

IND/97/964

# GOI – UNDP Sea turtle project

## Marine turtle nesting along the coast of Karnataka – a status survey

June 2002

Dr. B.K. Sharath

University of Mysore at Hassan



undp



भारतीय वन्यजीव संस्थान  
Wildlife Institute of India



MoEF, Government of India

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**Sea Wall along the high tide line**



**Sea Wall is made up of boulders**



**Fishermen Village**

**Threats for the survival of marine turtles along Coastal Karnataka**



Fig. 1. Map of Uttara Kannada District, Karnataka showing the Olive Ridley nesting sites. The sea wall is also shown in red.



Fig. 2. Coastal map of Dhakshina Kannada District of Karnataka showing Olive Ridley nesting sites and the sea walls.

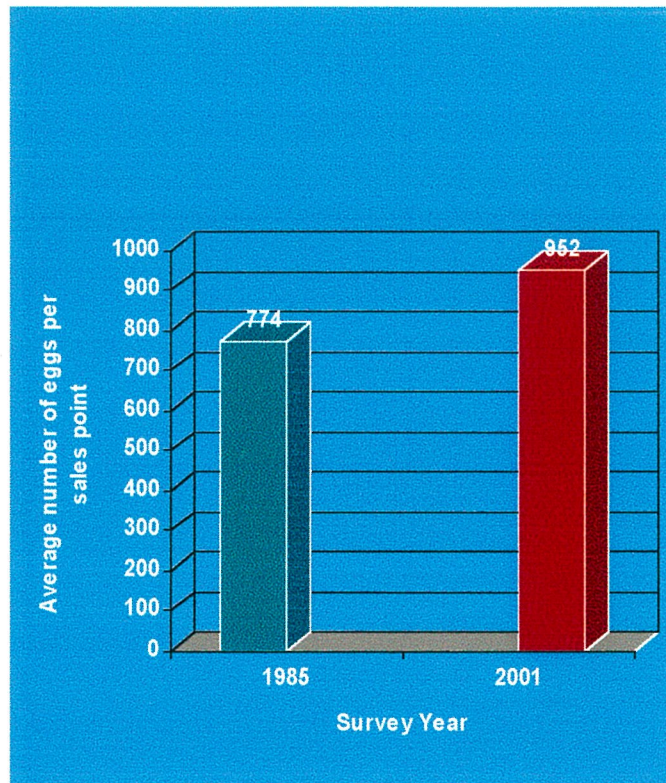


Figure 3. Chart showing the marine turtle eggs sales in Karnataka.

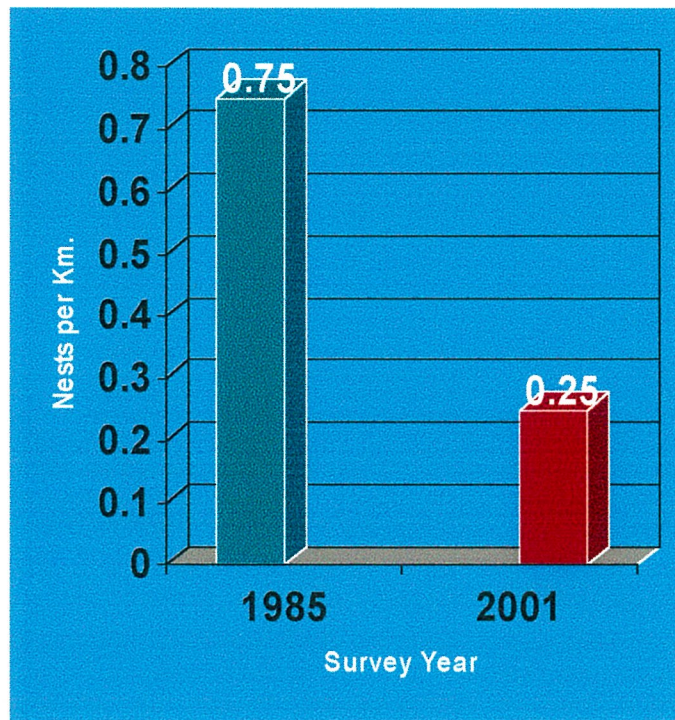


Figure 4. Chart showing the nesting densities of Olive Ridley's turtle in Karnataka.

