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MARINE TURTLE CONSERVATION AND MANAGEMENT: A SURVEY OF THE SITUATION IN ORISSA 1981/82 AND 1982/83

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Introduction

One of the most spectacular sea turtle activity is the mass emergence (arribadas) of the Olive Ridley *Lepidochelys olivacea* along the north Orissa Coast, more specifically along the Gahirmatha Beach. The unique phenomenon which may or may not occur annually, have been reported by Kar (1980) and Biswas (1982). This is the largest rookery of olive ridley and for that matter, of any species of marine turtle in the world. The mass capture and transport of live olive ridley from the nesting beaches of Orissa and West Bengal to Calcutta and other markets have been reported by Bobb (1982). Such exploitation, despite the endangered status of the species and the protection accorded under the Wildlife (Protection) Act 1972, has attracted considerable public attention and concern for marine turtles at all quarters. Incidental catch in fishing gear also accounts for the death of several hundred turtles during their nesting season. Varied efforts both by the Forest Departments of Government of West Bengal and Orissa and other agencies and individuals, are under way to study these problems.

Programme at the Central Marine Fisheries Research Institute

The CMFRI has also developed a national programme for :

1. surveying and demarcating nesting grounds of marine turtles along the Indian Coast and the Bay Islands;
2. monitoring incidental catch of turtles in fishing operations and finding ways and means of minimising the same;
3. developing hatchery and hatchling release programme;
4. carrying out tagging of turtles to understand their population structure, migratory habits, growth, longevity and mortality rates;
5. investigating biological aspects and behaviour of turtles; and
6. strengthening the National Marine Living Resources Data Centre (NMLRDC) for the acquisition and dissemination of data on marine turtles from our Exclusive Economic Zone (EEZ).

Nesting ground survey

Valliappan and Whitaker (1974) and Whitaker (1977) gave an account of Olive ridley of the Coromandel Coast and Biswas (1981) gave an account of olive ridley of Bay of Bengal, identifying some of the nesting beaches. Bhaskar (1981) in a preliminary report, has indicated the important nesting beaches of sea turtles along the Indian Coast and the Bay Islands. He (Bhaskar, 1983) also reported the nesting beaches of the leatherback turtle in the Andaman Islands. It is proposed to map all this information so as to make it available for further consideration towards taking conservation and management measures for protecting the nesting beaches especially during the nesting seasons (Fig. 1).

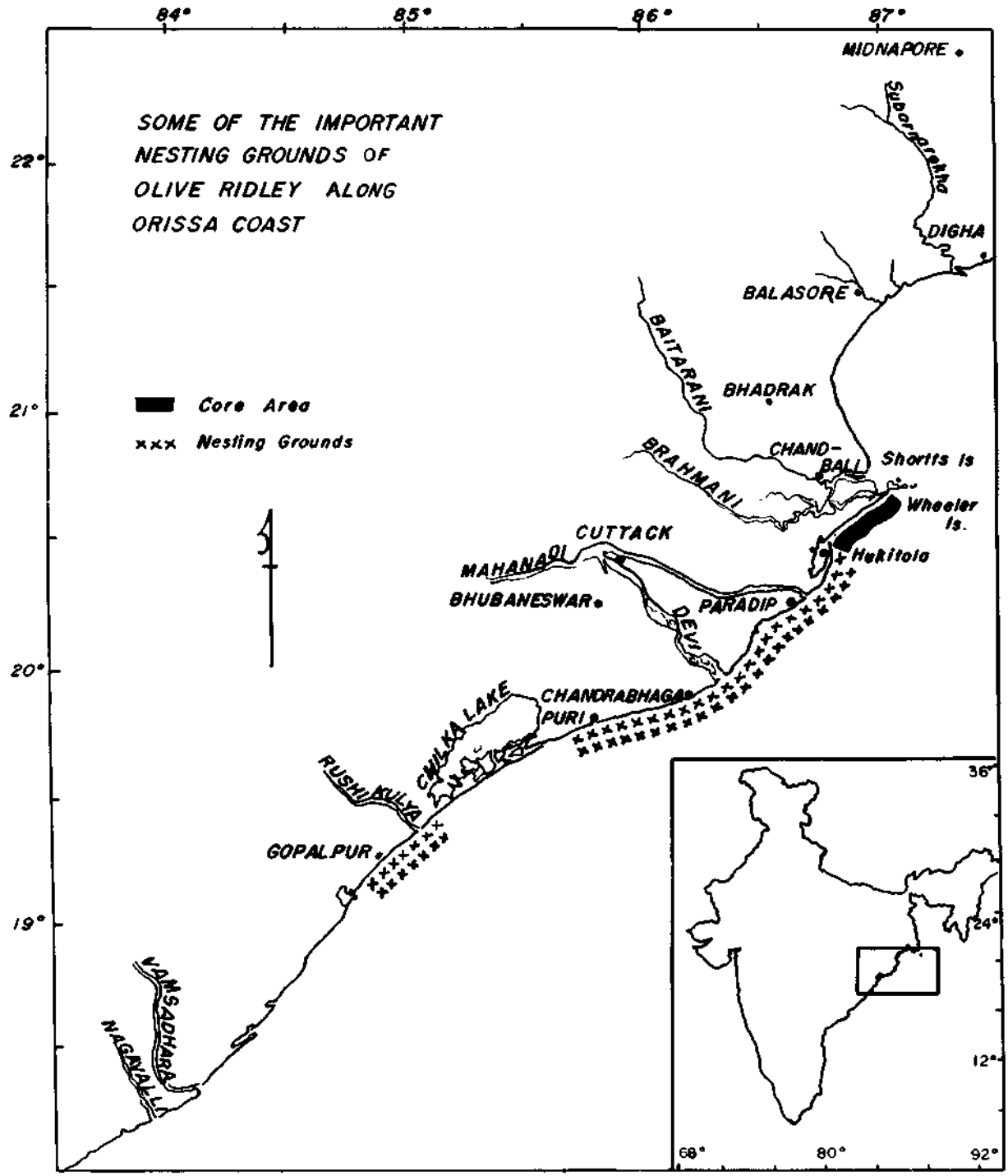
Gahirmatha sea turtle rookery 1981/82 and 1982/83 season

For earlier accounts of the nesting habits and intensity of breeding activity of the olive ridley reference is invited to Bustard (1976), Biswas *et al.* (1977), Davis *et al.* (1978), Kar (1980, 1982), Biswas (1981) and Kar and Bhaskar (1982).

