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(63)

THE MARINE TURTLE LEPIDOCHELYS OLIVACEA ESCHSCHOLTZ,
ITS OCCURRENCE AND CAPTIVE REARING IN SUNDERBANS

ABSTRACT

Reports on the presence of the ridley in the fishermen's catches during December to March every year, and its egg poaching indicate a sizeable population and number of nesting beaches along the Sunderban coast. The present investigation has indicated a number of ridley nesting grounds. Comparisons of the physiographic data with other nesting beaches indicate the width of the ecological niche. A 39% rearing success in the first year and a 100% rearing success in the second year suggest guidelines for captive rearing programmes. Growth statistics are provided to gauge the success of captive rearing technique, as a faster growth reduces cost of rearing. Experiments conducted on the feeding behaviour of sub-adults showed a marked preference for crabs such as Uca and Sesarma over fish and prawns. The successful treatment of a fatal skin ailment with dilute KMnO_4 solution, but its persistent recurrence creates scope for discussion and further investigation.

INTRODUCTION

Information on the status and distribution of the olive ridley in the Sunderbans was not available, when the first batch of 600 eggs of the ridley arrived at Bhagabatpur for artificial incubation in March, 1983. Their presence in this estuarine area being indicated

by ridley catches in fishermen's nets, brought to Raidighi and Kakdwip during December to March every year. Statistical analysis on the number of ridleys caught is difficult to compile as the trade is done underground. Turtle shells can however be found lying by the roadside at market places near any one of these centres during the period under study. 90 ridleys were found held captive in a pond in Kakdwip in January 1984 (Nandi pers. comm.). Other reports on this clandestine trade suggests an overall operation, large enough to indicate a population of enough magnitude along the estuarine beach, to call for management measures and ensure a viable number in perpetuity. The present paper summarises the information gathered in the course of a preliminary reconnaissance of the area and results obtained in captive rearing of the turtle.

Ridleys are caught while floating at the surface during the breeding season. As this overlaps the nesting season February - March in the Sunderbans, some are also caught in fishermen's net while coming to the shore to lay. The principle decimating factor is however the poaching of eggs by man and nest predation by boar (Sus scrofa), monitor lizards (Varanus spp.) and cats, as was indicated during this study.

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Nesting ground of ridleys in Sunderbans

Mass nesting of ridleys in West Bengal have been reported earlier (Biswas, 1982). In Sunderbans, the Lothian seaface and Sagar Islands have been mentioned as areas where ridley eggs and hatchlings have been found (Biswas, 1982). During the present study, nesting grounds have been located in course of ridley egg searching for turtle rearing projects in Sunderbans under the

Forest Dept., Govt. of West Bengal in Kanak Island (Banerjee, 1984). Some eggs and nests have been located in Mechua and at Chaimari locally known as 'C₂ dne'. A predated ridley nest have been found in Halliday Island Sanctuary. One ridley hatchling measuring 4.08 cms. Carapace length and 3.35 cm carapace width, weighing 17 gm recently hatched (Biswas 1982, Banerjee 1984) was recovered from the Northern face of Lothian on 27th May 1984. This appears to support reports by fishermen that ridley₃ nests on Bakha beach and southern shore of Lothian.

Natural history and biology of the ridley

In Sunderbans, sea turtles are commonly called "Katha, "Kachim", refers to the fresh water form, while "Kachhap" is the general term for the reptile. The most commonly occurring marine turtle in the Sunderbans is the ridley. Other species have however been identified. Some loggerheads (Caretta sp.) were rescued from a market near Kakdwip in January, 1984 by Forest Department. They were later released in the sea 9 km off Bakhali beach. Descriptions of the hawksbill (Eretmochelys) and the leather back (Dermodochelys) have also been obtained from local fishermen. The fact that these species occupy different niche in their common habitat have ensured their collective survival. Hughes (1983) observed that the leather back and the green turtle occupied and fed on the surface waters of the sea followed by the hawksbill. The intermediate layer between the hawksbill and the ridley is occupied by the loggerhead. Thus ridley is the species dwelling in deeps amongst our turtle population. Perhaps it is owing to the reason that catches are obtained mainly during intense mating add to the breeding season when the turtles are forced to surface for prolonged periods.

Some notes on weather and physiography of the nesting beaches

The regularity of the occurrence of the ridley and its nest along the Sunderbans Coast revealed during this study suggests a favourable ecological condition for inducing seasonal ridley

migration and nesting. From the results obtained from the study of the species in captivity it would be helpful in programmes which envisages rearing in simulated conditions.

