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SEA TURTLES

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**CENTRAL MARINE FISHERIES RESEARCH INSTITUTE
COCHIN, INDIA**

INDIAN COUNCIL OF AGRICULTURAL RESEARCH

SEA TURTLES OF INDIA — NEED FOR A CRASH PROGRAMME ON CONSERVATION AND EFFECTIVE MANAGEMENT OF THE RESOURCE

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Introduction

Great interest is now focussed on the study of sea turtle resources in our Exclusive Economic Zone to develop proper conservation and management measures. The turning point has been the promulgation of the Indian Wildlife (Protection) Act (1972) wherein all species of marine turtles have been placed as endangered species in Schedule I and are thereby completely protected. Nevertheless, there has been a subsistence fishery for the Green turtle and the Olive Ridley, the former in the Gulf of Mannar and the latter as a much larger directed fishery along the Orissa and West Bengal Coast primarily to cater to the Calcutta market. The 1980-'83 period has seen a phasing out of these directed activities. However, poaching in limited scale cannot be ruled out in some areas along our coast where people have been "addicted" to eating turtle meat or taking turtle blood as an efficacious remedy for certain ailments.

A major threat today is the incidental catch of turtles in gill net and trawl fishing operations. The last two years have seen large numbers of live turtles thus caught either being mutilated and removed from the nets and thrown out in the open sea to be washed ashore dead or where gill nets are used over long hours the animals 'drown' and the carcass thrown out is again washed ashore. We have to find feasible ways and means of regulating fishing activity during periods when turtles congregate close to inshore. Implementation of such management measures, though it may take time, should be pursued vigorously combined with an intensive extension programme on conservation. It is our responsibility to make the artisanal fishermen who may be involved in small-scale operations aware of the need for the protection and propagation of these animals.

On and off we have reports, particularly along south Tamil Nadu and Kerala Coast about turtle poisoning mainly caused by eating the meat of the hawk-bill *Eretmochelys imbricata* during certain seasons.

All these point to the need for developing a good monitoring system for understanding the resource, advancing our knowledge on the biology, life history and behaviour of turtles and utilising the information for developing proper management strategies. It is with this view that at the recent National Workshop on the Acquisition and Dissemination of Data on Marine Living resources of Indian Seas (*Mar. Fish. Infor. Serv. T & E Ser. No. 46, January 1983*), an important recommendation was made on the need for collecting data on endangered and rare marine species such as turtles and Cetaceans reading as follows:

"The Workshop,

noting that the populations of certain valuable species in the sea are showing decreasing trend due to exploitation, mortalities and other reasons and some of the endangered species such as the dugong, lesser cetaceans including dolphins and the turtles occur as incidental catch in fishing operations,

stressing that it is essential to conserve those species showing declining population structure through appropriate management and conservation measures,

recommends that all data/information pertaining to resources, exploitation and mortalities due to strandings and incidental catches in fishing operations of endangered marine mammals and turtles be collected and made available to the NMLRDC for analysis and action.

Action to be taken by: World Wildlife-India; Department of Fisheries, Governments of maritime States and Union Territories; Bombay Natural History Society; Public and private sector organisations/companies engaged in fishing directly/through charter; National Institute of Oceanography; Naval Physical Oceanographic Laboratory; CMFRI."

The proforma developed at the Workshop for the various types of fishing activities have also to report sightings and other details on sea turtles.

Sea Turtles of India

We have five species of sea turtles as follows:

Scientific name	Common name	Vernacular (Tamil) name
<i>Dermochelys coriacea</i>	Leatherback turtle	Elu varai amai; Thoni amai
<i>Eretmochelys imbricata</i>	Hawksbill turtle	Alungamai
<i>Chelonia mydas</i>	Green turtle	Peramai
<i>Lepidochelys olivacea</i>	Olive ridley turtle	Sithamai
<i>Caretta caretta</i>	Loggerhead turtle	Perunthalai amai

Data Acquisition

We have given here with the aid of simple line drawings and photographs, field identification characters for these species so that species-wise information on sightings, incidental catch in fishing operations, observations from the nesting grounds during the breeding seasons and so on could be collected in the proformae which have been designed (Annexe I, II, and III) and sent to the National Marine Living Resources Data Centre (NMLRDC), Central Marine Fisheries Research Institute, Cochin-682 018 for further analysis and advice.

