

OBSERVATIONS ON THE MASS NESTING AND IMMEDIATE POSTMASS NESTING INFLUXES OF THE OLIVE RIDLEY *LEPIDOCHELYS OLIVACEA* AT GAHIRMATHA, ORISSA-1984 SEASON

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ABSTRACT

Observations made during the mass nesting of the olive ridley *Lepidochelys olivacea* during January-February, 1984 at Gahirmatha rookery, Orissa is reported here along with some details on the nature of immediate post-mass nesting influxes. Strangely a large number of abnormal animals were seen to nest during the lean phase of nesting. The nature of the abnormalities, along with likely routes of the breeding migration, non-human predation of nests and environmental problems at Gahirmatha are discussed here.

INTRODUCTION

The mass nesting or 'arribada' of the olive ridley *Lepidochelys olivacea* commenced at Gahirmatha this year on 25th January 1984 when about 5000 turtles emerged for nesting. Thereafter, the intensity increased steeply and on the nights of 29th and 30th January in some short stretches of 100 metres about 2000 or more turtles came ashore for nesting. The mass nesting continued until 6th February from which date the numbers very sharply declined to a few hundred and on the night of February 9, there were hardly about 100 turtles nesting. A second minor peak in the breeding is expected around the last week of February or early in March.

Unlike previous years when mass nesting took place along a stretch of more than 10 km of the Gahirmatha Beach, this year it was conspicuously confined to a very short stretch of about 5 km in the northern sector from Ekkula to Ekkulanasi. Here again, the nesting intensity was greater over a stretch of 3 km south of Ekkulanasi, leaving about 200 metres at the northernmost limit where the Ranahansua-Patsala River enters the sea. The latter was due to this stretch of beach becoming inundated during high tide, water entering from both sides. The nesting in the southern sector between Ekkula and Habalikhathi was very sporadic.

A very significant deviation from the previous years was the protracted mass nesting from 25th January to 6th February, viz., 13 nights. Normally the event occurs within a short period of 4-5 nights. A rough estimate was that about 3 lakh turtles would have visited the beach for nesting. More precise estimates are being worked out by the Gahirmatha Marine Turtle Research Centre.

The turtles start emerging from the sea around 2000 hrs and continue until about 0500 hrs, the maximum emergence being after midnight. The animals first propped their heads out of water, rested for a few minutes after coming out of water and proceeded slowly up the beach. They frequently stopped with mild hissing sound, rising their heads and ultimately stopped in a place much above the high water mark to scrap out sand to make the egg pit. The general sequence of events was as that observed for the olive ridley nesting along the Madras Coast with slight variations in individuals movements. Only quantified data will reveal such finite behavioural differences, which may also be associated with factors such as the age of the animal or nature of the substratum. Since Silas and Rajagopalan (1984) have given the general sequences of nest building activity in the olive ridley, this is not repeated here. One difference noted was that due to earlier nesting, very often some of the subsequent