In view of the importance of the nesting grounds of olive ridley along the Orissa Coast, teams from CMFRI have been sent to the area in 1981–82 and 1982–83 seasons to study the situation and evaluate the options open for evolving in the future management strategies. It is proposed to outline here the factual information gathered from different locations along the Orissa Coast.

1981/1982 season

During the 1981-1982 season, turtle landing centres, such as Pentakotah, Astrang, Chandrabagh, Nuagoda and Paradeep were visited by the team. In order to collect information on the landings and transport of turtles, officials of the Departments of Fisheries, Forest and Railways were contacted. Official attempts have been under way by the State Forest Department to effectively enforce the Wildlife (Protection) Act from October 1977 for marine turtle protection. Prior to the Wildlife (Protection) Act coming into force, Pentakotah was the main fishing centre for sea turtles and from there during the season, around 2000 turtles used to be sent to Calcutta market where the meat was sold at the rate of Rs. 6 per kg. In the 1981 season, there was



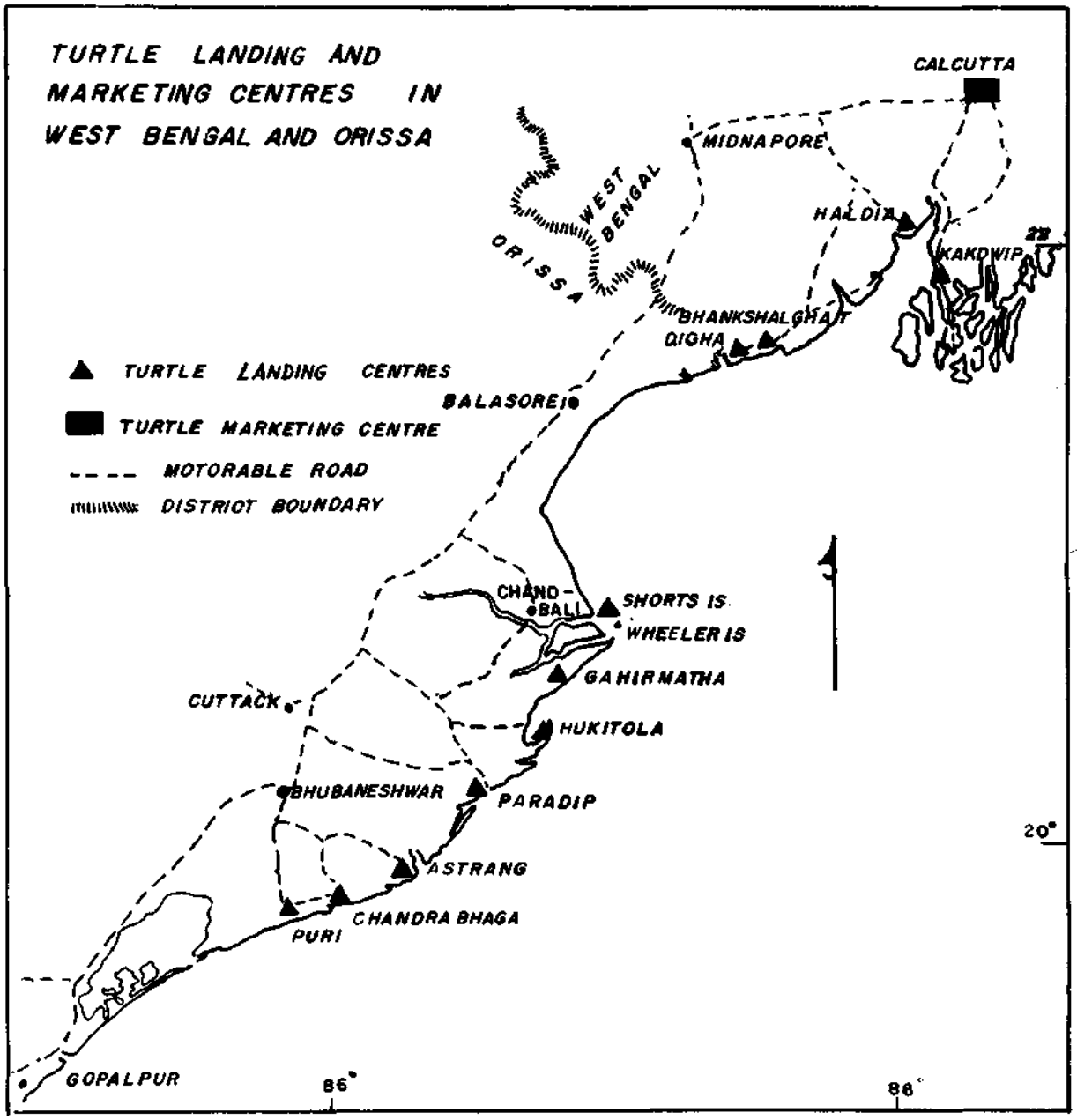
no fishery at all due to the ban imposed and enforced by the Forest officials of the Government of Orissa. The South Eastern Railway authorities also refused to book the turtles for transportation by train from Puri to Calcutta. There is no market for sea turtles in Orissa State. Some of the fishermen seasonally operating along the Orissa Coast hail from East Godavari District of Andhra Pradesh and due to religious taboo, turtle meat is not consumed by them. In fact, the turtle is venerated as according to Hindu belief, it is the second incarnation of Lord Vishnu (in the form of turtle He was born 'Koorma avathar').

