# THE OLIVE RIDLEY TURTLES (*Lepidochelys olivacea*) OF SUNDARBANS COAST

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## Introduction

The Sundarbans mangrove forest is situated in the south-western part of Bangladesh between latitudes 21°27'30" and 22°30'00" North and longitudes 89°02'00" and 90°00'00" East. The total area of the Sundarbans is about 601,700 ha, and has been under the management of the Forest Department since 1884. There are 32 species of mammals, 8 species of amphibians, 14 species of turtles, 30 species of snakes, 35 species of other reptiles, 186 species of birds, 120 species of fishes, and 334 species of plants. The Sundarbans mangrove forest is the home of the world famous Royal Bengal Tiger (*Panthera tigris*). There are three protected areas in the Sundarbans, known as the East, South and West sanctuaries, which were declared as World Heritage sites in 1997 by Unesco. The area of the sanctuaries is about one-third of the total area of the Sundarbans.

## Distribution

Olive Ridley turtle (*Lepidochelys olivacea* Eschscholtz, 1829) is an important aquatic animal often found in the marine zone of the Sundarbans mangrove forests, normally along the coast of the Bay of Bengal and sometimes a little deeper inside the estuary. It was reported that the Olive Ridley turtle used to nest on the sandy beaches of Dimer Char (opposite Kachikhali), Kachikhali, Dimer Char (the north side of Aloor Kool) and the Mandarbaria areas of the Sundarbans in February and March. The Olive Ridley turtles visiting the Sundarbans in the winter are often caught in the fishing nets and brought to shore either dead or exhausted. They also nest regularly on the sandy beaches of Inoni, St. Martins, Sonadia and Maheskhali islands of Cox's Bazar district, along the eastern coast of the country. The nesting here takes place in November.

## Habitat

The wildlife sanctuaries are situated along the southern coast of the Bay of Bengal from east to west. The length of the coast from Bogi in the east to Panir Khal in the west is about 110 km. The turtle breeding grounds are located in these sanctuaries. The fishermen used to stay all along the shore, mostly on the sandy beaches of the sanctuary in the winter season from mid-October to the end of February. They prefer sandy beaches for easy access, natural facilities to dry fish, and also to a certain extent because of the availability of fresh water. The seasonal activities of fishermen on sandy beaches restricts the nesting of turtles to a great extent. There have been sporadic reports of nesting by turtles at different parts of the sanctuaries every year, but it was not considered to be a routine phenomenon. The nests were often destroyed by predators – mainly wild boars (*Sus scrofa*) and lizards (*Varanus* spp.) Beginning in the winter of 1998, fishing was banned within the sanctuary jurisdiction and the fishermen were not allowed to settle temporarily on the sandy beaches for the same purpose. This has brought about positive results in the nesting of the Olive Ridley turtles, which is discussed in this paper.

## Mandarbaria Breeding Ground

The Mandarbaria marine turtle nesting ground is located at the extreme western point of the Sundarbans west sanctuary. Here, the sandy beach has always been used by the fishermen. According to information from the office of the Divisional Forest Officer, Sundarbans Forest Division, about 500 fishermen used to stay on the beach for fishing in the winter season every year. As a result, the turtles could not reach the beach for nesting, but instead were caught in fishing nets and drowned to death. The nesting of turtles was recorded at the Mandarbaria

coasts from the month of February 1999. The breeding of Olive Ridley turtle was observed in 1999 and 2000.

It was reported by the field staff on 25 February 1999 that 4 nests of Olive Ridley turtle had been damaged by wild boars. They also found a slightly injured mother turtle in an upside-down condition on the same day in the eastern part of the beach close to the water. The turtle had been attacked by a wild boar a little before detection, as was evidenced by the fresh blood oozing from wounds, and it was assumed that she was heading back to the sea after laying her eggs. It was returned to an upright position and helped to enter the sea. The animal was 81 cm long, 61 cm wide, and weighed about 40 kg.

