



MARINE TURTLES



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COVER:

A **Green Turtle** just came out of sea for nesting, unaware of threats to eggs, hatchlings and herself. Would she be back to the sea?

Would her eggs and hatchlings survive?

Who knows? Who cares?



FOREWORD

It is fact that all the species of the world are suffering from some sort of danger at the highest degree on this stage since world's known history. The cause may be our lack of knowledge, industry-influenced life style or increase in population and its demands. To fulfill them, we have completely neglected the impact of natural species on our environment. Let it be Pandas, Dolphins, Tigers or even Vultures, all are on the verge of extinction, same is the case with marine turtles. Marine turtles are one group, which has felt the heavy hand of man. Though heavily exploited, there is little information on their ecology and life history. This booklet presents an admirable review of the available information on the marine turtles and should be invaluable to anyone interested in marine turtles and their natural history. There is still much to be learned about marine turtles in Pakistan and around the world. Allah may help us to do something good for these creatures.

Hamid Iqbal Javed
Director

TABLE OF CONTENTS

Foreword	i
Table of contents	iii
List of illustrations	v
Acronyms	vii
Tips for turtle watcher	ix
Introduction	1
Some interesting facts about turtles	2
General features, Mysterious migrations	
Deep diving, Arribada, Longevity	
Taxonomic characters & distribution of Marine turtles	6
Hawksbill Turtle, Green Turtle, Olive Ridley Turtle, Loggerhead Turtle, Leatherback Turtle, Kemp's Ridley Turtle, Flat back Turtle	
Marine turtles of Karachi coast	11
Green Turtle, nesting behaviors, generation length, hatchlings.	
Olive Ridley Turtle	
Economic importance of marine turtles	19
Threats to hatchlings and marine turtles	21
Journey of hatchlings to the sea is full of danger, Nesting	
Beach habitat degradation, marine habitat degradation,	
Accidental mortalities, harvesting, disorientation,	
Population of marine turtles on Karachi coast.	24
Green Turtle, Status,	
Olive Ridley Turtle, Status	
Conservation measures	26
International legal protection,	
Protection under Sindh Wildlife Ordinance	
Turtle excluder device (TED)	
Recommendation	27
Education of Coastal rural communities	
Eco-tourism, Better monitoring, Turtle sanctuary	
Acknowledgment	29
References	29
Green Turtle(Poem)	33

LIST OF ILLUSTRATIONS

	Page No.
1 Marine Turtle (diagrammatic)	5
2 Hawksbill Turtle	6
3 Green Turtle	7
4 Olive Ridley Turtle	8
5 Loggerhead Turtle	9
6 Leatherback Turtle	10
7 Turtle in swimming action	12
8 Map showing distribution of sea turtles along Karachi coast	13
9 Green turtle making body pit	14
10 Green Turtle laying eggs	15
11 Dropping of eggs in the egg pit	16
12 Return to the sea	17
13 Turtle products	20
14 Crab holding hatchling	21
15 Seagull holding hatchling in beak	22
16 Shark and hatchlings	23

Illustrations redrawn from The Turtle, (1984) and Reports for the Centre for Environmental Educations, Sea Turtle Rescue Fund Florida, U.S.A

ACRONYMS

- ANON** _____ Anonymous
- ARBEC** _____ Asian Review of Biodiversity
and Environment Conservation
- CITES** _____ Convention on International
Trade in Endangered species
- IUCN** _____ International Union for
Conservation of Nature and
Natural Resources
- NOAA** _____ National Oceanic and
Atmospheric Administration,
USA
- SWD** _____ Sindh Wildlife Department
- WWF** _____ World Wide Fund for Nature
- ZSD** _____ Zoological Survey Department

TIPS FOR TURTLE WATCHER

- Keep quiet, while you are on a turtle beach.
- Keep yourself away from the direction, the turtle is moving.
- Approach turtle from behind.
- Stay at least 50 meters away from the turtle.
- Don't shine torch at turtle.
- Don't take flash photos.
- Turtle should not be photographed before laying eggs.
- Turtles are shy creatures; don't disturb them.

INTRODUCTION

It takes about five million years to evolve a species. Since 17th century, one species of higher vertebrates is becoming extinct every year. It is feared that similar situation is going to happen with marine turtles, which are presently the most vulnerable creatures on the earth.