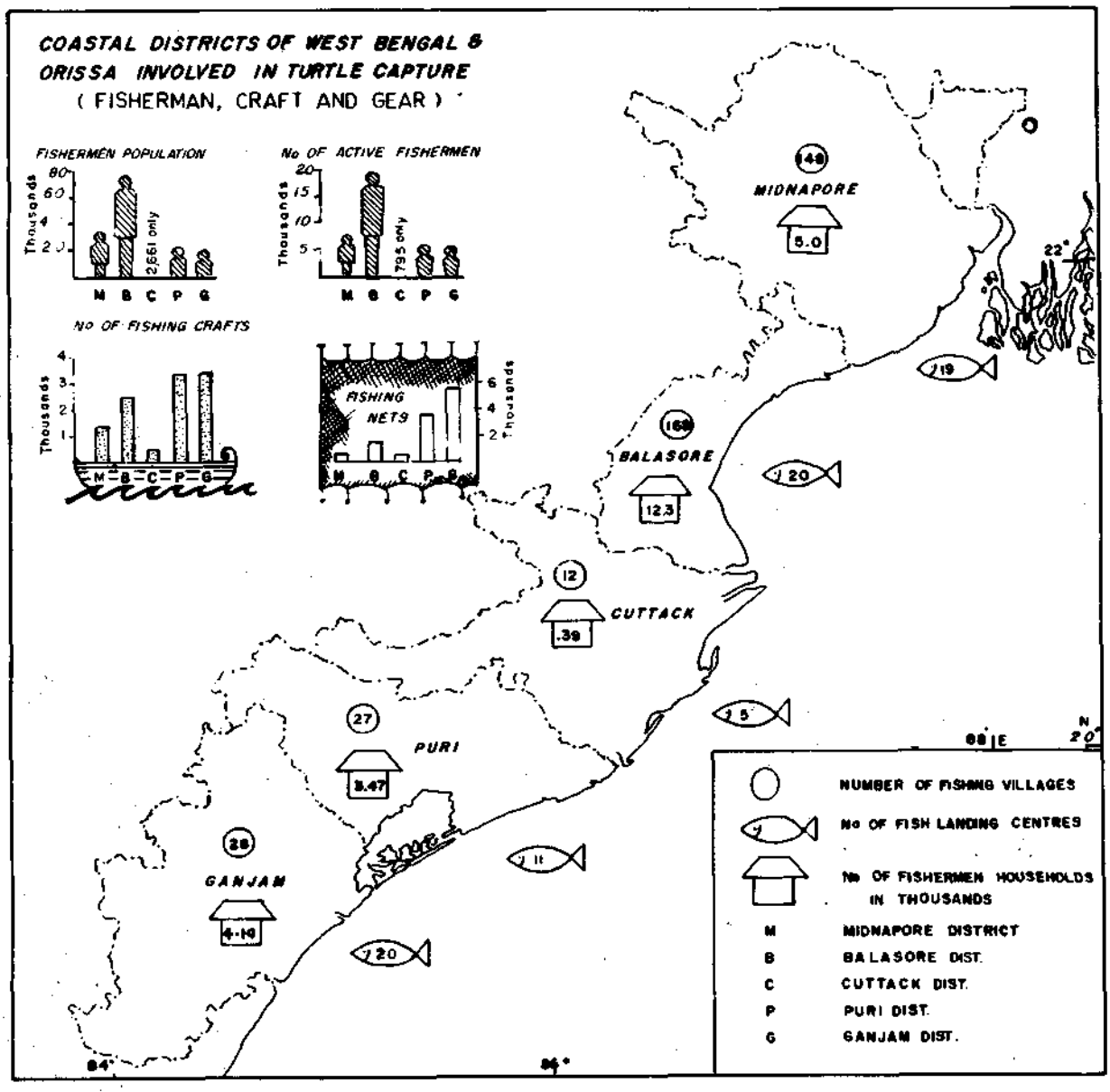
Pilfering of fish from Railway wagons has been a matter of routine. Live turtles were transported in trains without being confined to cages. On one such

fish pilfering spree, it is said that an employee of the Railway Department accidently stepped on the back of a turtle which quickly snapped at his foot and relieved him of two of his toes. Due to this incident the Railway authorities later insisted for proper caging of turtles for booking. As this would unreasonably increase the cost, there was reluctance and lack of interest on the part of traders to fabricate cages for transport. Besides, the price of turtle meat was hardly Rs. 6 per kg in the Calcutta markets and the cost at the landing site, hardly Rs. 15 to 20 per turtle. The investigations indicated that as late as in 1981, transport of turtles by Railways from Orissa to Calcutta was in vogue.

Fishery of the past

During the heyday of the fishery in the late seventies, no special turtle nets were used. The fishing season was from the second fortnight of October to the first fortnight of February. Turtle fishery was always a supplementary one. Gill nets with 70 mm mesh size were used for fishes such as seer fish, pomfrets and other pelagic fishes. These nets are used at different depths in the water column by changing different types of sinkers and floats. Fishermen in this area use catamarans and Kakinada type boats. During mating, the turtles are extremely sluggish and they are easily hauled aboard by hand or they were easily encircled with





nets and trapped without causing any damage to the nets. Usually during the mating season, turtles were caught in pairs. However, merchants preferred female turtles and males were generally released back into the sea. Illegal transport from landing centres by road to Calcutta and adjacent markets (Fig. 2) needs checking.