## ACKNOWLEDGEMENTS

This work would not have been possible but for the support of Dr. B.C.Choudury, Wildlife Institute of India, Dehera Dhun. I would like to thank Dr. Jack Frazier and Dr. Karthik Sharnker for their valuable suggestions and help. I thank Sri. P.C. Chakravorty, chief wildlife warden, Karnataka Forest Department for the permission and departmental support. The Deputy conservators of forest, Mangalore, Coondapur, Honnavar and Karwar have supported the project in the field. This study was funded by the UNDP as part of the GOI-UNDP sea turtle project. The Wildlife institute of India was responsible for realising this project as the nodal agency. This study was supported locally by the fishing folks especially Yogesh. Mr. Charles Paul of Mangalore has worked for the success of this project. Dr. Urala of Saligrama, Dr. Malli of Coondapur have accorded their wholehearted support for this study. I would record my gratitude to them. The biology staffs of the various colleges in coastal Karnataka have devoted their valuable time for the project. My respectful thanks to Prof. S.N. Hegde, Vice-Chancellor, University of Mysore and Prof. Y. Dongre, Director Hemagangothri for their support and permission. I thank my wife Savitha and son Amogha for their endurance during the course of the fieldwork.



# **The status survey of the marine turtle nesting along the coast of Karnataka**

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## **EXECUTIVE SUMMARY:**

Extensive survey of the west coast from Ullal in the south to Karwar in the North was conducted. Sporadic nesting of Olive riddley's was observed during September and October in the available habitats all along the coast. A distance of 260 km of coast was first surveyed to document the coast type and map the coast. I found that 40 sites were sandy six sites were rocky. Mangroves, vegetation and sand pits were found in and around Coondapur. However only 12 km of the coast was uninhabited and suitable for turtle nesting. It was interesting to note that in the Districts of Dhakshina Kannada and Udupi, the 'Marakalas', the fishing community of the Hindus did not eat adult turtles. The principle threat for the survival of the olive Ridleys in Karnataka is manmade modification of the seacoast and rendering it unsuitable for turtles nesting. An important modification is the construction of anti erosion sea walls along the high tide line. Collection of eggs from the nests by fishermen communities was another threat. The streetlight from the roads along the coast was observed along most of the coastline, which would disorient the hatchling. Not very many incidents of drowning of adults as after they were released from fishing nets were recorded in my study. At the end of the study four NGOs were initiated to take up conservation activity. A community based turtle conservation

protocol was developed and tried out in Mangalore. This trial was conducted in the Bengre beach along Mangalore coast. Finally I was able to make a comparison of the survey data of 1983-84 and this study to evaluate the trend in the status of the marine turtles along the coast of the Karnataka

## INTRODUCTION

Karnataka has a 260 km long coastline, which is heavily populated with fishermen. Numerous fishermen villages are located all along the beach. Many minor ports offer services to the thousands of fishing boats that go into the sea for fishing. Most of the fishing boats are mechanised trawler boats and purse in boats. Tiles factories are located along the estuarine regions of Mangalore, Coondapur, and Honnavar. Seafood processing factories, and ice plants are common all along the coast.

Olive Ridley is the only species of sea turtles that nest along the coast of Karnataka. However, stray reports of a large turtle are from small islands off Honnavar coast. The nesting is sporadic, mass nesting in rookeries like the ones in Orissa is not seen anywhere in Karnataka. Most of the fishermen folk do not use turtle meat but they eat the eggs of the turtles. Turtle eggs are available for sale at Rs. 2.25 to Rs. 4.00 per egg. The local fishermen believe that when the set off to fish in the morning if they see the emerging turtle hatchlings then it is bad luck and they would have poor catch that day. They also believe that turtles come to nest during full moon days when a halo ('Tattra') around the moon appears, which is due to moisture in the air.

During the period from October 1984 to March 1985 the author studied the nesting frequency of the Olive Ridleys in the coast between Mangalore to Mukka (16km). A captive breeding operation at Bengre beach was organized leading to the release of 2560 hatchlings (Sharath et.al., 1986). Later the Karnataka forest department in 1985 organised captive breeding programs in three different locations leading to the release of as many as 15000 hatchlings (Appayya, 1985). According to these studies nesting density at Bengre in 1985 was 0.75 per Km. whereas, the market survey report was 774 eggs from one sales point in Mangalore.