Marine turtles have been inhabiting along the seas/coasts of the world for over 200 million years and even survived during the extinction period of dinosaurs (Anon., 1984). But man has neither realized nor cared for their safe and continued survival. Sea turtles are characterized by their large size, their largely aquatic existence and specialized limbs designed for swimming.

Now a days, seven species of marine turtles viz. the Loggerhead Turtle, Leatherback Turtle, Green Turtle, Olive Ridley Turtle, Kemp's Ridley Turtle, Hawksbill Turtle and Flat back Turtle are surviving in the oceans of the world. All species of marine turtles, except the Kemp's Ridley (*Lepidochelys kempii*), occur within Asian waters, and of these, all except the Flat-back (*Natator depressa*), nest in the Asian region (Limpus *et al.*, 2001). Pakistan has long been known to support a large population of Green Turtle (*Chelonia mydas*) with a lesser number of Olive Ridley Turtle (*Lepidochelys olivacea*), nesting primarily at Hawkesbay and Sandspit near Karachi (Ghalib and Zaidi, 1976; Kabraji and Firdous, 1984). Despite their importance in the underwater web of life and their value to coastal

(iii) Deep diving:

- ☒ Leatherback turtle is the deepest diving turtle having record diving depth of 315m and remaining underwater for about 37minutes (Eckert *et al.*, 2006)

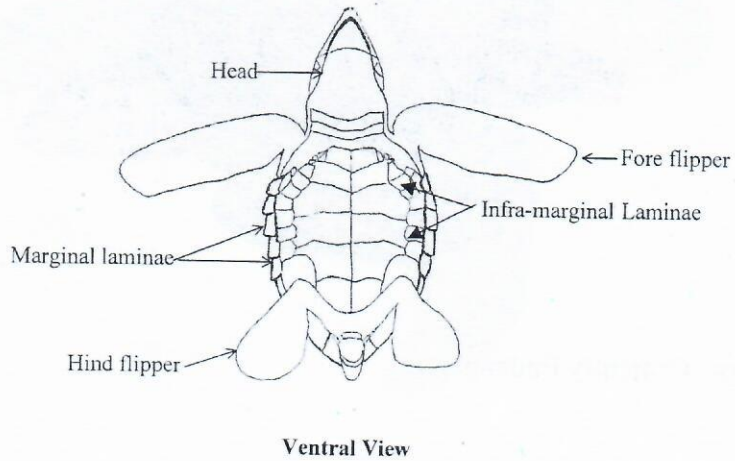
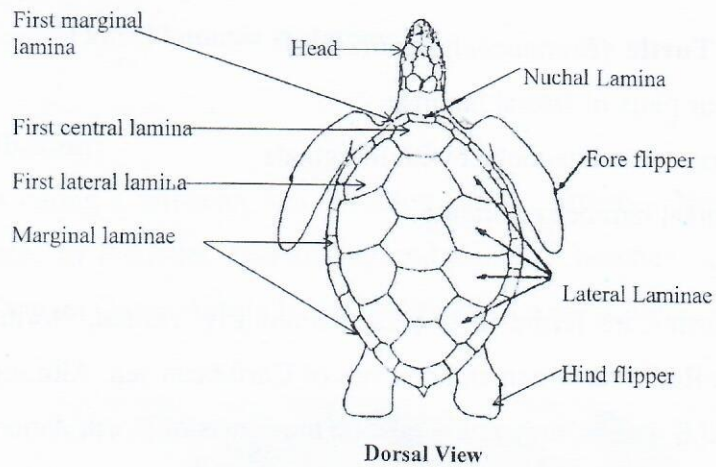
(iv) Arribada:

- ☒ All the sea turtle species of the world come alone for nesting, but the ridleys (Olive Ridley Turtle and Kemp's Ridley Turtle) come ashore in huge groups. This phenomenon is called "Arribada", which means arrival in Spanish and is one of the most spectacular events in nature.

(v) Longevity:

- ☒ A turtle has a long life expectancy and lives over 100 years (Anon., 1984).