Status of the turtle fishery, 1981-82

Except at Pentakotah and Astrang turtles entangled in fishing nets are nowhere landed now. At each of these villages on an average one or two turtles are brought ashore per day. Only a few fishermen, if at all they do, eat turtle meat and as there are no buyers (a turtle fetching hardly Rs. 5 to 10) often they are released back into the sea. This has been witnessed by CMFRI team when they visited these villages. It was estimated that about 12 to 15 turtles were landed per week at Pentakotah and 4 per week at Astrang. In other landing centres, since they are operating small meshed drift nets for sardines, the incidental catch of turtles is extremely rare.

Another important fact is that the fishermen are fully aware of the ban imposed and exercised by the Forest Department. The officials of the Fisheries Department are more preoccupied with culture fisheries and execution of economic plans concerning the upliftment of the impoverished artisanal fishermen of Orissa, leaving the turtle protection to the Forest Department. An anomolous situation prevails, where the Department of Forest and not the Department of Fisheries is empowered to control a resource that is

caught in the sea. The extent to which this would be a constraint for the development of proper management measures is yet to be seen.

In the recent past, the chief poachers of turtles have been the fishing vessels from Thailand and Taiwan. The CMFRI team met a number of skippers of Indian fishing vessels both at Paradeep and Vizagapatnam. They confirm that the area north of Gopalpur is a mating ground of turtles, and during mating, the turtles are remarkably sluggish. Males are often seen in fewer numbers than females, one male often favouring many females. During the mating season, the fishermen from foreign vessels (it is reported that atleast 70 vessels can be sighted in a day on the prawn fishing grounds close inshore) scoop off from the surface turtles methodically, while they fish for prawns from within our territorial and contiguous continental shelf waters.

Railway officials are unable to provide any data on the numbers of turtles carried by their wagons because almost all the turtles booked in the Railways were simply categorised as 'fish' since the turtles were not properly caged and as fish carried lesser freight rates.

1982/1983 Season

The 1982-83 season brought to light a very significant event along the Orissa Coast where exceptionally large number of dead turtles in various stages of decay were found along the Gahirmatha Beach during the first week of March 1983. This was undoubtedly the result of 'incidental catch' from fishing gears operated from mechanised and non-mechanised fishing crafts. The remains of nylon webbing around the neck and flippers of many of the carcasses are ample testimony to what happened prior to the visit of the team from the Institute. Another sad fact noted from the carcasses was that animals were mutilated before disentangling them from nets as evident from deep gashes on the head and parts of the body.

Kar (1980) indicated that incidental catch accounted for about 500 olive ridley along the Gahirmatha Beach area and opined that 'this of course represents a tiny fraction of the actual offshore catch'. His suggestion in this context is very pertinent and we would endorse the same for enlarging the limits of the Bhitarkanika Wild Life Sanctuary limits northwards to include Wheeler and Short s Islands and southwards to include Hukitola Island and the beaches upto Paradeep, as the olive ridley is known to often congregate in large numbers along inshore waters off these beaches for nesting. Besides, a seasonal restriction in the fishing activity using certain types of gears such as wide meshed gill nets would be imperative. This along with a clearly demarcated inshore area should afford protection to the turtles from fishing activity during the mating season. A "turtle excluder" net for shrimp trawling has been developed in the U.S.A. and trials with similarly designed trawl nets should be undertaken to see its efficacy in allowing turtles to escape while fishing selectively for shrimp from mechanised boats in our coastal waters. We feel that unless urgent action is taken in regulating or adopting new modifications in fishing gear, the nesting beaches along Orissa Coast may turn to be indeed the grave yard - the largest graveyard of olive ridley - anywhere in the world.

Observations at Gahirmatha turtle rookery

The CMFRI team vistied the Bhitarkanika Wild Life Sanctuary and specifically Gahirmatha to study the nesting beach conditions. Gahirmatha Marine Turtle Research and Conservation Unit was established in 1976 and the detailed studies on the nesting conditions of olive ridley was reported by Kar (1980). During the 1982-'83 season from 3rd to 9th February mass nesting of about 200,000 olive ridley turtles was reported (Courtesy: Orissa Forest Department).

In the first week of March 83, thousands of dead turtles strewn on a stretch north of Gahirmatha Beach was noticed. The numbers varied from 55 to over 150 per 100 metres of stretch of beach (average 59 turtles/100 metres). It was estimated that around 7000 to 7500 dead turtles were strewn along the stretch of 15 km at Gahirmatha a true 'grave yard' for turtles. The details of measurements in cm of dead turtles based on measurements of several dozens are as follows:

Carapace length 51-72 (62.2)	Carapace width 48-63 (57.8)
Plastron length 44-57 (51.8)	Plastron width 43-53 (49.3)
Head length 18-23 (20.9)	Head width 12.5-14.5 (13.6)

In addition to dead turtles, about 6 beaked dolphins were also noticed in different stages of decomposition, off Gahirmatha Beach along a stretch of 7.5 km. The details of measurements in cm are as follows:

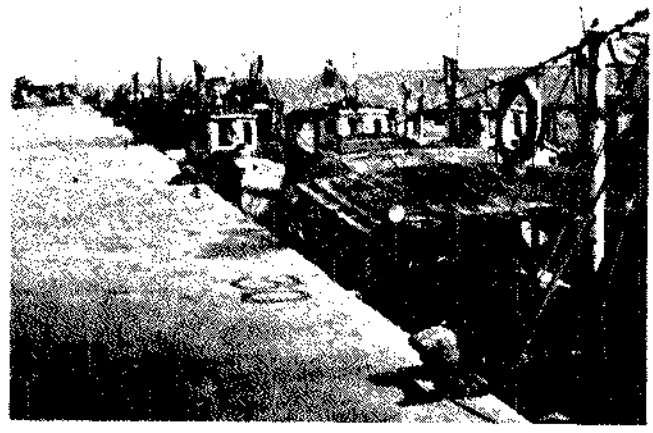
Total length (to fork of tail fluke)	170-286
Tip of snout to flipper origin	32-35
Tip of snout to dorsal origin	76-105

The dead turtles and dolphins, both endangered species were the result of incidental catch in gill net fishery as evidenced from pieces of net-webbing on the animals.

Predation by wild animals

Heavy predation on the eggs of olive ridley especially by jackals, wild boars, hyaena, dogs and other wild animals was noticed. They also create extensive damage to the nests, destroying not only the fresh ones, but the 5 to 15 days old nests as well. The predation was noticed mainly very near the mangrove areas.

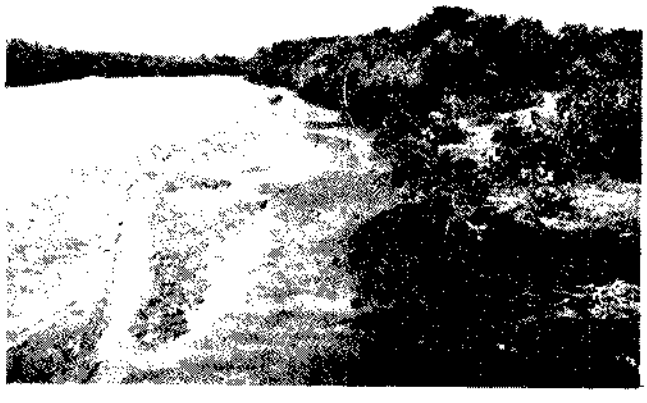
Fish landing centre at Chandpali



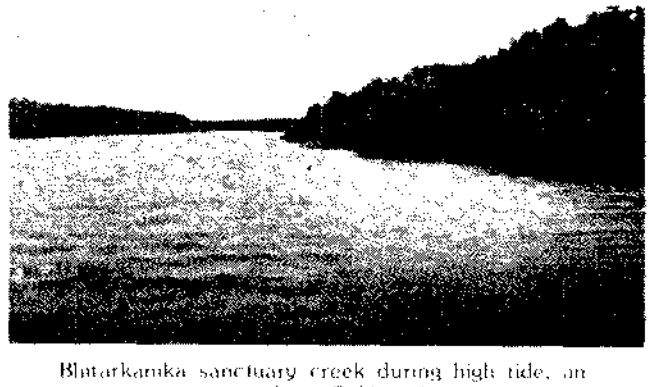
Fishing harbour at Dhamra.

Fishing harbour, Paradeep

Landing centre at Gahirmatha.



Bhitarkanika sanctuary creek during low tide.

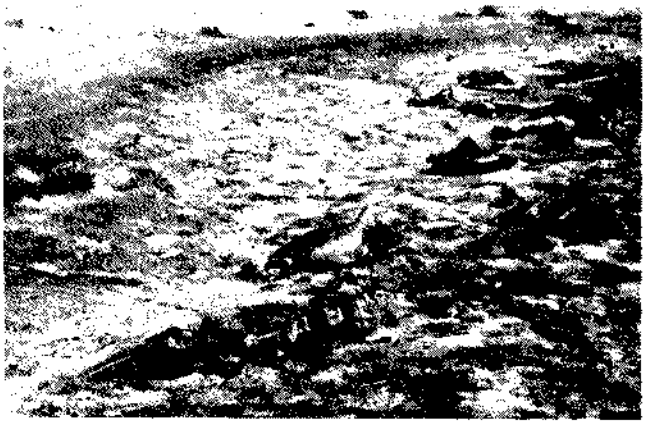


Bhitarkanika sanctuary creek during high tide, an approach to Gahirmatha

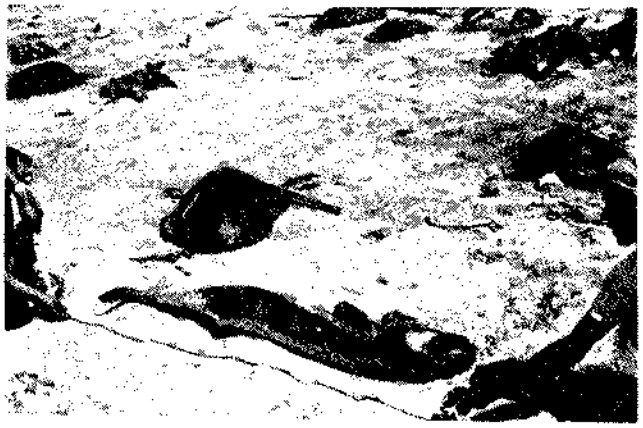
Carcasses of olive ridleys washed ashore along Gahirmatha Beach

Carcasses strewn along Gahirmatha Beach

Close up view of dead turtles at Gahirmatha.