## **STUDY AREA**

The coastline of Karnataka is highly disturbed due to different anthropogenic activities. The three coastal districts of the state are Dhakshina Kannada (DK) is the southern most district with Mangalore its headquarters and borders with Kerala to the south; Udupi is the newly formed district which for the purpose of this report will be included as part of DK; Uttar Kannada district (UK) is the Northern most district of the state and borders with Goa in the North. Running parallel to the coastline about 50 km from the sea is a mountain range called the Western Ghats. These mountain tracks ranging from 3000ft above the sea level to 6000ft elevation influences the climate system of the state. The Western Ghats receives heavy rainfall (average annual rainfall of about 5000 mm) and is a catchments area for all the south Indian rivers. Some of them flow eastwards to join the Bay of

Bengal whereas many of them flow to the west and join the Arabian Sea. Hence there are numerous west flowing rivers joining the sea in Karnataka. Out of the fifteen major rivers in DK and four in UK join the Arabian Sea, the Nethravathi, Sharavathi and Kali are important ones. The river mouths form estuarine region some of them supports mangrove vegetation, which is disturbed due to human activities. The major mangrove vegetation is in Coondapur where Kollur, Chakra and Haladi rivers join the sea.

Except for a few areas along the coast, the entire coastline is disturbed due to fishing activities, industry and housing. Roads and streetlights are right on the beach, which disturb the turtle-nesting habitat. Some places like Sasihithlu where the R. Shambavi joins the sea are less disturbed. The beach within the gaps of the sea wall in Maravanthe seems to be less disturbed. A couple of rocky islands with sandy beaches off the Karwar shores are less disturbed.

Due to the raising water line the sea erosion is seen all along the coast. It is severe in some areas where the settlements are near the shoreline. To combat this situation the government is building sea walls (ref) along the sandy beach. Large boulders of granite are dumped 30m to 40m away from the low tide line along the shore to create a 5m to 8m high heavy wall. Unfortunately, in most of the places this wall is exactly where the turtles nest.

## METHODS

### *Coastline mapping*

Most of the beaches along Karnataka are rocky and unsuitable for the turtles to nest. The 260 km long coast of Karnataka was surveyed. The whole coast was classified into three categories and their status (Table 1). A map of the coastline showing the different types of the shores were made.

**Table 1. Classes of beaches and their status.**

Type of beach	status
Rocky	Village
	Sea wall
	Road
	Industry
	Mangrove
Sandy	Village
	Sea wall
	Road
	Industry
	Mangrove
Port	Fishing
	Shipping

### *Nesting survey*

A preliminary survey was conducted to locate the principle nesting sites of the Olive ridley. The survey was based on interviews of knowledgeable people living along the coast, most of whom were fishermen and some were naturalists.

Based on the above preliminary survey beach walks were organised. Local students were motivated to take up these activities. Students from St. Aloysius College and Canara College in Mangalore, Govindadas College, Surathkal, Vijaya College Mulki, Poornaprajna and MGM colleges in Udupi, Bhandarkars College in Coondapur took active participation in the survey. A team of 5 students walked the beach for two hours in the early hours of morning. Some NGOs like the flora fauna club in Coondapur, animal care trust in Mangalore were also involved in the beach walks. Nesting sites, stolen nests and predators were recorded during these walks.

Transects of 8 km each were run at three selected beaches namely Mangalore, Maravanthe and Murdeshwar. Each transects were sampled by a team of five men - one local, three students and the investigator. Sampling was repeated three times during the study period. Hence effectively 72 km were sampled. Care was taken to ensure that the repetitions were evenly spread during the nesting season. Thus three transects were sampled once in the first week of November, December and January 2001.

### ***Turtle eggs market survey***

Turtle eggs used to be sold openly in fish markets during the 80's. To determine the status of this market a market survey was conducted. Apart from interview of people to find if the turtle eggs were sold students went to the markets in the guise of turtle egg buyers and purchased them only to determine its costs.

### ***Incidental deaths in the fishing net***

Interviews of fishermen were conducted to find out the rate of incidental catches of adults during fishing operations. Carcase and mortal remains were searched in the fishermen villages to estimate the rate of death due to incidental catch of the adult turtle.