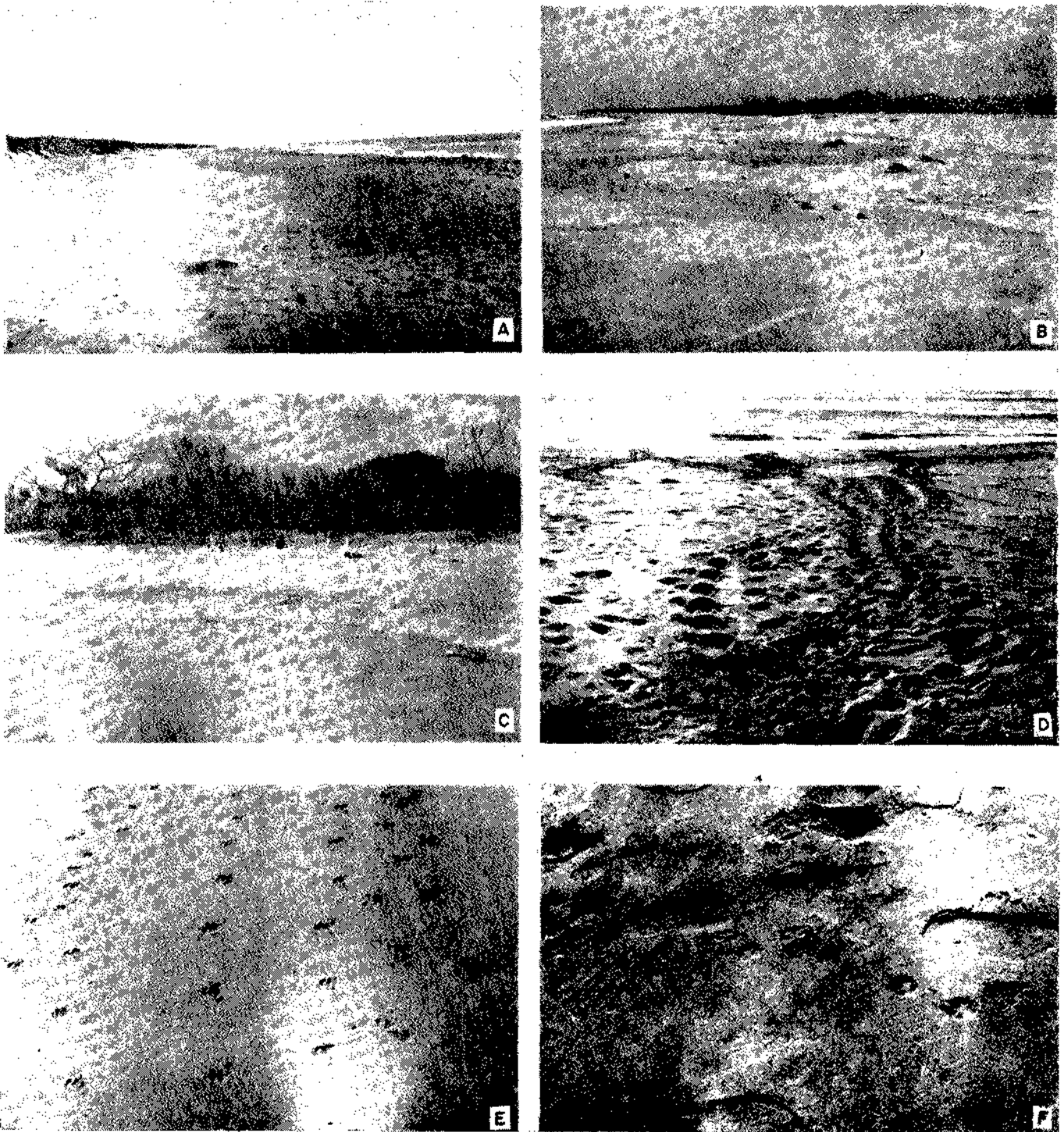


PLATE I A and B. Gahirmatha beach north and south of Ekkula ; C. Outer fringe of withered mangrove vegetation close to Habalikhali due to heavy accumulation of sand resulting from the 1976 and 1981 cyclones ; D. Crawl track of a nesting olive ridley ; E. Hoof prints of wild boar and F. of Jackal at Gahirmatha beach. (Photos E.G.S.)

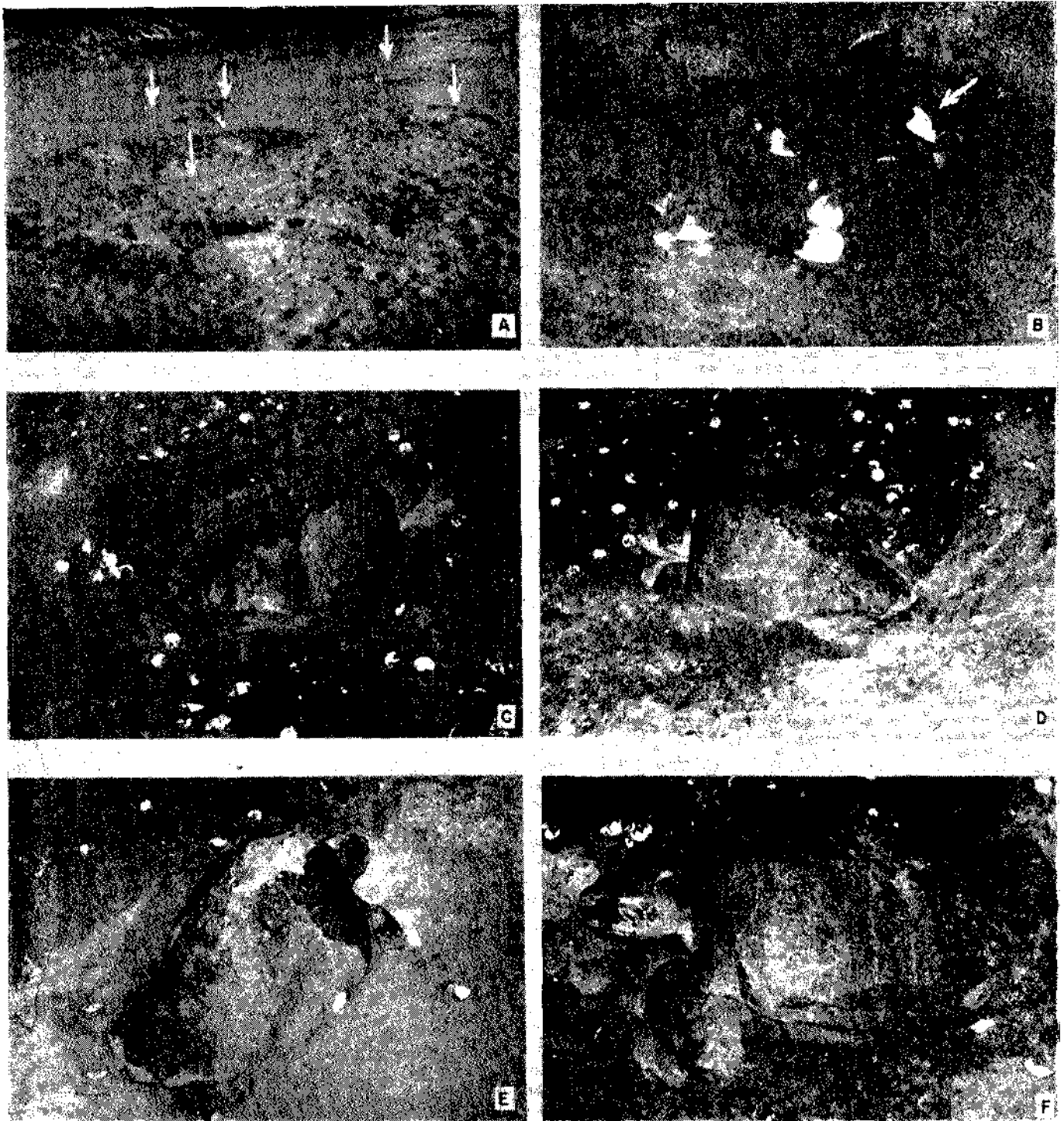


PLATE II Egg predation and destruction of nests and eggs at Gahirmatha beach. A. Arrows indicate dug out nest by jackals and dogs ; B. A ghost crab *Ocypoda macrocera* seen feeding on eggs rapidly entering a burrow; C-F. Heavy destruction of nests and eggs by subsequent waves of olive ridley during resting activity. (Photos E.G.S.)