Dead turtles (olive ridley) along with decomposing dolphin at Gahirmatha Beach

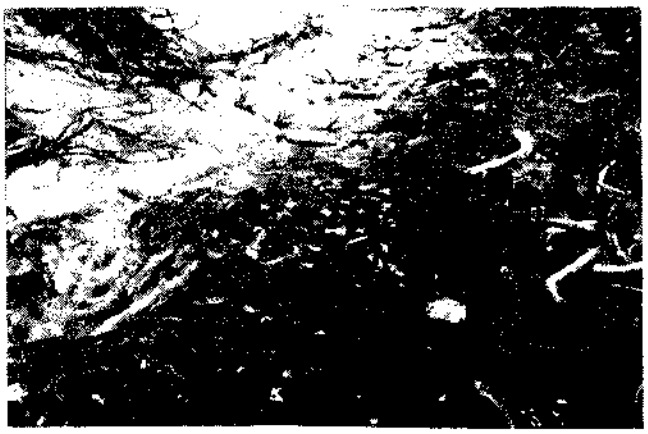


Collection of data on dead turtles and dolphins by CMFRI team

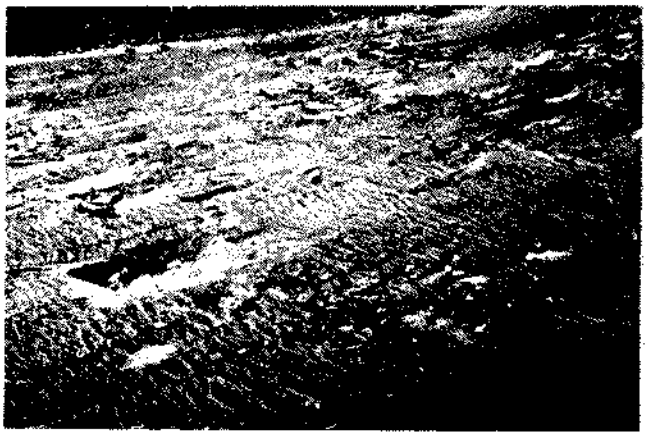
Dead turtles washed ashore near Gahirmatha Turtle Research and Conservation Centre, Orissa Forest Department

Remnants of cyclone affected mangrove at Gahirmatha.

Uprooted mangrove stumps for use as fuel at Gahirmatha a potential danger inviting sea erosion



Broken egg shells of olive ridley predated by wild animals immediately after nesting



Predation of eggs near mangrove area, Gahirmatha

Carcasses of beaked dolphin at Gahirmatha.

Piece of gill net around the neck of an olive ridley.

The damage was noticed upto 10 metres inside the mangrove area. The pugmarks of wild animals were seen in the mangrove area and upto the level of high water mark along the beaches.

Since predation is heavy and also the possibility of damage to earlier nests by subsequent nesting turtles due to pressure on the restricted nesting grounds, it is imperative that hatchery programmes for collecting the eggs, incubating them, releasing the hatchlings from the same beaches should be organised.

Need to preserve the mangrove

Erstwhile coastal mangrove vegetation said to have been destroyed earlier by cyclone is today indicated by mere stumps. The removal of stumps from the area may be fraught with increasing erosion of the beach and this should be prevented. Efforts to replant mangrove along the coast as a conservation measures should be given priority consideration.

Prevention of poaching of turtles

The problem faced by the forest officials is prevention of poaching by fishermen in the sea. The help of the Coast Guard was sought. During the year 1981-82 season Coast Guard vessels 'Rajhansa' and 'Rajtarang' patrolled between Paradeep to Dhamra area to prevent turtle poaching in the sea. During the 1982-83 season, Coast Guard vessel 'Rajhansa' patrolled coastal waters from Paradeep to Dhamra on 6th and 7th February '83. Since the mass emergence 'arribada' occurred at Gahirmatha from 3.2.'83 to 9.2.'83 the patrolling by Coast Guard vessel was very effective in preventing poaching. With their help, the Orissa Forest officials on 6.2.'83 seized 3 trawlers and 10 country boats with gear and arrested 32 persons belonging to West Bengal. The arrested persons were produced before the Judicial Magistrate at Kendrapara, Orissa.

The alert action taken by Forest Department officials needs appreciation. Here we reproduce extracts from the Press with English translation which should be of interest (Appendix I to III).

Fishermen population and infrastructure facilities

For any management strategies to be developed for conservation and management of turtles, it is essential that we have information on the existing infrastructure which has a direct link with resource. Here fishermen population along the coastal villages and their fishing craft and gear and marketing facilities should be known. The Central Marine Fisheries Research Institute has collected valuable information of the coastal fishermen population, craft and gear, village-wise, household-wise in Orissa and this information is summarised here. It is felt that this would be useful in planning any regulartory measure in fishing activities.

The number of marine fishing villages in Orissa State is 236, the maximum being Balasore District (169) and fewer in Cuttack (12). The number of fish landing centres in the State is 56 and of which 36 are in Balasore District.

Of the total 20,329 number of marine fishermen households, 61% of fishermen families is in Balasore and 17% in Puri and 2% in Cuttack Districts. The total fishermen population in the state is 1.17 lakhs and 64% are from Balasore District and 18% from Puri and 2% from Cuttack. The number of fishermen engaged in actual fishing in Orissa is about 30,724 forming 26% of the total fishermen population. In Balasore District the percentage of fishermen engaged in full time fishing is 62 and the part time and occasional being 23 and 15 respectively. The percentage of fishermen belonging to full time category in Cuttack District is 55, part time being 44 and occasional 1. The number of mechanised boats owned by fishermen is 106, all these being gill netters from Balasore District. The total number of non-mechanised crafts is about 10,000 and of this Puri District has 34% and Balasore District has 25%. Catamarans constitute the largest number of non-mechanised crafts (64%) followed by plank built boats (34%) and dug out canoes (2%). In Balasore District, plank built boats constitute 96% and in Puri District catamarans constitute 84% of non-mechanised crafts. Details of figures of marine fishing villages and fishermen population of Balasore, Cuttack and Puri Districts are given in

