered mainly by human activity. The *Acanthaster planci* have very flexible motile spiny rays. By their use, they are able to crawl easily upon colonies of the corals and hold onto them.

Coral disease

The exposure of corals to disease had been first discovered in M.G. marine national park in 1991. They described two kind of disease, white band and black band, as an indication of stressed environment. Still, corals from the deeper water of M.G. marine national park also showed symptoms of the disease. Outbreaks of these were recorded on reefs where corals had been destroyed by cyclones, and then bored by sponges and clams. The transfer of pieces of diseased coral to healthy ones can infect them. The diseased corals mostly die. It became evident that disease strikes mostly corals enfeebled by stress, in particular by the activity of man on reefs. Under the influence of siltation and pollution in zones of such an activity, the coral increase their excretion of mucus, the excess of which stimulates the development of bacteria, which then infect the corals themselves.

Anthropogenic factors

Reef ecosystems exist at their boundary of endurance of physical stress. However, its periodic character has allowed them not only to survive, but also to flourish. Anthropogenic stress is much more dangerous for them because in most cases it is not only permanent but has the tendency to increase with time. In conditions of cumulative impact of physical and anthropogenic stress, the inhibition and destruction of reef systems could be irreversible. Therefore, the anthropogenic impacts because of fisheries, tourism, deforestation and faulty land use practices in catchments have become the main factors for coral reef degradation. Massive anthropogenic stress on reefs had begun in late 70s, when settlement started growing rapidly and resulted in deforestation in catchments. Discharge of freshwater from

catchments increased in monsoon, which driven to the different reefs by currents, increase from year to year. As tidal wave currents are strong in this group of islands, these currents play a very crucial role in transporting this sediment from the creek mouth to the reef area. The soil in catchments is fine and loamy, and when it is transported to the reef by rainwater, it does not settle down in the nearest reef but in further reefs. They not only exert a toxic effect on reef biota, but also foment some processes unusual for reef environment, such as eutrophication. The nutrients accumulating on the reef with discharge waters stimulate the growth of seaweeds, which inhibit and then replace the corals. It is evident in most of the dead part of the reef. In areas subjected to discharge, the blooming of phytoplankton is furthered, including the toxic dinoflagellates and blue green algae. These blooms violate homeostatic conditions in the reef ecosystems, thus destabilising them. They weaken the resistance of corals and cause their mortality. The water discharged to reefs from the fields contain besides nutrient fertilisers and also pesticides, polychlorophenols, insecticides (delderin, eudrine) and herbicides (high phenoxy acids). These substances accumulate in the tissues

of corals and other fauna, being toxic for them in minor concentrations of 0.1 mg/l. Corals thus stressed die or, when they survive, they excrete a large quantity of mucus. It stimulates microbial growth, which then causes the death of corals. Among the resources of coral reefs in these islands exploited by local people are: 1) fish and edible invertebrates: molluscs, holothurians, crabs, shrimps, lobsters 2) Shell collection. Overexploitation of each of these resources destabilises the reef ecosystem, undermines its ability to reproduce and thus leads to their loss.

Tourism

The tourist boom of the last one and half decades may become an important harmful factor to the reefs of some parts. But this factor is not yet considered as an immediate threat to reefs. In Jolly Boys, Redskin and to some extent Grub island, hordes of tourists wander on the reef flats, trampling down everything that lives. Trampling about on reefs, tourist destroy the population of ramose corals of these reefs. These reefs also face damage from mechanical damage by anchors and motor propellers of excursion boats.

Mahanadi, an on-line newsletter

Mahanadi is an online newsletter dedicated to the ecology and wildlife of Orissa. It was started in June, 2000 and is brought out by Biswajit Mohanty and Ashok Mahapatra

“The Mahanadi is an e-newsletter dedicated to the ecology and wildlife of Orissa and shall be mainly circulated through the Internet. We believe that this is the quickest method to disseminate happenings of ecological and wildlife interest In order to keep costs low we request our readers and patrons to kindly give us their e-mail address so that we can dispatch the magazine through electronic mail. Apart from saving us postage costs it shall help in conservation of valuable forests since paper is

made from trees. Readers are welcome to submit articles. Readers are also welcome to write about any issue concerning the state's environment, ecology or wildlife. However, publication of articles shall be subject to acceptance by the editors” – Editors, Mahanadi

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Readers may also access the magazine on the Internet: www.angelfire.com/md2/mahanadi

(The following news items were extracted from Mahanadi # 1- Ed.)

