

IMPORTANCE OF TEMPERATURE MAINTAINANCE IN EX-SITU HATCHERY MANAGEMENT

(A TREE Foundation and Wildlife Wing of the Forest Department Joint Community ,Sea Turtle Conservation Program- 2007)

A Report

10-05-07

It is a known fact that the incubation temperature affects the sex ratio of hatchlings in sea turtles. The term "Threshold temperature" is used to describe incubation temperature at which the sex ratio occurs.

The incubation of eggs takes place between two different temperatures [26°C - 30°C] and [31°C - 36°C]. The pivotal temperatures for sex determination are $87\text{-}89\text{ F}$ [31°C - 33°C] at Playa Nan cite ;about 84 F [29°C] at Gahirmatha, India. In Costa Rica, temperature of 90 F [32°C] and higher produced hatchlings that are 100% female hatchlings. In India the temperature of 86 C [31°C] and above upto 35°C , produced 100% females. It takes 48-55 days for an egg to hatch depending upon nest temperature.

The study on nesting ecology and adult mortality of Olive ridley in five selected villages along the Chennai coast was studied from December to April, 30th 2006. The first nest was recorded on December 20th 2006 and similarly the last one on March 26th 2007, with a total of 107 nests, being recorded during this period. Peak nesting was recorded during February- with 40 nests, including 16 In-situ nests. There were 12 false crawl tracks. Following nest numbers were recorded in the said five villages: Periyar Neelangarai -20, Injambakkam-19, Panaiyur-20, Nainar Kuppam-35, and Reddy Kuppam-11 (In-situ) during this period predators, such as Crabs and Feral dogs were noticed. There was no poaching in these areas.

The hatchling emergence started from the 8th February 2007, onwards and the 'Hatchlings success' numbers were systematically and scientifically documented.

Determined after seeing the dismal results of hatchling mortality from late April onwards last year, TREE Foundation's KAP members wanted to ensure that all hatchlings emerge successfully this year. The last few nests showed the disappointing sight of eggs which looked like hard-boiled eggs and pipped hatchlings dead in their shells. Showing that the efforts of the KAP members went a waste!

Taking extra initiative and effort the KAP members followed the instructions of Dr. Supraja Dharini, who was advised by Dr Kartik Shanker Turtle Biologist IISc , Bangalore and Dr. Colin J. Limpus, senior Turtle Biologist (Professor at University of Queensland, Australia) working at Malaysia and Philippines ,on the importance of temperature mantainance. Loosely woven coconut leaves ('thatch roof ') were placed over the hatchery (all the leaves were taken from the respective villages and weaved by the old men of the same villages). This method was put into practice beginning March 15th, 2007. Temperatures were periodically checked and recorded with a thermometer placed at the depth of 10 inches below the surface. During the period from 17th March-7th April, the day temperatures ranged from 28 C (at 7a.m.), while the afternoon temperatures ranged

from 30 C-31 C and the night temperatures ranged from 30 C-31 C (at 9 p.m.) within the hatchery. From 14th April onwards, the morning temperatures ranged from 29 C -30 C, afternoon it's ranged between 32 C-33 C and night 31 C-32 C.

This method ensured that temperature regulation would result in better hatchling success. Hatchlings usually begin to emerge from the nest two to three days after hatching begins. Hatchlings should be released into the sea in groups immediately after emergence, preferably at different times of the night owing to temperature variance (27^oC-30^o C).

On the 25th of April 2007, between 7:00 p.m to 9:30 p.m., we witnessed the optimum numbers of 395 hatchlings spontaneously teeming out of four nests, in a crowded frenzy, from Periyar Neelangarai hatchery. Nothing can equal the sight of all those tiny hatchlings scurrying hurriedly, eager to ride the surf. It was a sheer celebration of the survival of life. Lessons learnt were that the thatch proved to be efficient and successful in reducing temperatures during the day and not letting the high temperatures make the nests a furnace.

As per observations, it was noticed that most of the hatchlings that emerged during this period were well-formed, healthy and very active. They lacked any kind of noticeable physical deformity and handicaps. On checking the residual nest contents, one observed that there were hardly any dead- pipped hatchlings. The remnants of the nest had only a few infertile eggs. Moreover, it was observed that the nests with more that a hundred eggs indicated a high mortality-rate in the middle of the season.

While in Periyar Neelangarai, our KAP member and Sea Turtle Guard (Wildlife Wing of the Forest Department.) Mr.Pugalarasu, decided to place the nests with larger numbers in wider nests than the normal natural nests. Usual practice is to place the nests in the same proportion (depth and breadth) which the female turtle had dug and his experiment had proved to be successful. Out of 165 eggs placed in the nest 148 hatchlings had emerged successfully with only 17 infertile eggs remaining.

It is heartening to see the observations made and the dedication of the KAP members involved in the Sea turtle Conservation. As on today 8,791 hatchlings have been released into the ocean .The appointment of 8 KAP members as Turtle Guards by Mr Ashish Kumar Srivastava IFS , Wildlife Warden has encouraged the KAP members to get more involved in conservation.