Table 1. *Details of marine fishing villages and fishermen population in Orissa 1980*

	Balasore	Cuttack	Puri
Number of villages	169*	12	27
Number of landing centres	20	5	11
Number of fishermen households	12316	393	3472
Fishermen population:			
a. Male	24145	886	6733
b. Female	20963	728	6119
c. Children	29410	1047	7888
Total	74518	2661	20740
Educational Status:			
a. Primary	6119	25	1180
b. Secondary	1362	2	545
c. Above Secondary	215	—	118
Total	7696	27	1843
Number of fishermen engaged in actual fishing:			
a. Full time	11539	442	4938
b. Part time	4204	349	643
c. Occasional	2766	4	417
Total	18509	795	5998

Table 2. *Mechanised and non mechanised fishing crafts and gears in Orissa 1980*

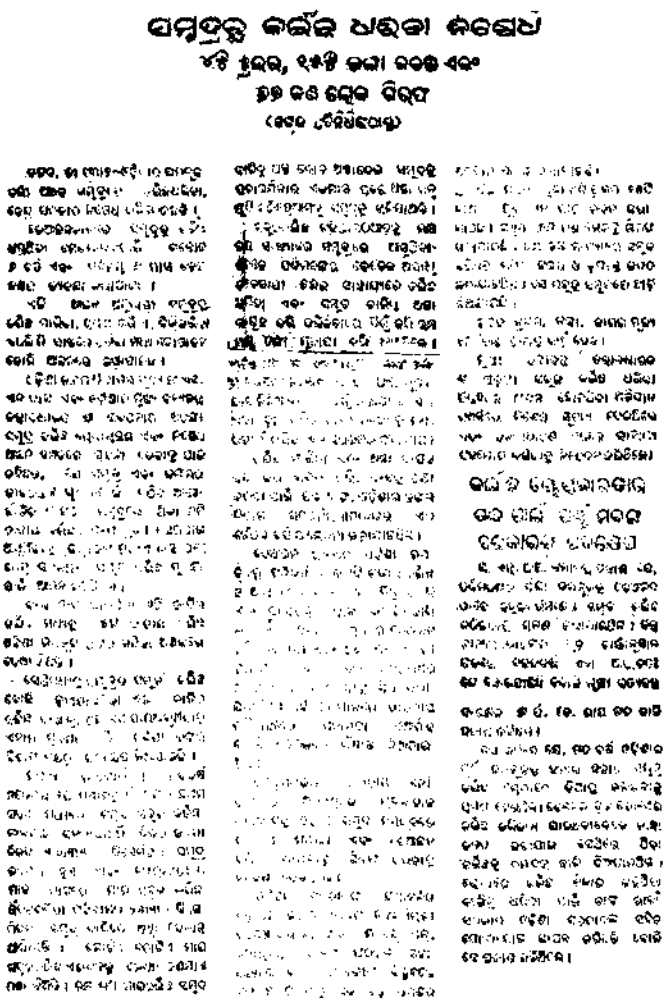
Number of fishing crafts	Balasore	Cuttack	Puri
a. Mechanised			
Gill netters	106		—
b. Non mechanised			
Plank built boats	2324	218	475
Dug out canoes	103		76
Catamarans	1	228	2831
Other	4	-	--
Total	2432	446	3382
C. Number of fishing gears			
Drift/Gill nets	1702	425	2782
Boat seines	141	19	1467
Fixed bag nets	2507	198	1
Hooks and lines	212	242	10688
Shore seines	2475	--	58
Traps	492	23	—
Scoop nets	14	-	--
Others	4575	4	13

Table 1 and the details of figures of marine fishing crafts and gears of the three districts are given in Table 2

General remarks

The 'turtle problem' along Orissa Coast calls for an integrated crash programme of conservation and management to be developed in the shortest time possible. This may have to be given a national priority in our programmes on the conservation and management of living marine resources. Since the inputs have to come from different agencies, a coordination body or cell will have to be constituted to discuss with specialists and planners for a long term programme for the area. The major initiative has to come from the Department of Environment of which Wild Life Protection is also a part.

APPENDIX I



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APPENDIX II

'The Samaj' Oriya daily published from Cuttack-1 dated 15.2.'83

Capture of turtles in the sea is prohibited

4 trawlers, 15 country boats seized and 66 persons arrested. (From Cuttack representative)

Cuttack Dated 13th Feb. '83

The Central Government has banned the capture of sea turtles from Orissa Coast. An imprisonment upto maximum of 6 years and minimum of 6 months has been provided in the law for the turtle poachers. Capture of sea turtle from the sea and also its transport, sale and keeping them in custody is banned.

The Additional Chief Conservator of Forests, Orissa Forest Department Sri. S.N. Das and the Chief Wildlife Warden Sri. U.N. Sarangi said that the Central Government has enforced the wild life protection act on marine turtles after the International Organisations expressed concern about the possible extinction of six varieties of turtles available in the sea. Out of six endangered species of turtles five are found near Bhitarkanika area.

One of the varieties, known as Olive Ridley turtle is facing the possible extinction and hence the Forest officials have taken steps to protect them. Every year these olive ridley turtles of the Pacific Ocean found to float in the sea water upto 30-35 km off Bhitarkanika for mating and the period is form 2nd week of November to 1st week of December and during February and March female olive ridely turtles lay eggs in the sand at Gahirmatha covering the area of 25 to 30 km beach.