Depleting reserves threaten fishing community

Declining fish reserves in coastal Orissa could spell doom for thousands of fishermen. According to a recent study by United Artists Association of Orissa and Integrated Coastal Management of Andhra Pradesh, over the last decade the catch from the sea as well as from Chilika lake has gone down considerably. The study covered the fishing villages in Puri and Ganjam districts. According to the study, the fishermen revealed that their total catch had come down to 10 per cent of pre 1990 levels. While the annual fish catch was about 5,983 tonnes and the shrimp collection about 1,177 tonnes, they had come down to 1,352 tonnes and 281 tonnes respectively. The presence of trawlers near the shore and population pressure had led to this decline, the study said. The study also said that trawlers from Andhra Pradesh had made it impossible for traditional fishermen of Puri and Ganjam districts to operate in the area. In most fishing villages, half the household income comes from shrimp seed collection which is a dependable source of income. However, indiscriminate collection of shrimp seeds has destroyed other marine species which are generally discarded on the beach by shrimp seed collectors. The study said many fishermen had moved to other coastal areas in the state to work as trawler crew or rickshaw pullers in Puri, Paradeep, Cuttack and Bhubaneswar due to the declining reserves.

Mother prawns are illegally caught from the coastal waters by Andhra trawlers and sold at about Rs.5 - 6,000 each. Due to the weak action by the Fisheries department, the seedling mafia has attacked them a number of times. Since the seedlings traders keep everyone happy from the top to the bottom, no action is taken against them. There is a demand to strengthen the fisheries laws to make it equivalent to the forest laws since in case of seizure of timber from any vehicle, the vehicle is also confiscated which is not being done in case of the seedlings. The fisheries dept. only seizes the seedlings and not the vehicle.

A recent survey conducted by the Wildlife Society of Orissa indicates that even schoolchildren are forsaking classes to collect seedlings to earn upto Rs.100 a day. This is more evident in Kendrapada, Jagatsinghpur, Balasore and Bhadrak districts where hundreds of people can be seen running to the creeks, river mouths and beaches at dawn to catch prawn seedlings. The tiger prawn seedlings are carefully picked up from the

whole lot and the rest are just thrown mindlessly on the ground killing such species like bhukti, mullets, tuna, sharks, pomfrets and sal. The supply of seedlings has grown to meet the demand and in 2000 the prices are lower at Rs.300 to Rs.400 per 1,000 compared to Rs.900 per 1,000 in 1999.

Source : *The Samaja*, 29.01.2000 * *The New Indian Express* , 17.2.2000 * *The Hindustan Times*, 24.3.2000 * *The Times of India*, 26.3.2000

High Court bans Prawn farms near Bhitarkanika Sanctuary

The Orissa High Court has directed the state government to ensure that no fresh prawn gherries are constructed or re-constructed within the 500 metre CRZ (coastal regulation Zone) of the Bhitarkanika sanctuary wildlife sanctuary. Justice P.C. Naik and Justice B.P. Das passed this order in response to a PIL by Wildlife Society of Orissa and Wildlife Protection Society of India. The court noted with concern that 196 prawn gherries had been constructed over an area of 6,497 acres in the forest and private land within the CRZ area. The collectors of Kendrapada and Jagatsinghpur districts maintained that the gherries had since been washed away in the super cyclone. The court also asked the government to formulate a plan for plantation and it could approach the Centre for funds. "Afforestation is of great importance as the forest cover had been destroyed in the super cyclone," the court observed.

Source : *The Times of India* , 23.12.99

Dolphins face Extinction

The Chilika lake is the abode of the Irrawady dolphin. Besides, this two other species are found in the coastal waters of Orissa. The dolphins are under threat due to illegal fishing activity of some fishermen . Dolphin meat is being used as bait for shark fishing in some parts of the state. " But the country fishermen in the State have a lot of sympathy for the mammal. They release the mammal the moment it is trapped in the net, " said Biswajit Mohanty, the Secretary of Wildlife Society of Orissa. They are sometimes caught in the trawl nets of shrimp trawlers and are drowned. Moreover, baby dolphins which are obviously slower than the adult ones easily get caught in the propellers of these trawlers.

Source : *The Hindustan Times* , dt. 27.4.2000, *Asian Age*, dt. 30.4.2000

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