nests were shallow, hardly 25 cm deep. In a few clutches observed the numbers varied between 70 and 159 eggs. The carapace length of nesting females was found to vary from 63 to 75 cm with modes at 64-65 and 70-71 cm. Nesting in some places along the beach was even upto 57 metres from high water mark.

INCIDENCE OF ABNORMALITIES IN NESTING OLIVE RIDLEY

Abnormalities and teratological conditions were seen in turtles both at the mass nesting phase as well as during the post-mass nesting phase. We found that the incidence was relatively high, being as much as 10 per cent or more in specimens emerging for nesting after the mass nesting phase. We have no quantified data of incidence of such during the mass nesting itself. However, on the night of 9th February 1984, out of about 100 nesting turtles over the 5 km beach north of Ekkula, 74 actual nestings were observed and followed up by us. Of these atleast 12 animals had abnormalities or teratological conditions which we consider as very significant. Some of the turtles were so mutilated that one would shed tears seeing them struggling with their stumpy hind limbs to scarp the sand for nesting. Very often where the hind flipper was badly damaged on one side, for long spells the turtle never felt 'satisfied' by the pit it had dug and in one case went on for over 45 minutes trying to scrape out the sand with one good hind flipper, eventually returning without oviposition.

We feel that there is a priority need for categorising the different types of teratological and damaged conditions due to mutilations and subsequent healing at an earlier stage of life, either as hatchlings or subadults in the sea. Looking at the healed mutilations it is incredible or even astounding how these animals could have survived and maintained normal life habits, though they may be stragglers.

Published literature does not throw much light on such a phenomena. Hence we feel that the whole problem needs a critical indepth study, categorising the different types of malformations, timing the ingression of such animals in relation to the mass nesting and postmass nesting activities and finding the causative factors that may be responsible for such maladies and their overall impact.

On February 1, 1984 the following was noticed :

1. A turtle of 65 cm carapace length was observed returning to sea, with the distal half of the right side of the carapace missing. It is likely that the turtle when young escaped from the predator which could take only

a chunk off the right side of the animal, the damage having healed subsequently, with movements not impaired.

2. A turtle with 72 cm carapace length which came for nesting was found with all the four flippers bifid. This could be a teratological condition.

3. In another instance, a turtle was found labouring hard to make an egg pit with no avail since both the hind flippers were stumpy. The animal could scrape hardly 15 cm shallow depression in which it laid the eggs and returned to the sea dragging itself with the front flippers after making a semblance of covering the nest.

On 9th February 1984, more such instances were observed among nesting females and some were photographed. The types may be categories as follows :

- I. Large chunk of posterior lateral half of carapace missing, but hind flippers normal.

Variabilities :

- a—Damage on left side.
- b—Damage on right side.
- c—Damage to also hind flipper of both left and right side or only one side.

1. Hind flippers on one or both sides either tapering or mere stumps and most ineffective for digging the nests. Surprisingly without them the animal keeps pace in surviving with normal animals ! How ?
2. Anterior or posterior flippers being either deeply cleft or bifid. They do not appear as being the result of a mark recovery experiment. The extent of the cleft is variable and to what extent this would impair life activities is worth looking at.
3. Damaged or cracked carapace or broken appendages, especially front flippers both of which could be the result of detaching the animal from the fishing gear and letting it off or due to other encounters.
4. Malformations, teratological conditions or external-visible growths.

We have not included here minor malformations such as abnormalities in scute orientations nor internal physical imbalances which may border on diseases.

To be more specific the conditions seen on 9th February 1984 at Gahirmatha are as follows :

a. In three of the nesting females the entire posterior carapace from the 4th posterior costal backwards on the left side was not present exposing the side of the body as well as the hind left flipper (Plate III A-C). In one of these specimens, both the hind flippers were mere stumps hardly 5 cm long, the belly bulging between the carapace and plastron becoming more conspicuous. The animal made long and strenuous efforts to make a nest with no avail. Finally the animal crawled back to the sea.

flipper was also partly damaged. However, the animal was able to successfully nest (Plate III D).

d. In eight nesting animals the posterior flippers had very long notches but this did not impair nesting activity and oviposition which were normal.

e. In one specimen the left anterior costal was cracked and badly damaged and the front flipper was also broken at midlength, the terminal half dragging.

f. A female on its ingress to the sea was found to have a large conspicuous protruding bulge (2 kg in weight) just in front of the left hind flipper (Plate III E,