Rainfall

The annual rainfall data (1964-1971) in the Orissa Coast where mass nesting of ridleys is an annual phenomenon shows a minimum average rainfall of 0.03 mm in December and a maximum average rainfall of 322.68 mm in September (Biswas, 1982). The annual rainfall in Sagar (1982 - 1983) show a minimum average rainfall of 4.30 mm in December and a maximum average of 634.45 mm in August (Table 1).

TABLE 1. Annual rainfall in Sagar (mm) 1982-1983

| Months | Year | | Average |
|-----------|--------|--------|---------|
| | 1982 | 1983 | |
| January | 0.00 | 26.20 | 13.1 |
| February | 39.80 | 36.10 | 37.95 |
| March | 52.40 | 64.80 | 58.60 |
| April | 58.90 | 1.00 | 29.95 |
| May | 0.80 | 69.50 | 35.15 |
| June | 216.30 | 335.20 | 275.75 |
| July | 370.30 | 178.20 | 274.25 |
| August | 691.80 | 577.10 | 634.45 |
| September | 81.90 | 377.30 | 229.60 |
| October | 207.00 | 277.10 | 242.05 |
| November | 32.20 | 10.40 | 21.30 |
| December | 0.00 | 8.60 | 4.30 |

Source: Alipore Meteorological office.

Temperature

Since temperature plays an important part in the biology of a reptile, data for the average monthly air temperature in Sagar for 1982 to 1983 are presented in Table 2 in comparison with that of Chandipur base (Biswas, 1982). Chandipur is colder in January -15°C & 27°C while in May temperature is higher (25.5°C (Min.) and 35.5°C (Max.)).

TABLE 2. Average monthly air temperature ($^{\circ}\text{C}$ at Sagar)

| Months | Year | | | |
|-----------|------|------|------|------|
| | 1982 | | 1983 | |
| | Min. | Max. | Min. | Max. |
| January | 17.6 | 26.2 | 16.6 | 24.7 |
| February | 19.6 | 27.0 | 19.1 | 26.2 |
| March | 22.7 | 28.4 | 23.9 | 29.6 |
| April | 26.1 | 30.6 | 26.6 | 32.5 |
| May | 28.4 | 32.7 | 26.8 | 32.0 |
| June | 27.0 | 32.0 | 28.2 | 32.7 |
| July | 27.2 | 31.4 | 27.4 | 31.2 |
| August | 26.3 | 30.3 | 26.8 | 30.3 |
| September | 27.3 | 31.3 | 26.9 | 30.6 |
| October | 25.7 | 31.8 | 25.8 | 30.1 |
| November | 21.7 | 28.4 | 20.7 | 28.2 |
| December | 17.3 | 26.1 | 16.2 | 24.9 |

Source: Alipore Meteorological office.

Salinity

Salinity recorded at Chandipur base showed an increase from 22.8‰ in December, 1971 to 34.6‰ in May 1972 (Biswas, 1982). At Sagar the average salinity varied from 15.07‰ in November, 1982 to 26.00‰ in May, 1983 (Table 3).

TABLE 3. Salinity fluctuations at Sagar

| Months | Year | Average salinity |
|----------|------|------------------|
| November | 1982 | 15.07 |
| December | 1982 | 15.07 |
| January | 1983 | 19.56 |
| February | 1983 | 22.65 |
| March | 1983 | 24.21 |
| April | 1983 | 25.82 |
| May | 1983 | 26.00 |

Source: Project Report Mangrove Ecosystem of Sunderban. Dept. of Science and Technology, New Delhi.

Breeding behaviour and nesting ecology

In Sunderbans, mating of the ridleys are generally observed to begin from the first week of December and continues upto February. A marked increase in the number of copulating pairs are observed when the sea is relatively calm. Average carapace length of the catches during this season was 65 cm. Laying of eggs accompanied by the high tide a drizzle and a strong on-shore wind.

Ridley nests were located in Kanak Island in 1983 after a night of light storm and rain. The high tide facilitated the nesting of ridleys. The nesting ground in the Sunderbans consist of fine silica sand. Beaches with silt depositions are not visited by the ridleys for purpose of nesting as the soil turns heavy and hardens on exposure, thus becoming difficult to excavate. Hatchlings would also find it difficult to emerge through such nests as was observed in the case of eggs hatched artificially at Bhagabatpur. The beaches associated with a good mangrove vegetation and relatively undisturbed are found to be favoured by them. The vegetation forming a basis of production of plankton and neritic fauna, which induce the ridleys to migrate and select these areas as nesting zones. The period immediately after the ridleys hatching is found to coincide with the emergence of large number of small pelagic fish and crustaceans and with the hatching of river tern (Sterna). The birds are found to lay on the same nesting beach as the ridley at Kanak Island.