Marine Turtle (Diagrammatic)



Taxonomic Characters and Distribution of Marine Turtles

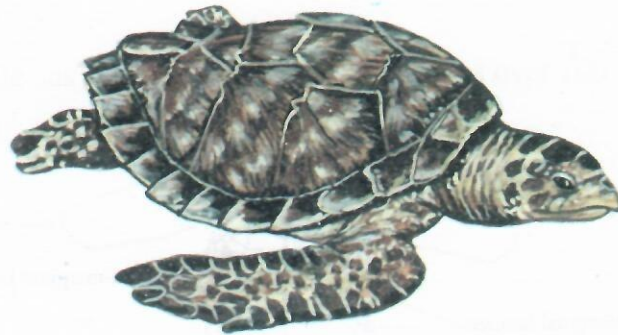
(modified from Minton, 1966).

1. Hawksbill Turtle (*Eretmochelys imbricata*)

- i. Four pairs of lateral laminae
- ii. First central in contact with marginals
- iii. Dorsal laminae imbricate

Distribution:

Hawksbill Turtles are found in tropics, particularly Yemen, Northeastern Australia, the Red Sea, Oman and beaches of Caribbean sea. Although they are found in U.S waters, they rarely nest on the coasts of North America.



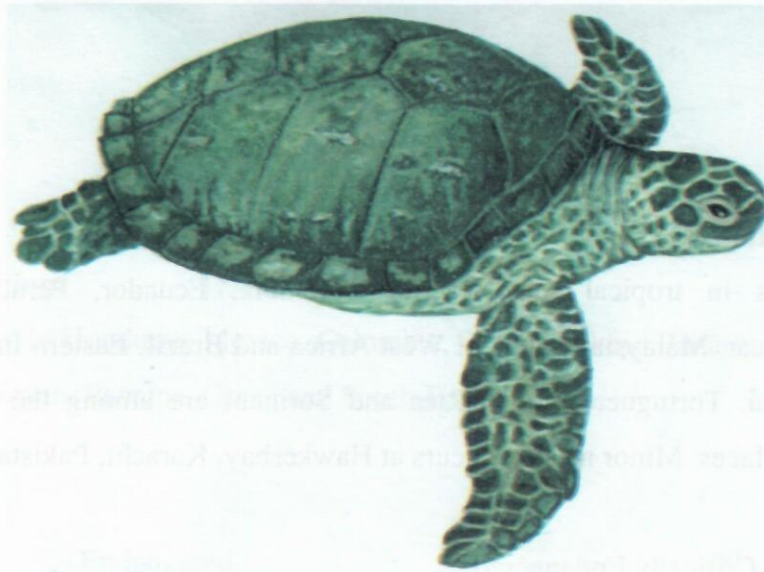
Status:- Critically Endangered

2. Green Turtle (*Chelonia mydas*)

- i. Four pairs of lateral laminae
- ii. First central in contact with marginals
- iii. Dorsal laminae juxtaposed

Distribution:

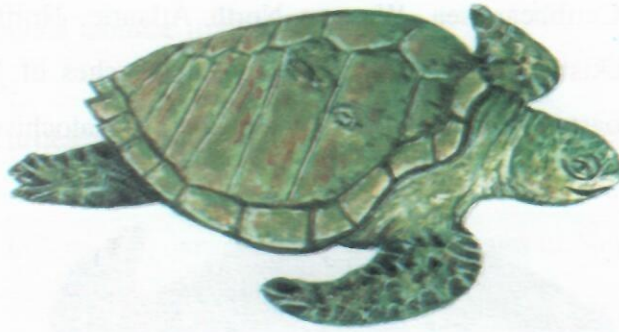
Coasts along Caribbean sea, Western North Atlantic, North and South America. In Pakistan, Hawkesbay and Sandspit beaches of Karachi. Taq near Ormara Coast, Astola Island and Jiwani Coast of Balochistan.



Status: - Endangered

3. Olive Ridley Turtle (*Lepidochelys olivacea*)

- i. Five to nine pairs of lateral laminae
- ii. First central separated from marginals
- iii. Four pairs of infra-marginal (bridge) laminae mostly with pores at their posterior margin.



Distribution:

It occurs in tropical seas, Pacific Colombia, Ecuador, Peru, Chile, Madagascar, Malaysia, waters of West Africa and Brazil, Eastern India and Sri Lanka. Tortuguero, Costa Rica and Surinam are among the famous nesting places. Minor nesting occurs at Hawkesbay, Karachi, Pakistan.

Status: - Critically Endangered

4. Loggerhead Turtle (*Caretta caretta*)

- i. Five or more pairs of lateral laminae, first touching nuchal.
- ii. First central separated from marginals.
- iii. Three infra-marginal laminae without pores.