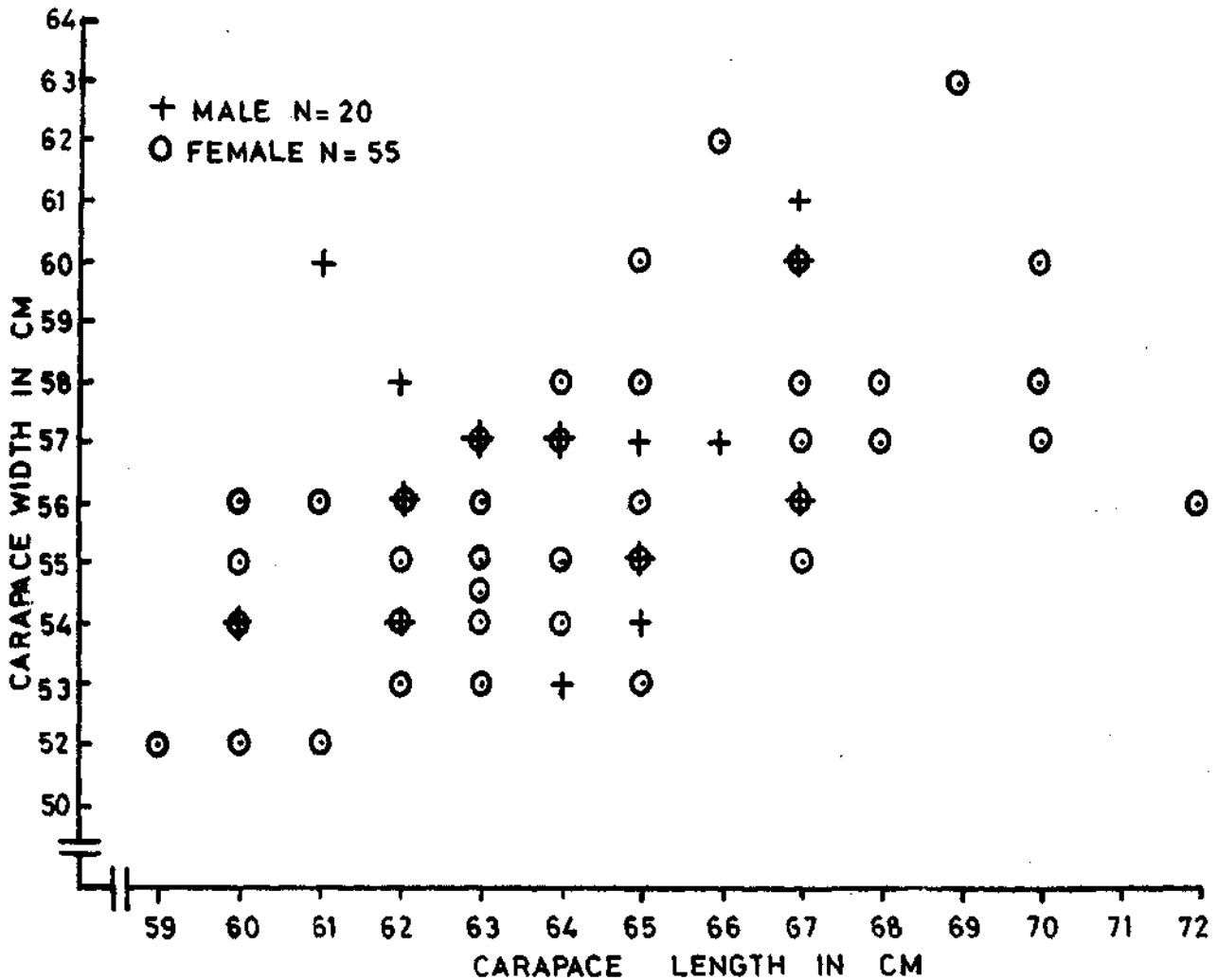


FIGURE 1 Scatter diagram indicating length and width of carapace (straight line measurements) in stranded carcasses of *L. olivacea* at Gahirmatha during the 1983-84 season.

b. In another turtle, when the left hind side was mutilated, but healed, the hind flippers were both tapering to a length of about 12 cm and the animal could not successfully nest.

c. In yet another turtle, with similar carapace damage on the right posterior part, the right posterior

F). The animal had difficulty in crawling and its movements were erratic.

The carcasses were also examined for size measurements and sex (when possible). The larger size of the female is note worthy (Fig 1) to what extent these represent remigrations of older year class is not known,