Natural ridley nests are found 50 to 75 metre away from the maximum tide water mark and at an average elevation of 1.35 metre. The average early morning nest temperature recorded was 30.5°C and the noon temperature 31°C, while the air temperature varied between 28°C to 32°C. The upper layer of the eggs were found at a depth of 45 cm in the nest laid in a cluster and touching each other. The nest cavity resembled a laboratory flask with a narrow neck of 30 cm and a width of 60 cm. The total nest depth measured 50 cm. Number of eggs per clutch varied between 96 -120 numbers.

Captive rearing

Studies involving the rearing of Olive ridley begun at Bhagabatpur Crocodile Project, Sunderbans in March 1983, when the first batch of 600 eggs were brought from Kanak Island, a newly sedimented land rising above the waterings, at the mouth of river Matla (Banerjee, 1984). Eggs were marked in the conventional manner on the animal pole before transferring to the transportation box and

carriage. 4 nests were opened. Each clutch being marked with a separate colour. Those were transferred to the hatchery at Bhagabatpur where simulated nests were prepared.

Hatchery technique

Simulated nests were prepared using some amount of parent soil and collected estuarine sand, in a trench of size 2.90 m x 0.80 m with a gradually deepening depth from 0.75 m to 0.90 m. The bottom slope was provided to facilitate prompt drainage. Nest cavity were scooped out resembling the original. and egg were placed in separate clutches as collected, touching each other. A hollow bamboo pipe was inserted at the centre of each egg chamber. A thermometer inserted through the pipe in order to record the nest temperature at 2 hours interval. The sand covering the nest was tightly packed. The entire hatchery was located in a partially shaded patch and fenced off.

Hatching

Eggs were found to start hatching from the 61st day, the average nest temperature being maintained at 29°C. Hatching continued upto the 6th day. 117 numbers hatched at a total hatching rate of 19.5%. Several eggs were found to be infertile (Table 4).

Hatching behaviour

First hatching took place on 17.5.1983 at about 5.15 P.M. when 28 hatchlings were observed running about on the hatchery floor. Hatching continued from the same nest and altogether 34 hatchlings were obtained upto 11.15 P.M.

Hatchlings emerged one at a time through a single opening in the nest, sometimes from the centre or through the periphery of the neck of the pitcher shaped nest. A small circular opening, the size of a 303 bullet was first observed at the site of emergence. Complete emergence took place in 15-25 minutes for each individual

in case of emergence less than in 10 numbers. After emergence it is found to propell itself slowly on its flippers. Momentum was slowly picked up and at its apex the turtle scurries forward by rapid movement of its flippers. It was not found to propell itself backwards on land.

TABLE 4. Hatching results of olive ridley at Bhagabatpur

| Date | Nest | | | | Total |
|----------|------|-----|-----|-------|------------|
| | (1) | (2) | (3) | (4) | |
| 17-5-'83 | 34 | 30 | - | - | 64 |
| 18-5-'83 | 5 | 3 | - | - | 8 |
| 19-5-'83 | 3 | 11 | 4 | - | 18 |
| 20-5-'83 | - | 1 | 2 | - | 3 |
| 21-5-'83 | - | - | - | 8 | 8 |
| 22-5-'83 | - | - | - | 16 | 16 |
| | | | | Total | <u>117</u> |

Release: Twelve days after final hatching, 99 hatchlings were selected at random and released at the original nesting site, in sandy creeks on the island. On 27th May, 1983 over a thousand river tern (Sterna) were observed nesting on the same island. Fine meshed fishing nets cast at the site, caught a large quantity of minute crabs, fish and prawns which were detected under a lens.

Rearing: Hatchling were kept in plastic basins 63 cm diameter and 20 cm depth in a water depth of 2.5 cm. After a fortnight these were transferred to a masonry tank 3 m x 3 m x 0.75 m. Water was filled to a depth of 25 cm. Necessary basking and

resting place was provided by filling sand above the water line at the corners. The hatchling climbed up onto these and remained for some time before clambering down into the water. The water in the plastic basin was changed twice daily and in the masonry tank once daily in each case changing being done after feeding. Saline estuary water was used for rearing experiments.

Food and feeding behaviour: Ridley hatchlings were not found to feed on the first day after emergence. Hatchlings were offered minced prawn ground to bite-size. The feed was dropped in the water filled plastic basins. These were picked up by the beak and gulped down under water and some times with the beak thrust out of the water line. Live fish, prawns, pond weed and algae were offered but no ingestive behaviour was noted.