## **RESULTS**

The survey resulted in identifying nesting of only one species of marine turtles Olive Ridley (Ref). Although there are reports of green turtle and hawksbill turtle from the islands off the coast and from fishermen who go deep sea fishing further confirmation is required.

A total of 35 beaches were visited to determine their status. Fishermen villages were found in all the beaches excepting 5 beaches where wild flora was observed. However, these areas are already earmarked for developing tourism and recreational activities. Table 2 gives the status of the beaches that were visited during the survey.

**Table 2. Status of the beaches along coastal Karnataka.**

Type of beach	Status	Number of sites along the Karnataka coast
Rocky	Beach	6
	Sea wall	Nil
	Road	8
	Industry	2
	Mangrove	Nil
Sandy	Beach	Numerous
	Sea wall	>16
	Road	Numerous
	Industry	13
	Mangrove	12
Port	Fishing	>17
	Shipping	8

**Table 3. Olive Ridley nesting sites in Dhakshina Kannada district of Karnataka.**

Sl. No.	Occasional nesting sites	Frequent nesting sites
1	Padubidri	Talapadi
2	Hejmadi	Ullal
3	Yermal	Tanneeru bavi
4	Moodubella	Bengre
5	Katpadi	Panaboor .
6	Udyavara	Haleangadi
7	St Mary's island	Pavanje
8	Hangarakatte	Pangala
9	Kota	Ambalpadi
10	Voderahobli	Koteshwara
11	Uppunda	Gangolli
12		Maravanthe .
13		Kerimanjeshwara
14		Kambadakone
15		Sirur
16		Bainduru

Preliminary survey to determine the nesting sites along the coast of Karnataka yielded 13 sites in UK (Table 4) and 27 in DK (Table 3). Some of them are sites where nesting is observed every year and is common where as in others nesting is occasional and is not seen every year. However, Ridley's turtle nesting in Karnataka is sporadic and no mass nesting rookeries are observed. It was also observed that the nesting season started just after the heavy monsoon in end of September and lasted up to January.

**Table 4. Nesting sites in Uttar Kannada district, Karnataka**

Sl. No.	Occasional nesting sites	Frequent nesting sites
1	Sirali	Bhatkal
2	Kaikini	Murdeshwara
3	Gunavanthe	Kumta
4	Maki	Amadalli
5	Karsarkod	Chandya
6	Kadri	Majali
7	Gokarna	

Seventy-two transect samples were recorded in the study area in the nesting season of one year. One transect was laid at Bengre in Mangalore, another at Maravanthe in Coondapur and the third at off Murdeshwar in UK.

In DK 48 km were sampled and 12 nests were located and the average clutch size was 98. The nesting density was calculated to be 0.25 (Table 5). Whereas in UK only 24 km were sampled and 8 nests were

located the average clutch size was 105. The nesting density in UK was 0.33. Thus overall in Karnataka 20 nests were located in a pooled sampling of 72 km and the density was estimated to be 0.28 (Table 5).

A market survey was conducted to estimate the turtle eggs that were sold in different markets. Most of them were not open markets but were individual sale points. Out of the six sale points that were surveyed in DK a total of 7056 eggs were collected. Whereas in UK four sale points were visited and 2912 eggs were collected (Table 6). The eggs that were collected were used to try out the semi conservative method of hatching the eggs in Bengre.

**Table 5. Results of the transect analysis of the coast of Karnataka in 2001.**

District	Coast line	Distance sampled	Nests located	Density	Average clutch size
DK	130	48	12	0.25	98
UK		24	8	0.33	105
	116				
Total...	260	72	20	0.28	

Pooled data three repetitions of three beaches transects, 8 km each.

**Table 6. Estimation of turtle eggs sold in different sale points in Karnataka.**

District	Number of markets surveyed	Average number of eggs per sale point
DK	6	1176
UK	4	728
Total...	10	1904

### ***Accidental capture data***

Most of the fishermen discarded accidental captures of sea turtles without checking for their condition. However, we found many carcasses and skulls of Olive Ridley turtle during our survey especially in DK district. Reports of dead turtle washing off the shore are common among fishermen. These deaths are probably due to the drowning of turtles when they are thrown away from the nets. Reports of people eating turtle meat are not very common, Hindu fishermen do not eat turtle meat in UK as they consider the turtle as an avatar of lord Vishnu.