The Central Marine Fisheries Research Institute has 12 Research Centres and about 30 Field Centres along the coast from where data on exploited marine fishery resources from the artisanal and industrial sectors are being obtained and evaluated. The Institute is advantageously placed that a fund of field data is being collected by the staff for developing proper monitoring of marine living resources. Besides this, we would like other organisations and individuals to cooperate in obtaining as much information on sea turtles for which the NMLRDC would be the repository of data which could be utilised for various purposes. With this in view, the Central Marine Fisheries Research Institute has prepared code number for the five different species of sea turtles for facilitating computer analysis (CMFRI Spl. Publ. No.12). The code numbers are as follows:

Species	Common name	Code
<i>Eretmochelys imbricata</i>	Hawksbill turtle	5101
<i>Chelonia mydas</i>	Green turtle	5106
<i>Caretta caretta</i>	Loggerhead turtle	5111
<i>Lepidochelys olivacea</i>	Olive ridley	5116
<i>Dermochelys coriacea</i>	Leatherback turtle	5121

We would solicit our readers and those who have an opportunity to come across sea turtles to help in developing this national facility and to write to us. It is proposed to bring out with immediate effect in the issues of *Marine Fisheries Information Service, Technical and Extension Series*, a monthly awareness publica-

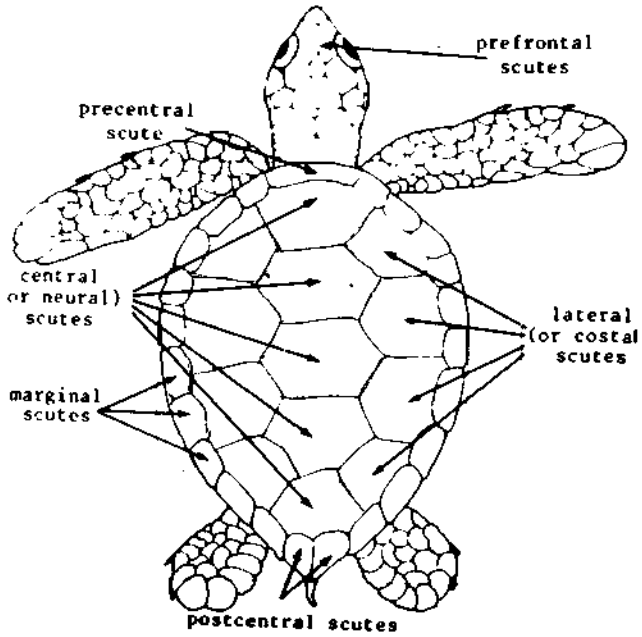
tion from CMFRI, a section on 'Turtle News' indicating field observation made by staff of CMFRI and others with acknowledgements.

The illustrations to help in identification have been taken from published illustrations, such as FAO species identification sheet for Fishery Purposes, Western Central Atlantic (Fishing Area 31), Volume VI, edited by Fischer (1978) and "Sea Turtle Manual of Research and Conservation Techniques prepared for the Western Atlantic Turtle Symposium by Peter C. Pritchard *et al.* (1983) and supplemented by original photographs.

A Key for identification of sea turtles from India

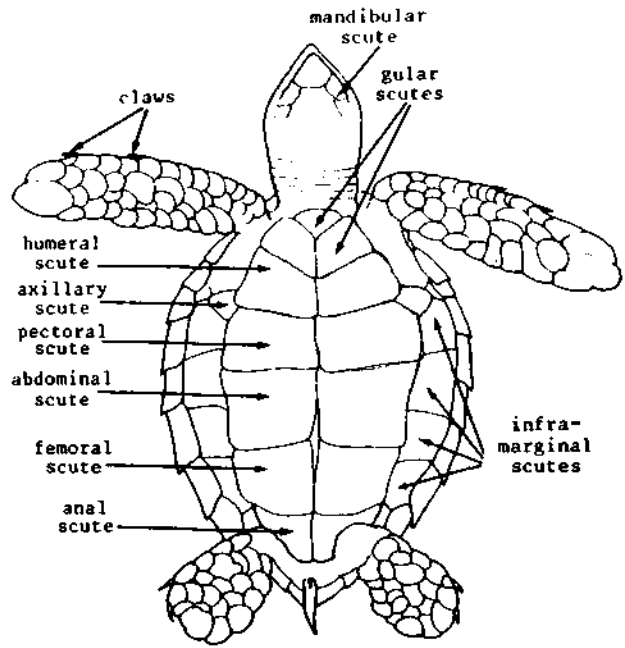
1. a. Skin smooth and without any scutes on head; 7 longitudinal narrow ridges on carapace and 5 on plastron; horny beak with well defined cusp on each side of upper jaw (beak 'W' shaped when viewed from front) and central cusp on lower jaw; flippers without claws *Dermochelys coriacea*
- b. Shell, head and flippers covered with scutes; no longitudinal ridges on carapace or plastron; horny beak not 'W' shaped when viewed from front; flippers with one or two claws 2
2. a. Carapace with 4 pairs of lateral scutes 3
- b. Carapace with 5 or more pairs of lateral scutes 4
3. a. Horny scutes imbricated (overlapping); two pairs of prefrontal scutes; 2 claws on each flipper; carapace is brown with darker markings; skin of neck region pale orange in colour *Eretmochelys imbricata*
- b. Horny scutes not imbricated but juxtaposed; one pair of prefrontal scutes; single claw on each flipper; carapace green with violet markings; skin of neck region yellow to cream in colour *Chelonia mydas*
4. a. Plastron with 3 pairs of enlarged inframarginal scutes without pores; lateral scutes 5; carapace brownish red with light spots and plastron yellow with orange spots *Caretta caretta*
- b. Plastron with 4 pairs of inframarginal scutes each with pores on hind margin; lateral scutes 6 or more, generally 7; carapace grey and plastron yellow *Lepidochelys olivacea*