The masonry tank bottom had to be covered by a sand layer as the turtles were found to injure their beaks and carapace. After the completion of a year the feed schedule (Banerjee, 1984) was experimented with live fish, prawns, crabs and weeds, since a change in feeding from the carnivorous to the herbivorous behaviour was stated by Biswas (1982). Kar (1982) and Hughes (1983) opined it to be carnivorous, while Murthy and Menon (1976) stated they were omnivorous. Crab was preferred as food while the vegetative matter was not accepted (Table 5).

Growth and health: In captive rearing, a balanced diet and proper husbandry conditions, helps to attain the target size in shorter time, thus cutting down on rearing expenditure. The growth rate of the hatchling are found to also depend on temperature, maximum growth being observed in July - August and levelling of totally during December - January. During the monsoon a skin infection was observed in 1983 and 1984. Infection appeared on the neck, flippers and carapace joints. Feeding was stopped and animals turned lethargic. Whitaker (1978) reported this to be fatal. However, successful treatment with 5% KMnO_4 solution twice daily, helped with a daily dose of 4% solution of terramycin

Antigerm - 77, checked and healed the infection. A dilute solution of electral powder was fed two drops per individual.

TABLE 5. Feeding behaviour of ridley

| | |
|-------------------|----------------------|
| Date | 23-6-1984 |
| Water Temperature | - 30.5°C |
| Water depth | - 20.00 cm |
| Tank size | - 3 m x 3 m x 0.70 m |

Specimen L. olivacea

| | |
|-----------------|------------|
| Age | - 395 days |
| Carapace length | - 27.8 cm |
| Carapace width | - 25.26 cm |
| Weight | - 2.795 kg |
| Numbers | - 10 |

| <u>Live feed offered</u> | <u>Average Size</u> | <u>Nos</u> |
|---------------------------------------|---------------------|------------|
| Prawns | 6 cm | 112 |
| Fish | 2.5 cm | 46 |
| Crabs (<u>Sesarma</u> , <u>Uca</u>) | 3.5 cm | 52 |
| <u>Boleophthalmus</u> sp. | 15 cm | 12 |
| Weed | 20 cm | |
| Grass | 20 cm | |

Recovery

| | |
|---------------------------|-----------|
| Prawns | - 103 Nos |
| Fish | - 39 " |
| Crabs | - Nil |
| <u>Boleophthalmus</u> sp. | - Nil |
| Weeds | - Total |
| Grass | - Total |

This helped to induce activity and feed intake . No mortality was observed. The infection again appeared during the monsoons of 1984. The treatment removed the infection but it reappeared after a week and is found persistently present. The turtles were feeding normally. No mortality was observed so far among the 1984 hatchling. Infantile mortality in captive ridleys at Bhagabatpur have been reported (Banerjee et al., in press). Over the period of an year the infantile mortality rose to 8 numbers i.e. 44%. 3 hatchling died owing to developmental abnormality and one owing to an accident. Thus in effect the infantile mortality was 4 Nos. (22%) for the 1983 hatchling after the first year. To date, 7 nos are surviving (39%). 5 hatchling are being reared from the 1984 stock and no mortality have been observed.

Financial implications in 1983

It is essential in any attempt at exploitation or rehabilitation of a species that husbandry cost be kept at the minimum required level. High expenditure may compel to abandon a programme prematurely. The figures given relate to the fiscal year 1983.

| | | |
|--|---------------------------|------------|
| * Cost of egg collection | 1) labour charges | Rs 120.00 |
| | 2) Boat hire | Rs 200.00 |
| Preparation of nest | | Rs 105.50 |
| Release | 1) Boat hire | Rs 200.00 |
| Maintenance cost (Food, cleaning pen etc. for 1 year) | Labour @ Rs 285/- p.m. | Rs 3420.00 |
| | | Rs 4045.50 |

After the second year the turtles will have to be stocked in suitably enclosed big ponds or creeks, protected from predation.

Bustard (1972) observed that only 1% survived to return at the beginning of the second year. Murthy and Menon (1976) stated 90% were predated during a turtle's life time. Turtle farming can be turned into a profitable industry through scientific rearing. Conservation of the species being attained as well by releasing a suitable number back to nature.

Turtle meat is sold at Rs 12/kg at the local market. It's egg is considered a delicacy. The much needed protein for the rural population can be met in turtle farming. Buttons are made from the shells. Attempt should therefore be made to exploit the species in a rational manner.

Ridley concentrations are observed very close to thick mangrove forests in the coastal regions the decomposing mangrove vegetation forming the basis of a complex food web, which help in producing a variety of plankton and neritic fauna. Ridleys migrate towards these zones during breeding. Thus the protection of these tracts of forest is of primary importance in maintenance of the ecosystem.

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