## **THREAT EVALUATION**

Based on this survey it is evident that nest snatching by men is the major threat to the incubating eggs. The local people had stole most of the nests that we located. Modification of the coastline is another threat for the successful breeding of these turtles. The fishermen villages all along the coast line most of the houses are right where the turtle would lay eggs. Building of roads on the beach is also a reason for the destruction of the nesting ground of these turtles. The streetlight that lights up the whole beach is certainly a threat to the emerging young ones. Building of sea wall is yet another serious threat to the survival of these species. These are the main reasons for reduction in nesting over the years.

## Nest snatching

Local fishermen visit the beach during the early hours of the morning and look for turtle nests. Each such person collects 500 to 1500 eggs in a week's time. Most of the nests that we located during the transect sampling were already stolen by the villagers (Table 7).

**Table 7. Nest snatching by local people.**

District	Nests located	Number of nests snatched	%Age of eggs snatched
DK	12	10	83.33%
UK	8	4	50%
Total...	20	14	70%

## Dense fishermen settlement

Most of the fishermen villages are located right on the beach. The main road always runs along the beach at a distance of 10 to 20 m from the high tide line. These roads are light with sodium vapor lamps and halogen lamps. At two places along the DK coast we saw 1000w halogen lamp directed into the beach. The nesting season also happens to be festival season for the fishermen especially the 'Karthik' month of the Indian calendar, when the village is lit up with lamps and electric decorations.

We also saw three occasions when dogs dug out the nest. The villages are known for their sturdy dogs and all the houses have pet dogs.

These dogs accompany their masters searching for eggs and later they go on their own search expeditions. During the hatching season we saw dogs looking for emerging turtles which were devoured by dogs preferentially.

## **Sea walls**

Sea erosion is a major problem of the fishermen living along the coast of Karnataka. The erosion is so intense that hundreds of houses are lost each year. The problem reaches its climax during the monsoon when the SW monsoon winds swells up the sea, which washes off houses and belongings of the fishermen. Politically lot of weight is attributed to this problem and the state administration spends corers of rupees in building sea walls to combat this problem (ref fig). In just one region between Surathkal and Mulki the government has spent 3.5 corers in one year.

Large boulders measuring around one meter cube, of granite are dumped 30m to 40m away from the low tide line along the shore to create a 5m to 8m high heavy wall. We estimated a distance of about 28 km of such wall in DK, out of which 10km length is lower than the high tide line. Which means that the water level touches the wall during high tide. Unfortunately, in most of the places this wall is exactly where the turtles nest. However, some walls could be avoided as they are much inland.

## **Naval base**

The naval sea base nick named '**sea bird**' is proposed to be near Karwar. Since the project is of national priority the fact that the site was a very good turtle nesting site was overlooked. Construction operations have altered the beach and have rendered it unsuitable for the turtles to nest.

## **Adult mortality**

Reports of carcass of Olive Ridleys (*Lepidochelys olivacea*) are quite common along the shores of DK. We have examined shells of Hawksbill (*Eretmochelys imbricata*) in fishermen's private collections said to be found in the beach during the year 2000. It is common that fishermen report of sighting carcasses of adult turtles floating in the sea.

## ***Community based conservation program – protocol***

Currently conservationists in India believe that people's participation is essential for any conservation efforts to be productive. After the present survey I am convinced that marine turtle conservation is impracticable without the involvement of the local community. However large-scale captive breeding programs have their own drawbacks and shortcomings. Hence I developed a semi captive breeding program, which is run by the local community. I tested this protocol at the Bengre beach in Managlore by involving a local fishermen youth named Yogesh.

The protocol was executed at Bengre site. Bengre is a sand pit off the coast of Mangalore caused due to the confluence of R. Nethravathi and R. Gurupur (fig), which together joins the sea at this point. There is a narrow strip of land that joins the sand pit to the main land at Panambur. Three communities of fishermen live here, the 'Marakalas' belonging to the Hindu community, Moslems and the Christians. I selected this area to execute the protocol because I had enough knowledge of the people living in Bengre. The area is a good nesting site (Sharath et.al., 1986) for Olive Ridley and is logistically convenient.