DORSAL VIEW

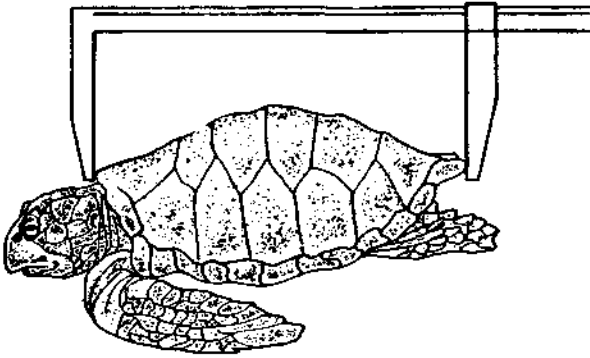


Dorsal view

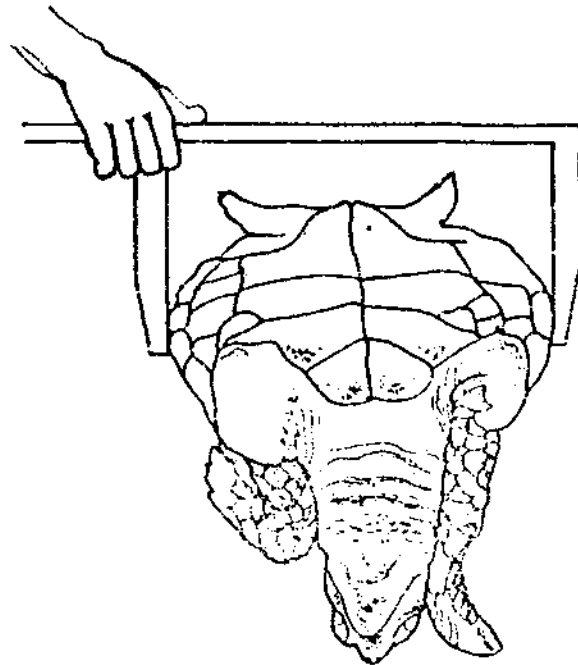
VENTRAL VIEW



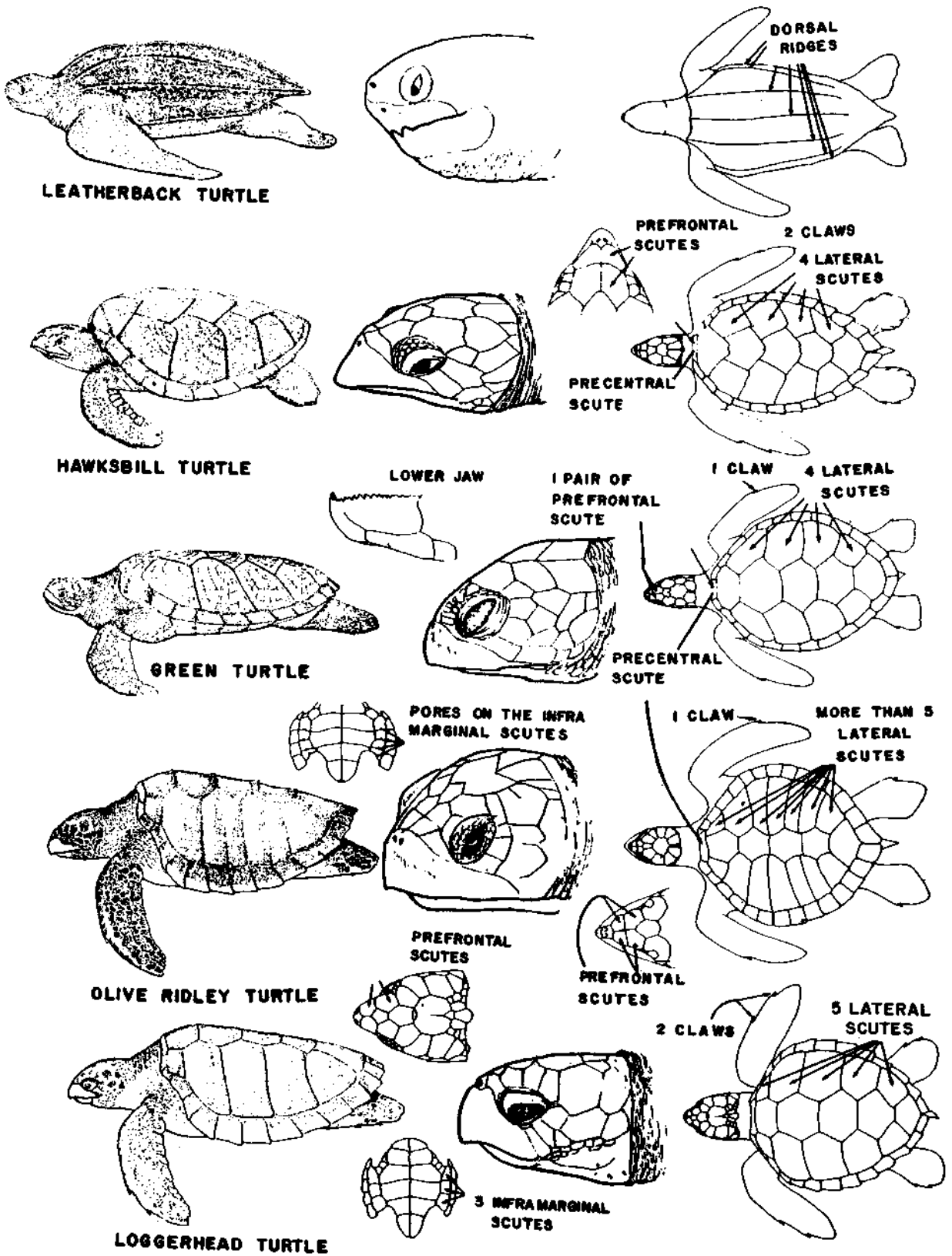
Ventral View



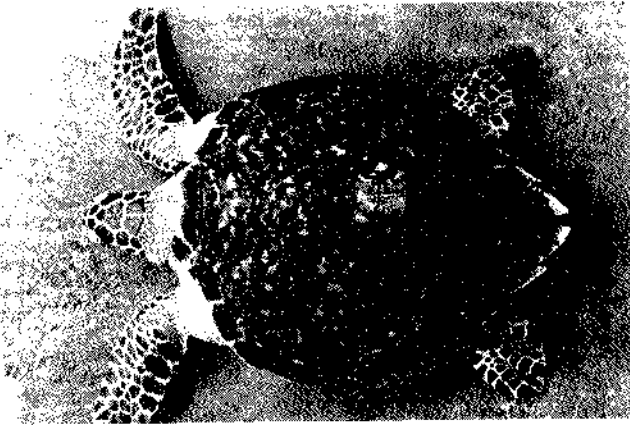