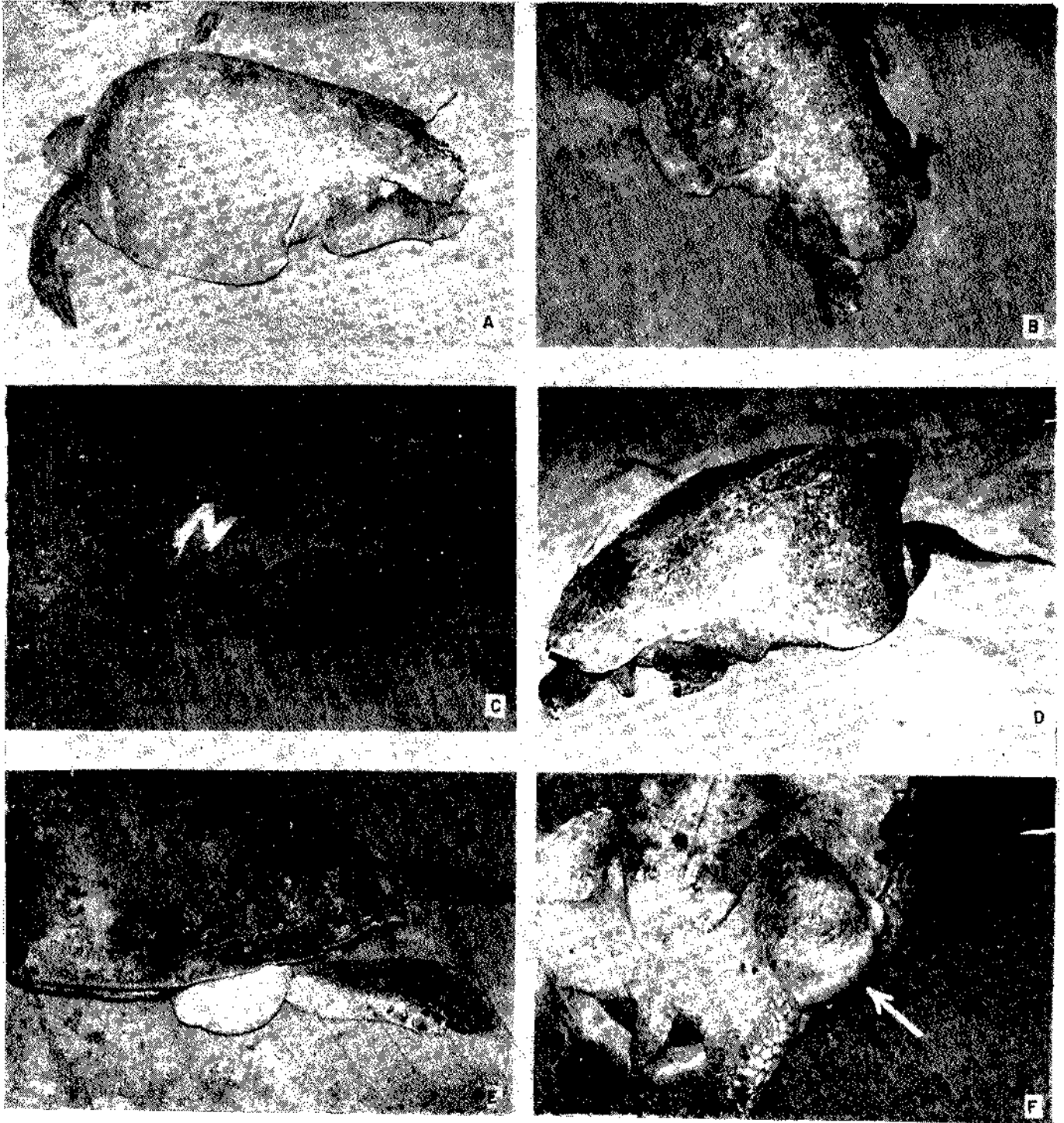


PLATE III A—F. Some of the mutilated and abnormal olive ridley seen nesting on 9th February 1984 at Gahirmatha beach. A and B are the same animal; E and F show a large abnormal growth at the axil of the left hind flipper. (Photos E.G.S.)

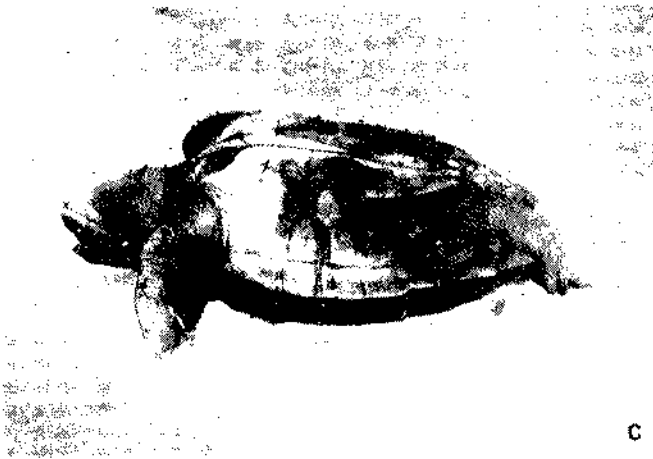
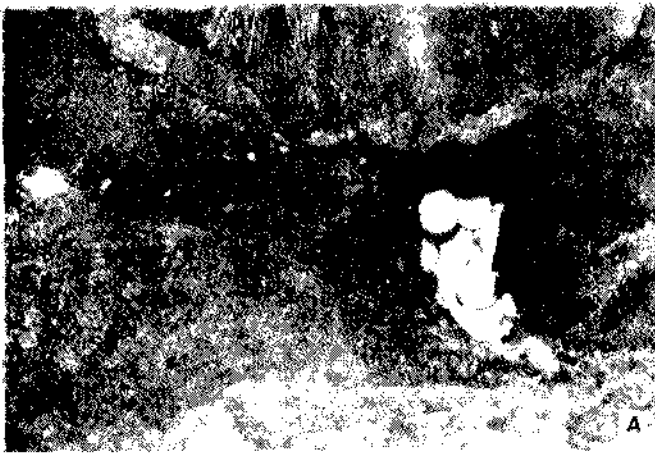


PLATE IV Gahirmatha, Orissa. A. Nest with eggs before completion of oviposition. B. The inward flexing or cupping of the left hind flipper to scoop in sand for covering the nest; D and E. Carcasses of a male and female olive ridley washed ashore respectively; E. Hoof prints of wild boar leading to carcass of olive ridley; and F. Shri Chandrasekar Kar in front of the Gahirmatha Marine Turtle Research and Conservation Centre set up by the Forest Department, Government of Orissa. (Photos E.G.S.)