### **Motivation**

I organized slide shows and talks on the biology of the marine turtle. Emphasis was given to the natal homing behavior and the temperature dependent sex determination. Facts like their long breeding cycles; long distance migrations; their feeding grounds and breeding grounds; their vulnerability to deaths while fishing etc. were narrated during these talks. Opportunity to discuss about the ecology of turtles was created so that people could learn about the myths associated with the turtles.

Care was taken to organize the talks in locations where the youth in the fishing community would attend the program. These talks were organized with the cooperation of local teachers, post masters and youth leaders, in a few places local nature clubs in colleges were also involved.

## **Beach walks**

Beach walks were organized in the early hours of the morning to selected youth and to other college students and staff. The idea of the beach walks was education and popularization of the concept of marine turtle conservation. The purpose of the talk and the beach walks were also to identify one or two youth living along the beach and were keen to learn about the conservation of these turtles. At the end of my programs I was able to short list five youth. Since I had decided to conduct the experiment at Mangalore for logistic convenience I selected Yogesh, a fishermen youth who lived in Bengre.

## **Insitu protection**

Yogesh was assigned a task of surveillance of the 8 km beach every day. He was given metal cages (Figure 1) measuring 4 feet by 4 feet and has four spikes of 3 feet each that would anchor the cage in the sand. Yogesh sited 3 nests during the season and two cages were planted around the nest. The third nest was covered with a bamboo cage, which later collapsed.

The cage has a notice depicting the name and address of Yogesh, there is also a small door and lock. The purpose of the door and the lock is to create a psychological fear in the minds of the intruder so that he would hesitate to pull it away. Moreover all the intruders would know Yogesh well and would not harm his belongings.

### **Maintenance of the cage**

Yogesh was given data sheets to record the date and time of nesting he would also record if he had any observation regarding the cage. Basically he would keep watch and ward of the cage daily. I arranged for a small notice board in front of his house, which would carry photographs of the turtle and posters of the marine turtles. There would be small write-ups for the local people about the turtles from time to time.

### **Release of hatchlings**

At the time of hatching Yogesh was very careful to visit the cage early in the morning. When the hatchlings emerged he lifted the cage and let go the young, protecting them from stray streetlights, dogs, and other predators until they reached the water. He would record the number of hatchlings that emerged. Any other observation he would note.

### **Future**

This protocol was a success in that it involved the local community who were educated and would conserve turtle. This protocol takes care of the problem of temperature and other ecology related problems in a mass captive breeding program.

Such activity can be initiated in a more effective and community participatory approach with a little financially support. The cost effectiveness

of this protocol for the conservation of the turtles is immense. Although it does not have tourism interest it is highly conservation oriented.

Based on this experiment I suggest that in future a community conservation center for sea turtles (CCC) be set up in Mangalore. This center will coordinate this semi-captive breeding program in at least 5 sites in Karnataka. Each site will have to begin with 10 metal cages and two local youth workers. The local youth workers may be rewarded with some monetary incentives so that conservation will not be a financial burden on them. Small interpretation centers must be set up along these sites so that local people and students may visit these centers for education and recreational purposes. Literature and reading material must be supplied to them. Once such centers operate for a couple of years then other conservation activity like the use of TEDs etc must be initiated through these motivated youth.

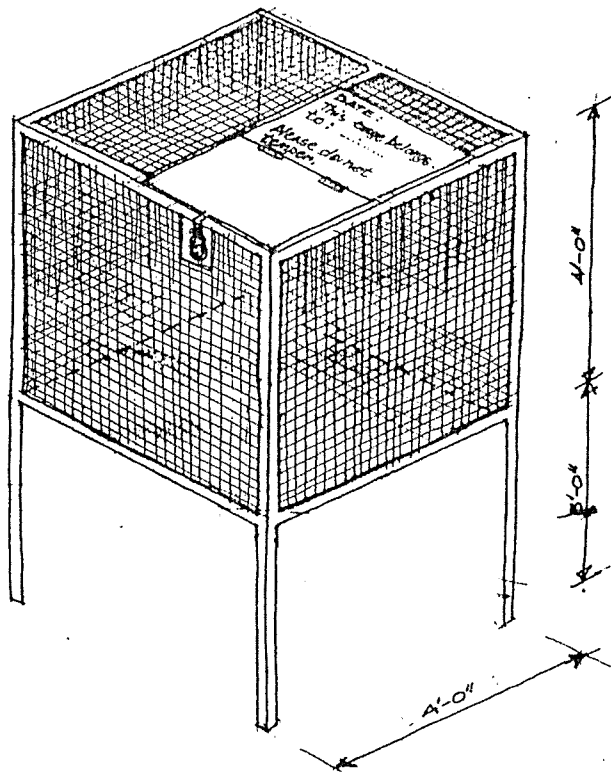


Figure 1. Drawing showing the metal cage used to protect the turtle nest.