Measuring the length of Carapace



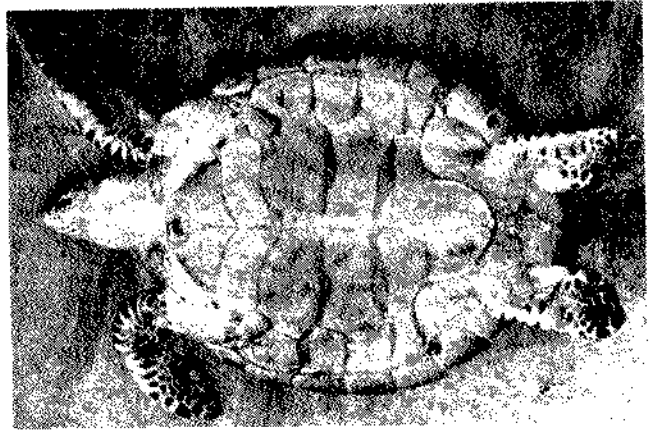
Measuring the width of carapace



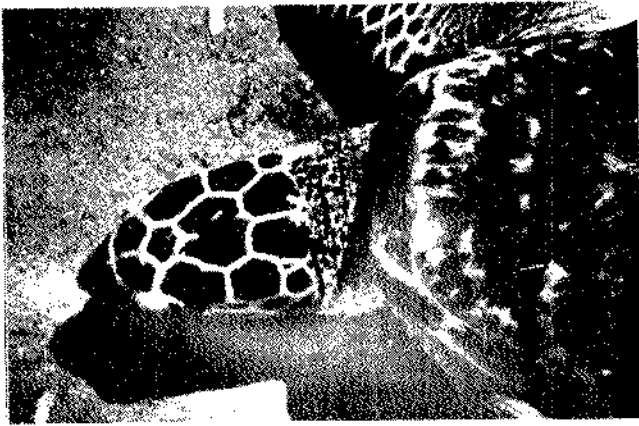
Identifying features of different species.