One female turtle lays 100-110 eggs at a time. Lakhs of such turtles lay eggs in the sand and after one month the hatched out young ones go back into the sea. Some dishonest businessmen from West Bengal have been making huge profits by catching of lakhs of turtles from the sea using trawlers and collecting eggs from the beaches. Turtle meat (flesh) and eggs are served as costly items in big modern hotels in Calcutta. Apart from this, export of turtle meat to foreign countries is a profitable business.

To save the progeny of the olive ridley turtle, capture of turtle and collection of turtle eggs are prohibited and the officials of Government of West Bengal and Orissa meet together in the arranged meeting and discussed about the steps to be taken for protecting the marine turtles.

It was estimated that the turtle meat and eggs worth 4 crores of rupees was sold every year in Calcutta markets and also exported to foreign countries. For the protection of marine turtles in the sea, help of Indian Navy was sought. The Central Government had instructed to use the most modern ship 'Rajhansa' to maintain vigilance in Orissa Coast and to arrest people engaged in illegal fishing. The officials of forest department, Orissa especially Sri. L.N. Chowdheri, Divisional Forest Officer raided the poachers on 5.2.'83 with the help of police.

By noon 4 trawlers and 15 country boats with costly nets were seized. Altogether 66 persons were arrested. Thousands of turtles were seized from them.

The cost of country boats and trawlers is above 18 lakhs.

The Chief Wildlife Warden Sri. Sarangi appealed the public to cooperate in the protection of marine turtles.

The steps taken by West Bengal Government to prevent poaching of turtles

U.N.I. report: According to Sri. P.K. Roy, Chief Wildlife warden, large number of turtles used to be transported to Calcutta markets from Digha. But due to stern action taken by the Government this has come to an end. Last year thousands of turtles captured in Orissa Coast were landed at Digha and transported to Calcutta markets. This year some turtles which were transported from Digha were caught on the way and released back into the sea. West Bengal Government is regulary contacting the Orissa Government and steps are taken to arrest the persons engaged in this illegal business.

APPENDIX III

THE TIMES OF INDIA, MONDAY, DECEMBER 6, 1982 7

Turtle poaching causes concern

BHUBANESWAR, December 5 (UNI).

LARGE-SCALE poaching of the Pacific Ridley sea-turtles (Lomep ldachelys Olivacea) and wanton destruction of their nests by various beach predators has caused concern to the government.

According to an Orissa forest department report, these oval-shape, olive-green creatures which form an endangered species used to migrate in large numbers from the Pacific Ocean to the shallow waters all along the eastern coast, especially the high sand dunes interspersed by forests, creeks and nallahs between the mouth of the Maipura river and Hagirmatha, and the adjacent Wheeler and Shorts islands near the Bhitar Kanika Crocodile Sanctuary in Cuttack district.

Though preliminary studies in 1976 revealed that their courting and mating usually takes place during October-December when a large number of copulating pairs can be seen floating near the rookeries on the beach, little is known about their migratory routes, food habits, life cycle and other data necessary for formulating a scheme for their preservation and scientific examination.

The report points out that a large number of hatchlings which fail to enter the sea before dawn are preyed upon by thousands of migratory sea gulls and other birds and mammalian predators like wild boars, dogs, jackals, hyenas and panthers.

Poachers in big groups from Digha in West Bengal and Balasore in Orissa also catch thousands of sea-turtles by nylon nets in violation of the Wild Life (Protection) Act, 1972 and sell them mainly in the Calcutta market.

The adults and their eggs are also collected by the poachers from the rookeries on the beach and trawlers which go sea-fishing in the vicinity of the breeding ground, causing accidental killings.

The department has suggested a scheme to regulate such fishing activities especially during the peak mating and nesting season, and transplanting of the nests to protect the hatchlings from high-tide flooding.

It has also suggested more scientific research on their behaviour pattern, protection in their natural habitat and proper exploitation of the surplus turtles and eggs without affecting the population.

REFERENCES

Bhaskar, S. 1981. Preliminary report on the status and distribution of sea turtles in Indian waters. *Ind. Fore.*, **107** (11): 707-711.

Bhaskar, S. and R. Whitaker 1983. Sea turtle resources in the Andamans. *Bull. Cent. Mar. Fish. Res. Inst.*, **34** : 94-97.

Biswas, S., L.N. Acharjyo and B.C. Mahapatra 1977. Observation on incubating eggs of *Lepidochelys olivacea* (Eschscholtz) from Orissa Coast in natural and artificial condition. *Sci & Cul.*, : **43**: 43-45.

Biswas, S. 1981. A report on the Olive Ridley *Lepidochelys olivacea* (Eschscholtz) (Testudines : Chelonidae) of Bay of Bengal. *Rec. Zool. Surv. India*, **79**: 275-302.

Bobb, D. 1982. Massacre at Digha. *India Today*, **31**: 64-65.

Bustard, H.R. 1976. Worlds largest sea turtle rookery. *Tiger paper*, **3**: 3.

Davis, T and R. Bedi 1978. The sea turtle rookery of Orissa. *Insona*, **1** (2).

Kar, C.S. 1980. The Gahirmatha turtle rookery along the coast of Orissa, India. *IUCN/SSC Marine Turtle Newsletter*, **15**:2-3.

Kar, C.S. 1982. The Gahirmatha sea turtle rookery, Orissa. *Makara*, **3** (1): 20-23.

Kar, C.S. and S. Bhaskar 1983. The status of sea turtles in the Eastern Indian Ocean. In: Bjorndal, K. (Ed.): *The biology and conservation of sea turtles*. Smithsonian Institute Press. Washington. pp. 365-372.

Valliappan, S. and R. Whitaker 1974. Olive Ridleys on the Coromandal Coast. Madras Snake Park Publication.

Whitaker, R. 1977. Sea turtles of Madras. *Ind. Fore.*, **103** (11): 733-734.