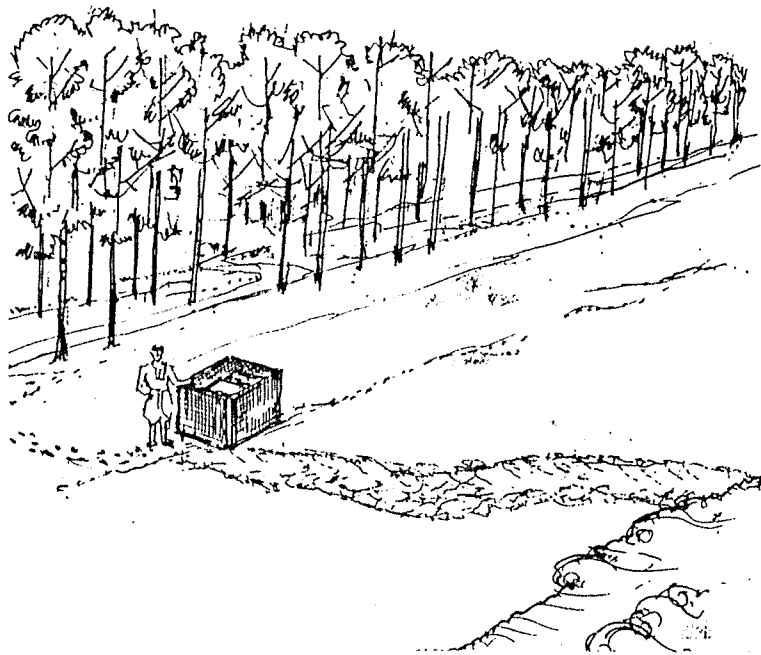


Figure 2. Schematic representation of laying the metal cage.

## DISCUSSION

The marine turtle population along the coast of Karnataka is fast declining. As evidenced by the reduction in nesting densities when compared to 1985 data (Figure 4.) the nesting along the coast has reduced. Due to more than one anthropogenic reasons the nesting has declined. It is noteworthy that the eggs sales though has changed locality has increased in numbers (Figure 3.). The main threat for the decline is nest stealing; sea wall construction and other nesting site modifications; increased dog predation of the hatchlings; street light distraction of the hatchlings. The adult mortality rate is still high as the fishing boats refuse to use TEDs.

## ACCOMPLISHMENTS

### *Community based conservation protocol*

The development and testing of the community based conservation protocol was one of the important accomplishments of this project. The estimation of the nesting density and its comparison to the 1985 data is yet another information that will be useful to the conservation of marine turtles in Karnataka.

### ***Education***

The talks and slide shows organized as part of this project has increased the level of education in the public especially the fishing folks. Articles in local language and local newspapers were of educative value to the local public.

Networks of people and NGOs who are keen to conserve the marine turtle have been identified contact established. The network will be of use for future conservation work.

### **ACKNOWLEDGEMENTS**

This work would not have been possible but for the support of Dr. B.C.Choudury, Wildlife Institute of India, Dehera Dhun. I would like to thank Dr. Jack Frazier and Dr. Karthik Sharnker for their valuable suggestions and help. I thank Sri. P.C. Chakravorty, chief wildlife warden, Karnataka Forest Department for the permission and departmental support. The Deputy conservators of forest, Mangalore, Coondapur, Honnavar and Karwar have supported the project in the field. This study was funded by the UNDP as part of the GOI-UNDP sea turtle project. The Wildlife institute of India was responsible for realising this project as the nodal agency. This study was supported locally by the fishing folks especially Yogesh. Mr. Charles Paul of Mangalore has worked for the success of this project. Dr. Urala of Saligrama, Dr. Malli of Coondapur have accorded their wholehearted support

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