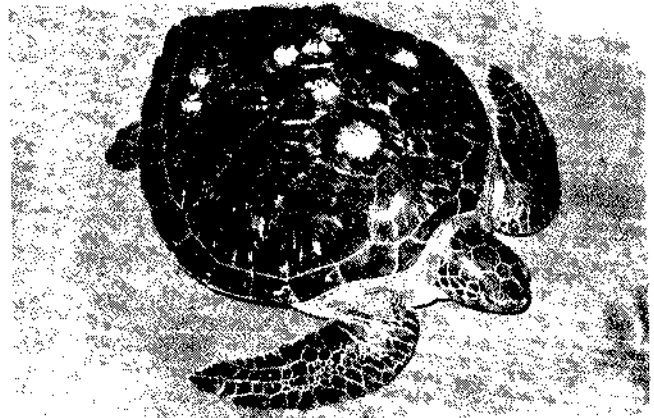
Dorsal view of *Eretmochelys imbricata*



Ventral view of *E. imbricata*



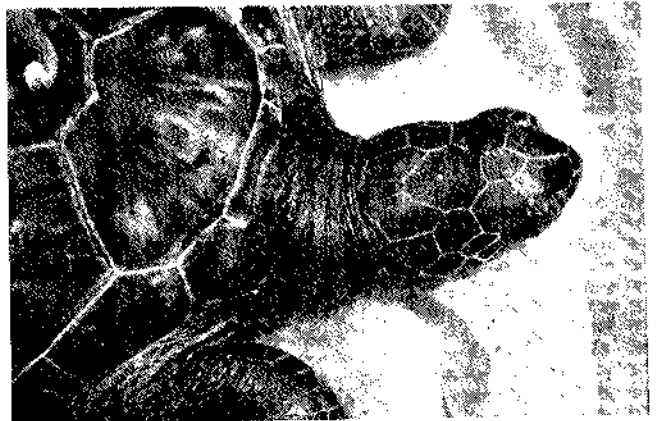
Head of *E. imbricata*



Dorsal view of *Chelonia mydas*



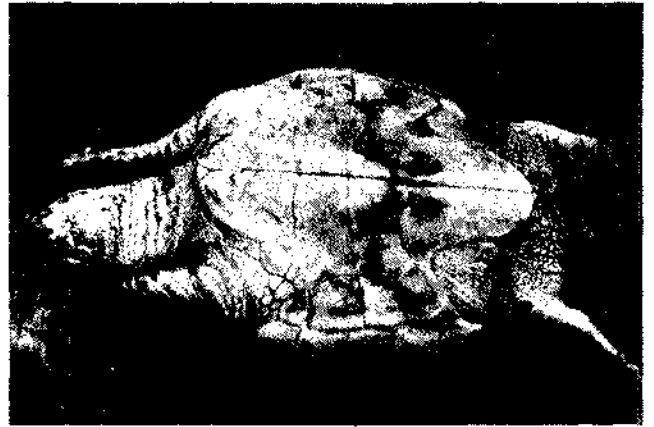
Ventral view of *C. mydas*



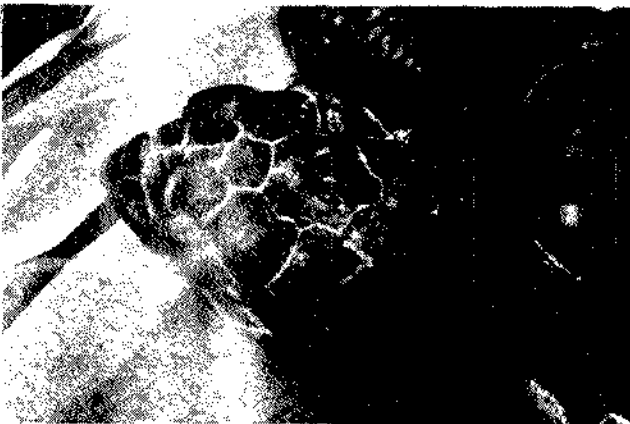
Head of *C. mydas*



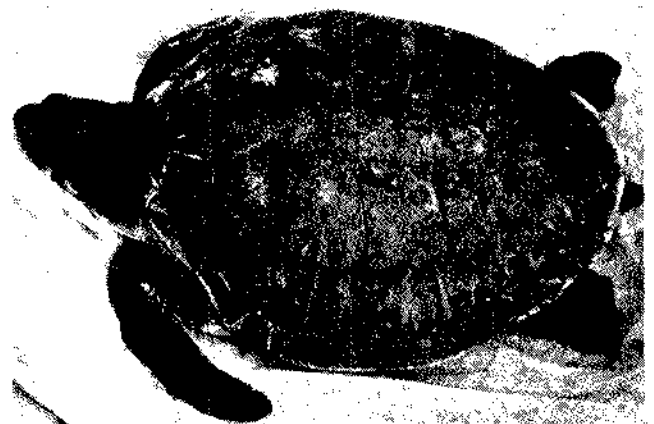
Dorsal view of *Caretta caretta*.