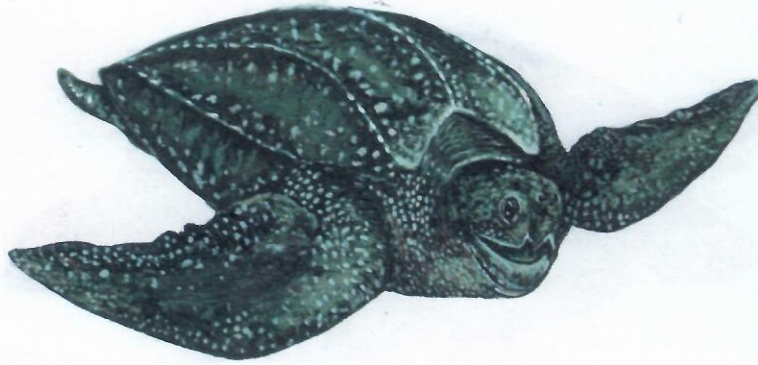
Distribution:

It is found in Honduras, Mexico, Colombia, Israel, Turkey, Bahamas, Cuba, Greece, Japan, Panama, Oman and South-Eastern USA.

Status: - Endangered

5. Leatherback Turtle (*Dermochelys coriacea*)

- i. Dorsum tough leathery, having seven longitudinal ridges.
- ii. No hard shell like other turtles.



Distribution:

Mexico, Costa Rica, Malaysia, India, Sri Lanka, Thailand, Trinidad, Tobago and Papua New Guinea. Population is seriously declining in all major nesting beaches throughout Pacific.

Status: - Critically Endangered

6. Kemp's Ridley Turtle (*Lepidochelys kempii*)

- i. Five pairs of lateral laminae
- ii. Jaw bluntly pointed
- iii. The orbit smaller than that of Olive Ridley.

Distribution:

The only breeding site is on a small beach of Rancho Nuevo (Mexico).

Status: - Critically Endangered

7. Flatback Turtle (*Natator depressa*)

Shell very flat, smooth, waxy and can be easily damaged.

Distribution:

Northern coastal area of Australia and Gulf of Papua New Guinea. Unlike other turtles, they do not undertake lengthy migration.

Status: - Endangered

MARINE TURTLES OF KARACHI COAST

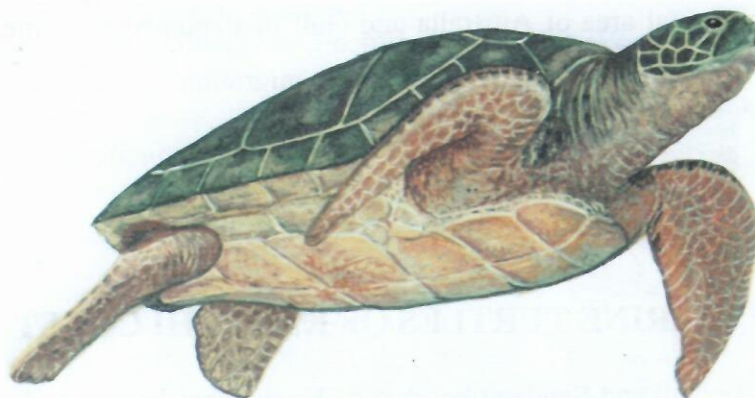
The Hawkesbay and Sandspit beaches of Karachi are located towards south of Karachi at longitude 24° 48N and latitude 66° 58 E. These beaches are

among the major 11 green turtle nesting beaches of the world. (Firdous, 1988).

Two species of marine turtles, the Green Turtle and Olive Ridley Turtle, regularly visit Hawkesbay and Sandspit beaches of Karachi for nesting (Ghalib *et al.*, 1981; Rahman and Iffat, 1997). Brief surveys indicate that the coastline of Balochistan is also important for turtle nesting (Groombridge *et al.*, 1988).