Fifteen turtle nests were detected between 26 February and 4 March 1999, and all but one had been damaged by predators. The only nest that was in good condition was then protected by fencing. It was observed that the predators would dig up the nests, bring the eggs to the surface and eat the yolks, leaving the shells at the top mixed with sand and easily visible. Most of the nests were damaged by predators due to the failure by authorities to locate them as they had been camouflaged by the turtles. Besides the above-mentioned nests, other damaged nests were found on 9 March, 11 March and 15 March 1999. However, 5 nests were located in good condition and protected by fencing. It was noted that nesting started at the end of February and continued until the end of March in the Mandarbaria nesting ground.

Only 3 nests were located during the breeding season in 2000, which was much less compared to the 23 nests found the previous year. The nesting was reduced to a great extent due to habitat destruction caused by erosion. Of the three nests, one was detected after damage by wild boars on 26 February. The other two nests were located on 15 February and 6 March and were fenced immediately for protection against damage by wild boars and lizards.

**Nesting**

The Olive Ridley turtle nests were located almost near the top of the gently sloping sandy beaches of Mandarbaria where the Behela and Koila canals meet the Bay of Bengal, which is very close to the Mandarbaria center of the west sanctuary. The turtles used to climb the beach in an almost perpendicular direction, as could be seen from the marks of flippers and plastrons. They started nesting in the eastern part of the beach and gradually moved towards the west. This was due to gradual erosion in the east and the formation of new beaches in the west. The nesting place was about 35 m to 90 m from the water line at low tide near the vegetation line, which was beyond the reach of high tide during the nesting time. The nesting site was composed of almost pure sand with waterborne debris and dry plant materials on the surface.

Nesting was done by turtles at night on the upper part of sloping beaches. It was observed that they used to select areas that were safe from inundation .There were 23 nests in 1999, out of which 18 were damaged by predators and the remaining 5 were protected by fencing until they hatched.

One fresh nest was located from visual observation of the turtle track on 4 March 1999. To confirm the nest, it was opened up to the top of the clutch. White, soft, almost round eggs of similar size and shape were observed. They were found 62 cm below ground level. The nest was closed again and fenced at once for protection.

After the eggs had been laid, the nests were closed by the turtles in a clever manner in order to hide them from the predators. The turtles used drifted debris and dry plant materials to camouflage the nests. The turtles returned to the water after closing the nests, taking a series of detours and disturbing the adjacent area in order to hide the route leading to the nest. This made it very difficult to locate the turtle nests, but the wild boars and lizards still managed to find them, despite all the efforts made by the turtles to hide the nests. The smell of the eggs may have helped the predators to find the nests.

To pinpoint suspected nests, a thin, strong, straight and slightly pointed stick was used. The

stick was pushed slowly through the compacted ground with force, and after a certain depth, if the stick started moving freely downward due to the difference in compactness, then the turtle nest was precisely located. There is a chance of damaging some eggs in searching for nests by this method. This method was used to detect the first nest on 4 April 1999, but later on it was discontinued. The other nests were found by following the tracks left by the turtles.

**Protection of Nests**

After the damage of 18 nests by predators in 1999, it was decided to build fences around the nests to protect the eggs. Five nests in 1999 and 2 nests in 2000 were located in good condition where fencing had been erected using locally available strong and straight saplings and branches of trees about 5 feet high and planted 2 feet deep under the ground at a spacing of 5 cm in a circular shape.

Misra (1998) also made similar fencing for the protection of the nests of Leatherback turtles. Barbed wires were also placed at a spacing of 30 cm around the fence. The fence was covered with a plastic net of fine mesh (used for catching shrimp fry) at the bottom to about 30 cm height as a precaution against any digging by predators and also to collect the hatchlings for measurement.