Ventral view of *C. caretta*



Head of *C. caretta*



Dorsal view of *Lepidochelys olivacea*



Ventral view of *L. olivacea*



Head of *L. olivacea*.

Need for a national coordinated programme for studies on sea turtles

A number of governmental and non-governmental organisations are in some way or other involved with sea turtle programmes. We would like to list some of these below:

Central Marine Fisheries Research Institute and its subordinate establishments; Zoological Survey of India; Bombay Natural History Society, Bombay; World Wild Life-India; Snake Park, Guindy, Madras; Forest/Fisheries Departments of Gujarat, Maharashtra, Karnataka, Kerala, Tamil Nadu, Andhra Pradesh, Orissa and West Bengal and Union Territories of Goa, Pondicherry, Lakshadweep and Andaman and Nicobar Islands.

The list may not be exhaustive and we feel that in next few years the sea turtle programme may catch the attention of more organisations and individuals. At the level of Government of India, the Department of Agriculture and Cooperation (Wild Life Protection Section); the Department of Agricultural Research and Education (I.C.A.R.); the Department of Environment; the Department of Ocean Development and the Department of Science and Technology have important roles to play.

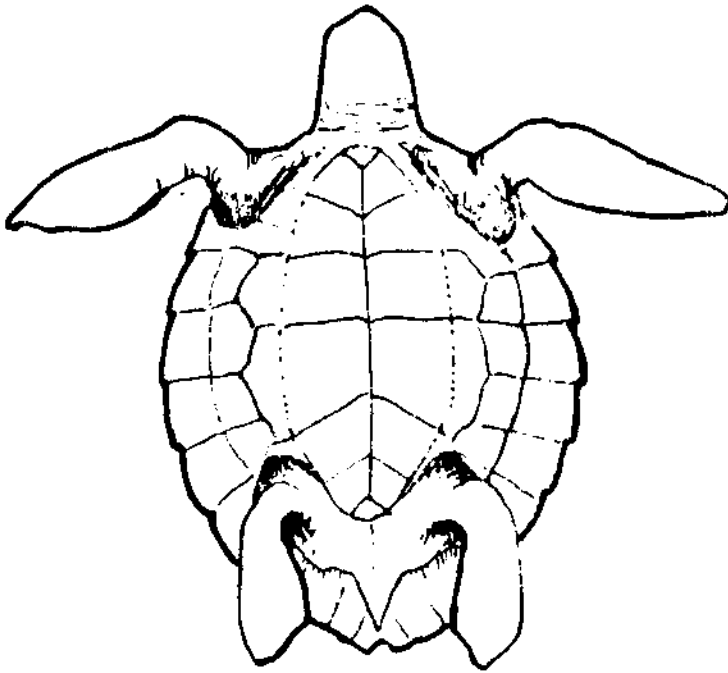
While our interest in sea turtles is increasing, this should also be linked with a national coordination of the effort being expended. At the same time, a greater awareness on the problem has to be built up in as diverse groups as the artisanal fishermen, industrial fishing sector, officials of Fisheries and Forest Departments for implementing regulation and the public at large. Extension and training are essential components to be integrated in this programme. The identification sheets and the Proformae given in the Annexure will also be printed in regional languages and distributed for strengthening acquisition of data. Recently a trawl net with escape mechanism for allowing turtles to escape from nets (turtle excluder net) has been developed in the U.S.A. The adoption of such nets during the nesting season and trials with such nets to study the economics of the operations for shrimp and other fish forming bycatch need serious considerations. All this call for the active involvement of many agencies and it is felt that such coordinated effort will fructify in developing sound conservation and management measures for sea turtles. It is hoped that this publication will help in the collection of information for baseline studies as well as tackling specific problems.

Areas needing priority attention

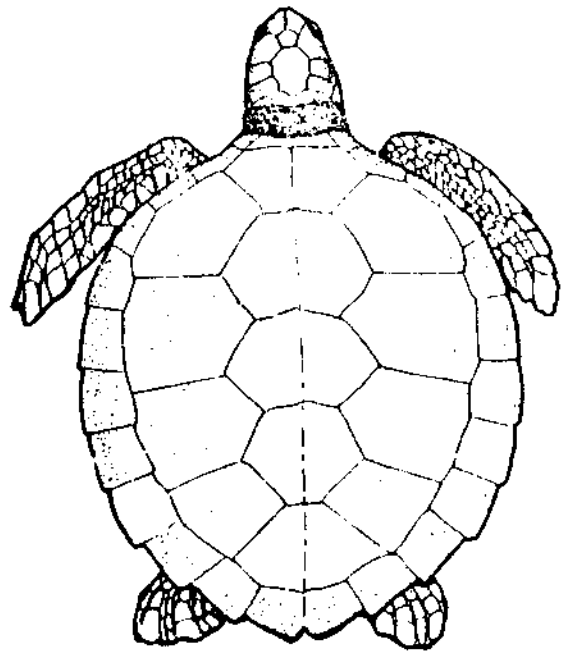
There is a need for developing a crash programme on sea turtles on scientific lines. This would call for an identification areas for studies and we have tried to identify these here. It is likely that concurrent works