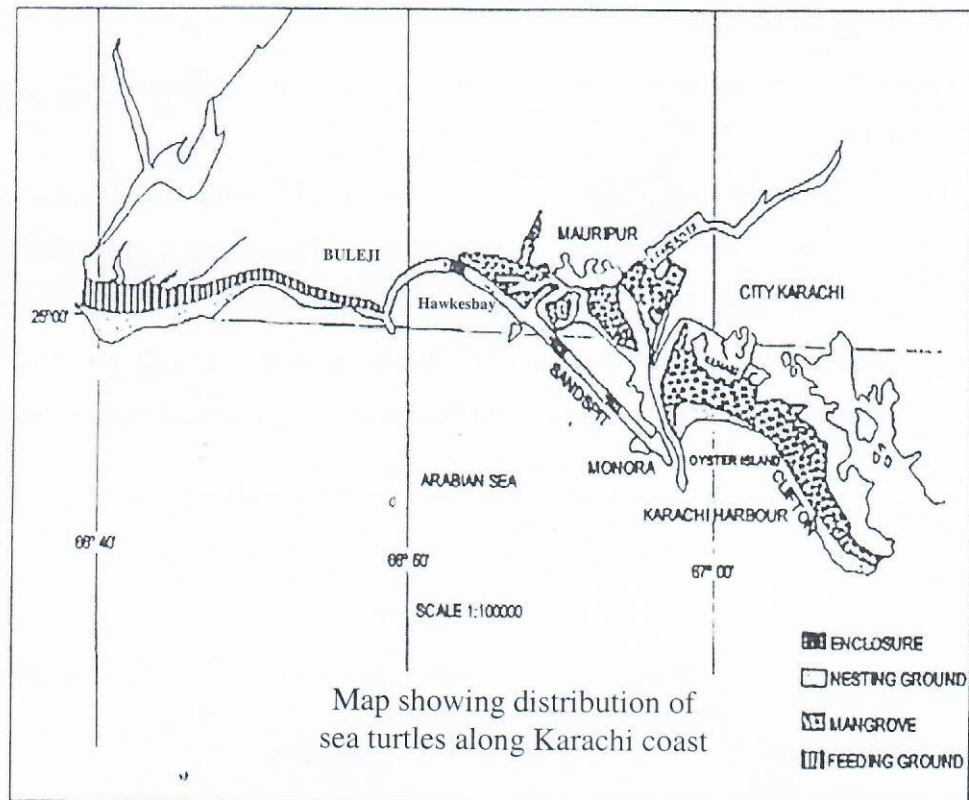
1. Green Turtle (*Chelonia mydas*)

The green turtle owes its name from the green colour of its internal fat. It is the only sea turtle that feed on plants. The Green Turtle has circum-global distribution occurring throughout tropical and sub-tropical waters (Atlantic Ocean, Indian Ocean, Mediterranean Sea, Pacific Ocean). Migrations are carried out by both males and females (Carr *et al.*, 1978; Mortimer and Plicher, 2001). Upon leaving the nesting beach, the hatchlings begin an oceanic phase.



Turtle in swimming action

After a number of years, these turtles recruit to neritic developmental areas rich in marine algae, where they forage and grow until maturity. Upon attaining sexual maturity, the green turtle commences breeding migrations between foraging grounds and nesting areas (Hirth, 1997). Nesting occurs in more than 80 countries worldwide. Migrations are carried out by males and females during breeding periods, adults reside at coastal feeding areas (Seminoff, 2004).



Courtesy SWD

A continuous sandy coastline having medium slope, with a tidal water rise up to three meters along the Hawkes bay and Sandpit beaches is an ideal site for nesting.

Nearby located submerged rocky areas, rich in algal weeds, serve as foraging ground for the turtles. Although turtles nest all along the beach, yet the rich spawning area, as indicated by the greatest number of tracks and pits, is approx. 10 km continuous belt of loose sand (from Manora to Buleji, mostly without pebbles).

Nesting Behaviour:

Green Turtle nests throughout the year with a peak during September-October.

The female comes out of the sea at night. Leaving the water behind, it drags itself slowly across the sand. Its large flat paddle-shaped flippers are not meant for walking. Its weight of about 330 pounds is a heavy load to carry. It makes her nest out of the reach of the seawater. It digs a body pit 150-200 cm in diameter with the help of fore-flippers and a cylindrical egg pit (about 30 cm wide, 40 cm deep) with the hind-flippers.