2006

VILLAGES	TOTAL NO.OF NESTS	TOTAL NO. OF EGGS	TOTAL NO.OF HATCHLINGS	TOTAL NO.OF HEAD OUT HATCHLINGS	TOTAL NO. OF DEAD HATCHLINGS	TOTAL NO OF UN-DEVELOPED EGGS	%
<u>PERIYA NEELANGARAI</u>	1	109	--	--	--	109	0
<u>INJAMBAKKAM</u>	--	--	--	--	--	--	-
<u>PANAIYUR</u>	8	923	91	120	57	655	9.85
<u>NAINAR KUPPAM</u>	9	997	310	26	69	592	31.09
<u>REDDY KUPPAM</u>	--	--	--	--	--	--	--
TOTAL	18	2,029	401	146	126	1,356	-

On checking the undeveloped the eggs we found most of the eggs were like boiled eggs and the others had embryos which had died(embryonic death)

2007

VILLAGES	TOTAL NO. OF NESTS	TOTAL NO. OF EGGS	TOTAL NO OF HATCHLINGS	TOTAL .NO OF HEAD OUT HATCHLINGS	TOTAL NO. OF DEAD HATCHLINGS	TOTAL NO OF UN-DEVELOPED EGGS	%
<u>PERIYA NEELANGARAI</u>	5	609	525	15	6	63	86.20
<u>INJAMBAKKAM</u>	1	100	93	4	--	3	93
<u>PANAIYUR</u>	2	214	144	18	25	27	67.28
<u>NAINARKUPPAM</u>	11	1040	950	78	18	94	91.43
<u>REDDYKUPPAM</u>	--	--	--	--	--	--	--
TOTAL	19	1,963	1,716	115	49	187	-



2007

TOTAL NESTS =107
TOTAL EGGS = 10,980
TOTAL HATCHLINGS = 8,791*
TOTAL (INSITU) = 11 +6 +4+4+3

(* 5 IN-SITU NESTS LOST TO STRAY DOGS)



2006

TOTAL NESTS =90
TOTAL EGGS =10,273
TOTAL HATCHLINGS=8,821
TOTAL (INSITU) =4+5+5+2

Swimming Efficiency of newly emerged Olive Ridley Hatchlings- Chennai

Olive Ridley **Hatchlings** spend the first few days of their lives swimming out to sea and feeding opportunistically on animals such as ctenophores (small jelly-like creatures) and tiny larval crabs and shrimps. As they still carry some yolk inside their bodies which will be a reserve supply of food for up to two weeks. After few days they are far away from the shore and beyond the reach of their worst predators (fish of all kinds, frigate birds, gulls) who patrol the beach.

After hatching, the baby turtles race to the sea where it would spend the next few days in an active and frenzied swimming effort, trying to get beyond the breakers to the phelegic sargassum rafts. From this point, hatchlings are passively carried by oceans currents,

Hatchlings that reach the surf line keep crawling because the first wave or two usually drag them backward and leave them on the sand. Soon bigger waves lift them into the sea. Some of them begin to swim and dive towards the bottom, where they will be captured by the undertow and dragged in deeper. Females (hatchlings) will not return to the beach till a decade or more and the males never come back. Sea turtles' brain contains Magnetite (iron compound) whereby they can sense the Earth's magnetic field because the magnetite molecule is drawn to the North Pole like a needle in a compass and brain cells can sense that pull easily. As, they swim into the waves they are able to detect the direction in which they are heading .They probably use Magnetic navigation from that point onward ,whether moving about at sea ,or many years later finding their way back to the nesting beach where they hatched .

On 10th April 2007 when the KAP members Gnanashekhar and Mahesh, released the newly emerged hatchlings, at approximately 5:30 p.m., it was observed by another KAP member Vijayabharti that the hatchlings, released near the shore, had got caught in his sardine net. He not only released them immediately but also , made note of the spot and later on measured the distance to be 200 meters from the place of release to the place of entanglement .This was observed with the help of thin nylon thread. The 15 hatchlings had taken 10 minutes to swim to a distance of 200 meters.

In order to know the swimming efficiency of a hatchling weighing a mere 35gms-50 gms (Weight) and measuring about 6-7 cms, the KAP members undertook the following observation. Two weeks later on 26th April 2007, KAP members along with Dr. Supraja Dharini Chairperson TREE Foundation sailed alongside two hatchlings on a fiber glass boat and observed the hatchlings riding the waves. Swimming only on the surface taking small breaths at different intervals. It was also observed that on entering the water, the hatchlings were observed to be taking in gulps of water. Both the hatchlings swam in different directions and most of the time were led by the strong currents of the Ocean. We observed that the hatchlings swam for only a few minutes at a time. When they were not swimming, they would fold their flippers along their sides and rest floating in the ocean's strong currents.

It was extremely disheartening for the KAP members to see the little hatchlings swimming

against all odds to reach the strange, dangerous and unknown place called home, with no one to guide them through their arduous journey.