Interestingly one specimen was found with the left hind side damaged as given under (b) above.

The points which emerge from these observations are :

1. How do these maladies occur ?
2. Do the weaker or affected animals reach the nesting grounds later ?
3. Is courtship and mating possible with their deformities and delayed arrival? In short do they lay fertilized eggs or lay a full clutch ?
4. If they are not able to successfully nest on one emergence, do they return the next day or thereafter or drop the eggs in the sea ?
5. The need for quantified data on the proportion of abnormalities, once they are categorised, should throw some light on whether some of these deformities are present even in the hatching stage caused by stress during development.

NEST PREDATION AND OTHER CONSTRAINTS

During our visits we found dogs and jackals, and wolf (?) digging the nests for eggs. While the daily depredation is of a high order, the repeated destruction to nests during the period of incubation of eggs will have a serious cumulative effect. This is one aspect which cannot be ignored and calls for critical assessment. Earlier literature speaks of the non-human egg predators getting satiated after the first few days and the predation level rapidly declining. At Gahirmatha during the mass nesting season, since about fifteen enumerators were working on different stretches of the beach, we felt predation by animals may on these nights be lower, but may continue unabated during day time and at dusk. What could happen in the later half of the incubation period and between pipping and emergence of the hatchlings is a guess. Definitely greater predation is present when the beaches are untended.

Estimation of the number of nests and the approximate number of eggs that may be destroyed will be necessary. A rough survey carried out by us is given in Table 1.

On 10.2.1984 we found some crows picking on eggs from nests which had been earlier dug up by a dog at the Ekkula field centre. During the previous night we also noticed the ghost crab *Ocypoda macrocera* feeding on eggs in one damaged nest.

Unintentional but equally serious, if not of greater consequence, is the damage to nests caused by turtles coming to nest on different nights. This year due to the arribada taking place over a restricted stretch of the

TABLE A. Details for number of destroyed nests observed in February 1984, at Gahirmatha, Orissa

Place	Km	Number of destroyed nests	Date
Ekkula Nasi ..	0-1	24	11-2-84
	1-2	268	..
	2-3	984	..
	3-4	1316	..
	4-5	923	..
Ekkula ..	5-6	972	12-2-84
	6-7	240	..
	7-8	25	..
	8-9	11	..
Habalikhati ..	9-10	7	..
Total ..		4770	

beach over a larger number of days the situation was really bad. Since many of the nests were shallow, nesting turtles were seen to scrape and throw about a large number of eggs and some were invariably damaged or exposed. It is as though the clutches of eggs are packed in close tiers in some places where repeated nestings have taken place. What would this mean in terms of incubation and development, especially at the pipping and emerging stages of the earlier laid batches and the effects on the unhatched upper layers of the eggs? We have no answer. Silas and Rajagopalan (1984) found that unhatched eggs in a clutch at the time of emergence of hatchlings, if disturbed may end up in arrested development. This is one aspect which has to be looked into while estimating hatching success. Considering this, we feel that at Gahirmatha the answer to better management would be the transplantation of eggs in the lesser used stretch of the same beach. This is also very essential that during the arribada some of the turtles nest in the intertidal area, the clutches of which if not transplanted, may result in total loss.

During our visits we found that petromax light and torch light did disorient the nesting and emerging turtles. In one case we noticed a female which had just emerged from the sea turning back due to the light. We wonder whether under stress, turtles drop eggs in the sea! One of us (A.B.F.) has observed such a happening in the olive ridley in a fishing net in the Gulf of Mannar at Tuticorin.

We were glad to notice that the enumerators carrying out the census of the nesting turtles under the supervision of Shri Chandrasekhar Kar did their job with the least amount of use of torches.

INFORMATION ON TAGGING AND TAG RETURNS

The Divisional Forest Officer Shri S. K. Mishra at Chandpali told one of us (E.G.S.) that tagging of turtles which commenced during the 1977-78 season had not so far given any encouraging results. In fact as late as the beginning of 1984, there have been hardly about 87 returns of about 15,000 tags used. The re-nesting returns have also shown differences from year to year with practically no returns during the 1982-83 season. Detailed analysis is being conducted by Shri Chandrasekhar Kar who had initiated the programme and who has been involved with the tagging. The tags used by him are the monel metal type which bear a number on one side and the following inscription on the other side :

REWARD RETURN CHIEF WILDLIFE WARDEN, BHUBENESWAR, ORISSA, INDIA.