may have to be undertaken in some of the aspects detailed below.

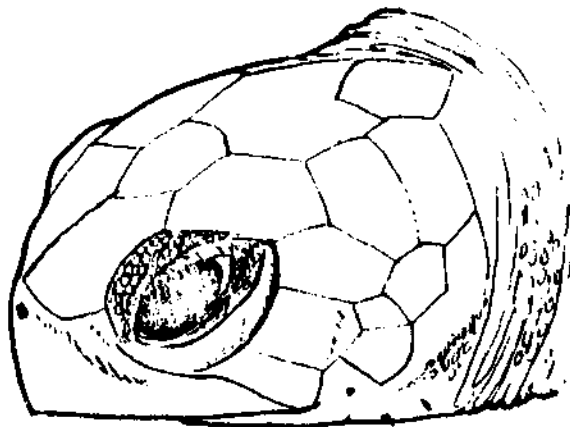
1. Survey of the coast line and Bay Islands for identifying nesting beaches and areas to be protected during the nesting seasons. This will also include demarcation of areas to be developed eventually as reserves where human interference will be minimal and thus affording complete protection to turtles during nesting seasons.
2. Developing a national programme where heavy predation by man and animals on nesting turtles and eggs exists. Hatchery programme for incubating and releasing hatchlings into the sea to improve survival at that stage to enhance possible recruitment.
3. More effective implementation of Indian Wild Life (protection) Act by the State Governments through a programme of training the staff of the concerned Departments in conservation and management of sea turtles and for the implementation of the Wild Life (Protection) Act and regulations.
4. Benign research involving the study of life history, biology and ecology of sea turtles to be carried out with proper dispensation from the concerned authorities.
5. There is a large lacunae in understanding the behaviour of all species of turtles from hatchlings to adults, their migratory habits and movements to and from feeding grounds. This is an area which need important attention.
6. Non-consumptive utilisation of turtle resources so that the relationship between man and turtles could change from killing them for its products to utilize them for educational values, captive and display aspects, recreational/tourist potential, ecosystem concept and so on. There is a great need for creating awareness through proper extension and education programmes on sea turtles among the public.
7. Monitoring of turtles incidental catch in fishing operations and finding ways and means of reducing mortality.
8. An impact study on phasing out subsistence/directed fishery of turtles on the artisanal sector traditionally involved in such activities.
9. Monitoring of the resource to find out whether any of the species could be shifted from Schedule I to Schedule II of the Wild Life (Protection) Act, if sufficient scientific data is forthcoming to indicate the enhancement of resources through proper management measure. This will also have an implication on the CITES convention



Ventral view of *Chelonia depressa* (Flatback turtle)



Dorsal view of *Chelonia depressa* (Flatback turtle)



Head view of *Chelonia depressa* (Flatback turtle)

Species to be on the look out for

Chelonia depressa Garman (Flatback turtle) has been reported from Northern Australia and adjacent waters and its distribution limits are not well defined. The occurrence of this species in the Andaman and Nicobar Islands and along the mainland coast of India cannot be ruled out. In view of this, the salient features of *C. depressa* along with line drawings to facilitate field identification are given here.

The salient features of *C. depressa* given by Pritchard *et al.* (1983) in the Sea turtle Manual of Research and Conservation techniques, Western Atlantic Turtle symposium are as follows:

"Four pairs of lateral scutes, head upto about 13 cm wide; carapace upto 100 cm long. One pair of pre-frontal scutes. Carapace scutes do not overlap, very thin with indistinct margins, especially in adults; dorsal colour yellow grey to grey-green, without spots or radiating markings; underside light yellow; weight upto about 90 kg."

The main difference is that the carapace in *C. depressa* is flatter, more rounded and not tapering behind as in *C. mydas*. The major visual difference between *C. mydas* varies from light tan to almost black above, often with radiant or spotted markings and with underside yellow; while in *C. depressa* the carapace is yellow grey to grey-green without spots or radiating markings, with underside light yellow. *C. depressa* seems to be a smaller species weighing about 90 kg while *C. mydas* weighs upto about 230 kg.