**Kachikhali Breeding Ground**

It was reported from Kachikhali center in the east sanctuary that there were flipper marks indicating four turtle routes on the beach near to a place known as Jamtala on 18 April 1999. But no traces of the nests could be found and therefore nothing is known about their nesting. This place is also inundated during the high tide of the full moon for a period of 4-6 days fortnightly during the breeding season. There was no nesting in the Kachikhali breeding ground in the year 2000.

**Results and Discussion**

Five protected nests were under constant observation during the 1999 nesting season. The first nest was located on 4 March and was expected to hatch within 60 days, but no hatchlings emerged when the time came. The nest was 40 m from the water line during low tide and was inundated by saline tidal water from the middle of April. The nest was also affected by erosion which had caused the shore line to be pushed back and the nest was pulled down to the middle of the slope.

The second nest was detected on 17 March. This nest was about 90 m from the water line during low tide and was very close to the vegetation line of Kash (*Saccharum spontaneum*). This nest was also inundated by saline tidal water from the end of April for a period of 4 days fortnightly. No hatchlings emerged from this nest either, as the eggs were damaged by the tide and sand deposits on the surface (15 cm) carried with the tide water.

The third nest was located on 20 March. This nest was about 50 m from the water line during low tide and was situated at a higher elevation. This nest was also inundated from the beginning of May by tidal water for a period of 4 days during the full moon tide and was also damaged due to erosion like the other nest.

The fifth nest was located on 22 March. This nest was situated at a higher elevation on a steeply sloping beach about 35 m from the water line during low tide, and was free from tidal inundation. It was inundated from the beginning of May during the full moon tide for a period of 6 days in a fortnight. There was sand deposited on the surface of the nest carried by the tidal water.

No hatchlings emerged from any of the nests. All the nests were opened on 6 June and rotten eggs were found. Dead hatchlings were found inside the shells in the first nest. The inundation, along with erosion and accretion, was responsible for total failure in the hatching of the eggs. This was supported by some other studies (Anon, 1998).

Observations of the nesting of Ridley turtle continued at the Mandarbaria nesting ground from February 2000. Two nests were located in

good condition on 15 February and 8 March 2000, which were designated as the number 1 and number 2 nests. One more nest was detected on 25 February 2000 in a damaged condition due to predation. The intact nests were protected by fences and placed under constant observation. These nests were located in raised areas in comparison to the previous year's nesting places, and were free from tidal inundation until hatching. Moreover, there were no natural calamities like cyclones during hatching time.

The hatchlings began to emerge from the number 1 nest on the night of 17 April and continued to emerge until 12 noon the next day. It took 63 days to complete the process from the laying of eggs to the emergence of the hatchlings. Altogether 54 hatchlings emerged from the nest. Of these, 8 died, possibly due to the high temperature (38.5°C) of the sandy ground. The remaining 46 hatchlings moved to the sea during the low tide swimming conditions.

The weight of the hatchlings varied from 16 to 18 gm. The average length was 7.4 cm. The average length of the front flippers and hind flippers were 3.5 cm and 2.0 cm respectively. The temperature inside the pit was 33.0°C, whereas the surface temperature varied between 34°C and 38.5°C and the air temperature was 37.0°C. At the end of the breeding season, the pit was opened and 15 more unhatched eggs were found, 14 of which were rotten, and one with a dead hatchling inside. The eggs were located at a depth of 60 cm from the surface. It was observed that the total of 69 eggs inside the nest was relatively low in comparison to the number of eggs in other nests. The pH inside the pit was 4.5 (*in situ*) and on the surface was 5.0 (*in situ*). The moisture content inside the pit was 60% (*in situ*) and on the surface was 50% (*in situ*). The salinity of the sea water was 5.85 gm/liter NaCl.