Since no tagging was undertaken during the 1983-84 season by Shri Chandrasekhar Kar, we have used similar monel metal tags from the CMFRI bearing the number on one side and the inscription on the other as follows :

PLEASE RETURN TO
CMFRI, P.B. 1912
COCHIN, INDIA

At the Institute a monitoring system for sea turtle caught incidentally in fishing operations along the coast is being developed and in this connection, we are glad to record that one of our staff Shri K. V. Seshagiri Rao has got a tag return from Narasapur Field Centre. He has sent us the information that between 20th and 22nd January 1984 a turtle was caught in shore-seine net at Peddamylavanilanka (South), 24 km south of Narasapur, bearing the number 14938 with the details of returning the tag to the Chief Wildlife Warden, Bhubaneswar, Orissa inscribed. The turtle was released by the fishermen after the tag was removed. The identity of the species is not difficult since only the olive ridley has been tagged with these tags at Gahirmatha. It is hoped that with the strengthening of such a monitoring system along the coast, we will be able to obtain a clearer picture of the migratory route of the nesting turtles during the inter-nesting period as well as much needed information on feeding grounds. 900 CMFRI monel tags have also been left with Shri Chandrasekhar Kar to continue the tagging operations from Gahirmatha beach on the turtles coming for nesting after the mass nesting phase.

Shri S. K. Mishra, informed one of us (EGS) that about the end of November 1983, the Government of Orissa had received a message from the Coast Guard

of the sighting at sea of large number of turtles moving northwards off Pondicherry. It is not known whether these turtles could have reached the Orissa Coast towards the end of December and early January since courtship and mating was noticed off Gahirmatha Coast during the later period. The stranded carcasses of males and females at Gahirmatha Beach, as already mentioned earlier, testified to the occurrences of the species in large numbers off the coast. Fishing being on, the carcasses seen could have resulted from incidental catch. Added to this, the tag recovery from Peddamylavanilanka (South) near Narasapur may be indicative that olive ridley migrates almost the entire length of the east coast to reach the nesting grounds along the Orissa Coast with probably stray numbers digressing to the shores along Tamil Nadu, Andhra Pradesh and south Orissa during this period. At CMFRI we have alerted our field staff to inform the fishermen about the tagged turtles for helping in future recoveries. In the accompanying text figure (Fig. 2) we have presented the major activities of olive ridley discussed above. It will be interesting to know whether the olive ridley mass migration commences from the Palk Bay, Gulf of Mannar and further south and goes on to the Orissa and West Bengal Coasts or whether this is only one of the pathways of part of the population, the others converging from the Bay islands (Andaman-Nicobar area). We feel that there is a need for extensive tagging of this species at different centres so that we will have information not only on the routes of migration and the feeding grounds but also on the strength of annual remigrations over a longer period of time.

Tagging at the courting and mating phase of the olive ridley out at sea will also be necessary and is possible in larger numbers along the Orissa Coast.

PROBLEM OF BEACH EROSION

From what we have seen at Gahirmatha, one of the most crucial issues is going to be whether the Gahirmatha beach will still exist a decade hence ! There is heavy erosion on the southern part of the beach which has eaten away hundreds of meters of land. Shri S. K. Mishra, informs us that in the recent past the Forest Department has lost two full blocks due to erosion. We have elsewhere (Silas *et al.*, 1983) reported on the stumps and remains of mangrove in the intertidal region in the southern sector of the Gahirmatha beach close to Habalikhathi. The vast pile up of sand among mangrove vegetation during 1976 and 1981 cyclone which had affected the area is still evident with a broad fringe of withered mangrove over a few kilometres stretch (Plate I, D).