From literature it is seen that the clutch size and size of eggs of *C. depressa* and *C. mydas* differ as follows:

<i>C. depressa</i>	<i>C. mydas</i>
1. Average clutch size about 50 eggs (maximum 73 eggs)	Average clutch size about 85 eggs (maximum 200 eggs)
2. Diameter of egg 5 cm	Diameter of egg 4 to 5.5 cm

C. mydas makes the tracks which are deeply cut with symmetrical diagonal marks made by the front flippers while *C. depressa* makes relatively lightly cut, with symmetrical diagonal marks made by the front flippers.

Confirmatory evidences of the occurrence of *C. depressa* in the Indian seas, including the Andaman-Nicobar Islands, is wanting.

Conclusion

While very dedicated and valuable work has been carried out under extremely difficult and inhospitable conditions along Orissa and West Bengal Coasts by Chandrashekar Kar and other areas by Satish Bhaskar and others the time has come when our efforts should be expended to obtain maximum information in the shortest time possible. The identification sheets and the proformae given in the Annexure which are also to be printed in regional languages for distribution in coastal areas would strengthen the acquisition of data and help to create greater awareness. When turtle tagging programme are undertaken in future wider publicity will be given in coastal areas for recovery of tags/noting of tag numbers and other details during nesting seasons. Adoption of modified fishing gear as the 'turtle excluder net' during the nesting season should be done after suitable trials. It is hoped that this publication will help to accelerate Research and Development programmes on sea turtles and assist in the collection of information for different studies to help and evolve conservation and management strategies for our sea turtles.



NATIONAL MARINE LIVING RESOURCES DATA CENTRE (NMLRDC)

CENTRAL MARINE FISHERIES RESEARCH INSTITUTE, COCHIN-682 018

PROFORMA I

DATA ON SEA TURTLES AT FISH LANDING CENTRES

Species : NMLRDC's Code No.

Location : Sex :

Date : Dead or Live :

Evidence of any previous tag : Yes/No.
If Yes, give details of Tag number, etc :

New tag number if tagged
and released :

Carapace length (Straight Line) : cm Total weight : Kg

Carapace width (Straight line) : cm

Evidence of any injury : Yes/No. If Yes, give details

If incidental catch in fishing gear, type of
fishing craft and gear used :

Any turtle trade in that area : Yes/No. If Yes, give details

Any turtle egg trade in that area: Yes/No.
If Yes give details :

Any incident of turtle poisoning : Yes/No. If Yes, give details

Remarks:

Investigator :

NATIONAL MARINE LIVING RESOURCES DATA CENTRE (NMLRDC)
CENTRAL MARINE FISHERIES RESEARCH INSTITUTE, COCHIN-682 018

PROFORMA II
DATA ON NESTING SEA TURTLES

Species : NMLRDC's Code No.

Location : Sex:

Date : Time : From To

Weather condition :

Surf Temperature : Sand temperature :

Evidence of any previous tag : Yes/No. If Yes, give details of Tag Number, etc:

New tag number, if tagged and released :

Carapace length (Straight line) : cm Total weight : Kg

Carapace width (Straight line) : cm

Evidence of any injury : Yes/No. If Yes, give details:

If incidental catch in fishing gear, type of fishing craft and gear used :

Surf condition : Distance of nest high water line:..... (m)

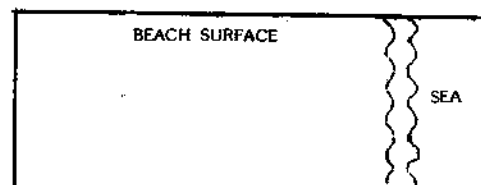
Number of eggs :

Any predation of eggs on nesting beaches : Yes/No. If Yes, give details:

Remarks :

Investigator :

NATURE OF CRAWL (Draw a sketch of crawling pattern in the box)



NATIONAL MARINE LIVING RESOURCES DATA CENTRE (NMLRDC)
CENTRAL MARINE FISHERIES RESEARCH INSTITUTE, COCHIN-682 018

PROFORMA III

DATA ON SEA TURTLES TAKEN AS INCIDENTAL CATCH IN FISHING AND TAGGING OPERATIONS

Species : NMLRDC's Code No. :

Location : Sex: :

Date : Depth :

Time of capture : Time of release:

Gear operated : Depth at which operated :

Evidence of any previous tag : Yes/No.
 If Yes, give details of Tag number, etc.

New tag number, if tagged and released :

Carapace length (Straight line) : cm Total weight : Kg

Carapace width(Straight line)..... cm

Evidence of any injury : Yes/No. If Yes, give details:

Evidence of any ectoparasite : Yes/No. If Yes, give details :.....

Any sighting of mating of
 turtles in that area Yes/No. If Yes, give details :

Remarks :

.....

Investigator :