The hatchlings emerged from the number 2 nest on the night of 29 April. Forty-two hatchlings had emerged by 10.00 am the next day. A total of 43 hatchlings emerged from the nest and were released in the sea after the necessary measurements had been taken. The weight of the hatchlings was within the range of 15-18 gm. The average length of the hatchlings was 7.0 cm and the average length of the front and hind flippers was 3.97 cm and 2.1 cm respectively. The temperature inside the pit was 32.8°C while the ground surface temperature was 38°C and the air temperature was 37°C. The pit was opened after the end of the hatching period and 65 rotten eggs were found at a depth of 35 cm from the surface. Here, the depth of the clutch was relatively less than that of other nests. There was a total of 108 eggs in the nest. The pH inside the pit was 4.3 (*in situ*) and on the ground surface 5.0 (*in situ*). The moisture content inside the pit was 50% (in situ) and on the surface was 40% (*in situ*).

It was observed that the hatching of the eggs took 53 days after the location of the nest. But Saha (1984) reported that hatching took 59 days under artificial conditions. The hatching of eggs took 63 and 53 days for the number and number 2 nests respectively. So it is assumed that the number 2 nest was located a few days after nesting.

**Problems of Hatching Eggs in Sundarbans**

The following problems were observed in hatching eggs of the Olive Ridley turtles at Mandarbaria:

- Erosion and accretion of beaches create problems for incubating eggs as the habitat is destroyed by the washing away of the sand due to erosion and deposit of sand on the surface of the nest due to accretion. Normally the turtle nests are located at a higher elevation of the beach slope, free from inundation in the months of February and March. With the beginning of the monsoon in April, big waves and higher levels of tidal water push the shore line back toward the mangrove forests, pulling the nests to the middle of the slope, although it was initially located at the top of the shore.

- Depressions in the Bay of Bengal form cyclones which aggravate the erosion and accretion processes. This is also responsible

for the habitat destruction and inundation of the nests. There is no information about the occurrences of cyclones within the hatching period. There was a cyclone on 10 June 1999 in the Mandarbaria area. As a result, there was a big change in the terrain of the beach.

- Wild boars and lizards are the predators found at Mandarbaria that are responsible for damaging the nests. They damaged 18 nests out of 23 in 1999, and 1 nest out of 3 in 2000.

So the failure of hatching eggs is due to an unstable sea beach, the submergence of nests by saline tidal water due to depressions at sea, and the damaging of eggs by predators.

**Recommendations**

There is a need to adopt artificial breeding systems at Mandarbaria and Kachikhali centers of the sanctuary. The eggs should be shifted to sand beds in a raised place free from inundation close to the sea beach, which may be termed as a 'protected hatchery' so that the hatching process can be completed properly and the hatchlings can move to the sea conveniently. Moreover, sand boxes can be used to hatch eggs artificially under controlled conditions. There is need of further study regarding the artificial hatching of Olive Ridley turtle eggs.

Regular patrolling of the beach is needed during the nesting period which will help to locate the nests and to relocate eggs laid close to the water line to protected hatcheries. This will help to save the nests from inundation, natural calamities, and also from predation.

There should be a law for the compulsory use of Turtle Excluder Devices (TED) by trawlers engaged in trawling shrimps and other fish in the deep waters of the Bay of Bengal.

About 100 Ridley turtles are drowned every year in the drift nets and set bag nets used by the fishermen to catch fish. The turtles get caught in these nets and drown, or are brought to the shore in an exhausted condition, after which they eventually die. The incidental deaths of marine turtles caused by trawling nets, drift nets, set bag nets and hooks of longliners should be monitored by the Forest Divisions located in the coastal zones.

A public awareness campaign is also needed about pollution detrimental to the turtle population. The dumping of plastic, oil and toxic chemicals can cause the death of turtles. Many turtles eat plastic which resembles jellyfish, but becomes clogged in their intestines. Oil also obstructs the throat and jaws of immature turtles, leading to their death.

**Conclusion**

The Olive Ridley turtle is an endangered species. The turtle population in the Sundarbans coastal areas is declining due to the destruction of habitat by erosion and accretion, inundation of nests, predation by wild boars and lizards, and the killing of turtles by fishing nets. Appropriate measures are needed to save the turtles in the interest of biodiversity and ecological balance.

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