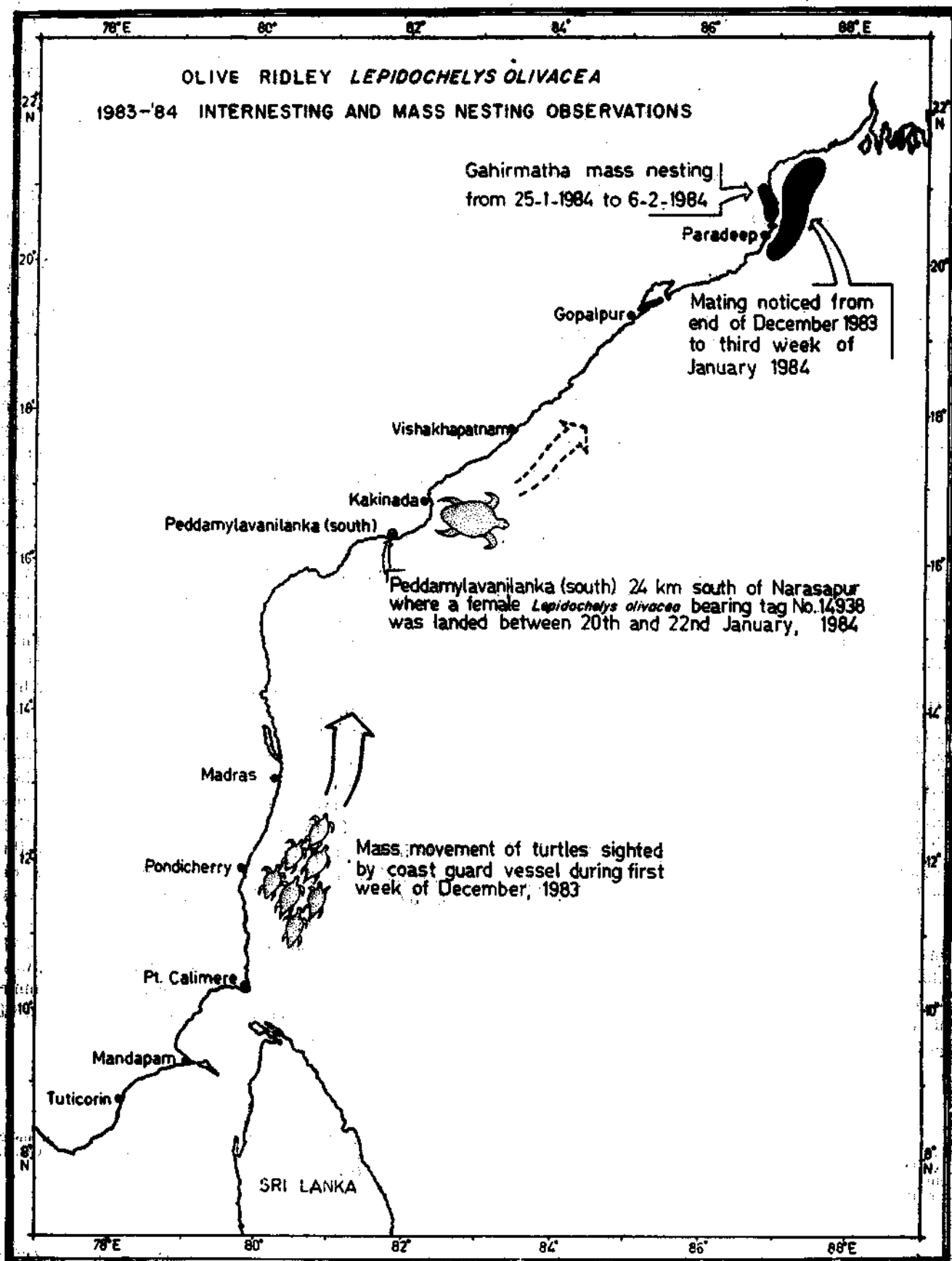


FIGURE 2 Map showing the interesting and mass nesting activity phases of the olive ridley during the 1983-1984 season.

In view of the mass nesting of the olive ridley along this beach, any reduction or changes of beach configuration and profile would also adversely affect the rookery. We would urge that the Government of Orissa take immediate steps to tackle the problem of erosion along this coast so that corrective measures may be taken which may not affect the beach itself. Mining operations if in vogue in adjacent areas or man-made engineering works which could result in erosion and accretion in different places should receive special attention. The expensive sea walls as constructed along Kerala Coast is not going to be a solution to the problem since this will not allow for nesting turtles to come ashore. The matter is one of urgency needing a multidisciplinary approach of hydrological and related studies to ascertain the causative factors for erosion and see how best this could be prevented.

POACHING OF TURTLES IN WEST BENGAL 1983-84 SEASON

Unlike the previous years, directed turtle fishing was not carried out this year. But incidental catch from gill nets were hidden and transported in wooden boxes and bamboo baskets in such a way that it is difficult to trace. They appeared at Howrah market in December 1983 at the rate of 7 to 87 per day. The Forest Department of the Government of W. Bengal apparently did not take any action against the storage and sale of turtles at Howrah market during the period. Turtles were observed at Howrah market as follows :

Date	No. of turtles at Howrah market observed
5.12.1983	15-20
6.12.1983	22
7.12.1983	7
8.12.1983	16
9.12.1983	36
10.12.1983	58
11.12.1983	87
13.12.1983	64 (26 Nos. came as fish by relay in baskets)
14.12.1983	33
16.12.1983	15 (tied in bamboo baskets each containing 2-3 animals)

On 30.1.1984 night Forest Department officials of Contai obstructed one truck carrying 74 sea turtles (olive ridley) at Bajkul chekpost of the Forest Department and produced the same before the Judicial Magistrate of Contai. The merchants defended that

the turtles captured are not covered by the Indian Wildlife (Protection) Act, 1972. The Additional Divisional Forest Officer, Midnapur was brought to identify the turtles and these were released into the sea at Junput. The earlier cases pending in the Court have not yet been decided.

EVOLVING PUBLIC POLICY ON CONSERVATION OF THE OLIVE RIDLEY

One of the most significant events that happened during the 1984 mass nesting of olive ridley was the visit to Gahirmatha by the Honourable Chief Minister of Orissa to witness the event. On this occasion he made it known that the inshore waters for a stretch of 20 km and width from the coast of 10 km would be prohibited for fishing. This pronouncement certainly had its effect in that the fishing effort was almost nil during the mass nesting period. It is to the credit of both the Government of Orissa and the fishermen sector that without promulgating a regulatory fishing Act they have been able to achieve self-regulation to this extent during the season. This is also evident from the very few carcasses that has been washed ashore during the 1984 season. Our examination of the carcasses indicated that these were washed ashore during December and January when courtship and mating of turtles of Gahirmatha coast was noticed and fishing operations were also in vogue. As on 12th February 1984 the total number of Carcasses between Habalikhathi to Ekkulanasi (10 km stretch of beach) was 392 of which 24 per cent were identified as males. When compared to the 1983 season of over 7500 along a stretch of 15 km, this is only a very small fraction mainly accounted by the pre mass nesting fishing activity. We hope that greater awareness through proper extension programmes at the village level would be initiated in the State so that the artisanal fisheries sector could be fully taken into confidence to also help in the conservation programme. They could certainly do this by voluntary restriction of fishing activities or releasing live turtles from gill nets as soon as they detect the same instead of allowing the net full soaking time. Small steps of this nature would go a long way in strengthening the sea turtle conservation programme and perhaps Orissa could lead the way for the rest of the country in this matter.

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