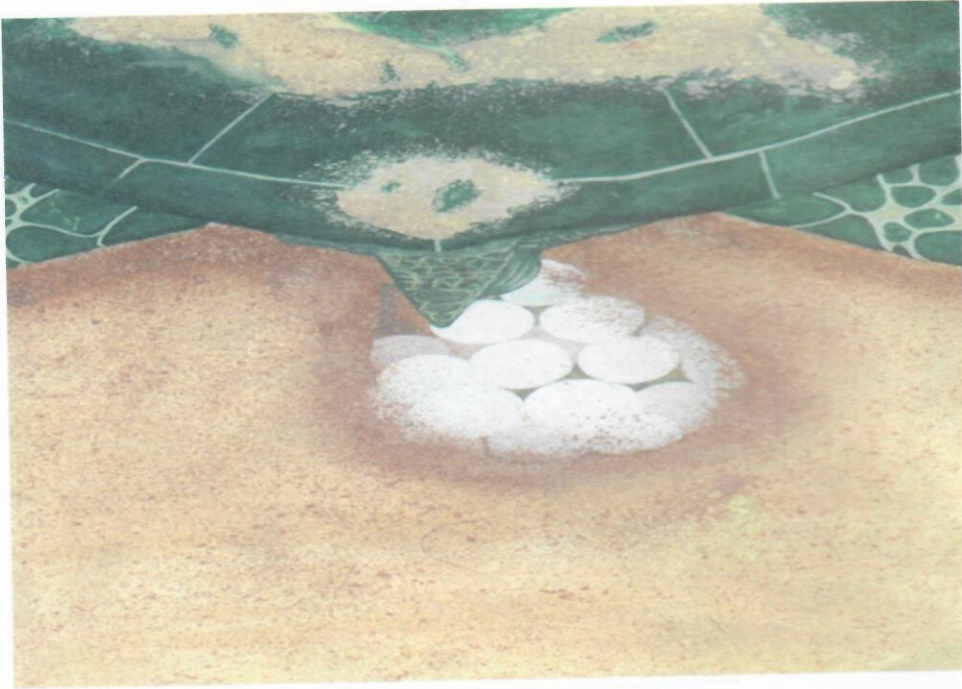
Green Turtle making body pit

The mother turtle places herself in a position that her tail is over the egg pit. She begins to lay eggs, well wet with mucous, one, two or three at a time. She drops about 100 eggs on the average, in approximately 20 minutes.



Green Turtle laying eggs

The eggs are white and round, looking like table tennis balls. When the turtle has finished laying eggs, she uses her hind-flippers to shovel sand back onto the nest to cover the eggs.



Dropping of eggs in the egg pit

The female turtle comes out of the body pit and starts backward journey to the water. The whole exercise is very tiresome and exhausting. Her flippers leave deep regular furrows in the sand. The time consumed for the entire nesting process (coming out of the water and returning back to the sea), is about 2 to 3 hours. She comes out of water, for nesting again, after interval of about two weeks. In one season/year, she comes ashore 3 or 4 times. Each time she digs a new nest in the sand and lays another batch of 100 eggs. The female turtle returns to the beach after 3-5 years period after egg laying for one year (Pers. Comm. Firdous).



Returning to the sea after egg laying

Generation Length:

Green Turtle exhibits slow growth rate and the age to maturity appears to be the longest of any other sea turtle. It attains sexual maturity at 26 years to 40 years, (Hirth, 1997). Its estimated reproductive longevity ranges from 17 to 23 years i.e. 20 years on the average (Carr *et al*, 1978; Fitzmmons *et al.*, 1995).

Generation length is based on the age to maturity plus one half the reproductive longevity (Pianka, 1974).

Thus based on the average age to maturity i.e. 33 years and half of the average reproductive longevity i.e. 10 years, the average generation length of green turtle has been calculated as 43 years.

Hatchlings:

The mother turtle has nothing to do with her eggs, once she has left the nest. It takes 45 to 60 days for the eggs to hatch.

The hatchlings come out mostly at night. There is no parental care for the hatchlings and they are left at the mercy of the nature. The baby turtles are tiny about 5 cm in length. They crawl on the sand towards the sea.

2. Olive Ridley Turtle (*Lepidochelys olivacea*)

Olive Ridley is a small hard-shelled marine turtle. It is much smaller in size than the green turtle. It weighs about 100 pounds, which is 1/3 of the weight of green turtle. On the nesting beaches of Karachi, the Olive Ridley nests from July to September with a peak during August.

According to various reports of Sind Wildlife Department (SWD), the nesting frequency is declining continuously. The last egg laying was observed in August 2001. However, a few dead Olive Ridley Turtles were seen on the beach after the Tasman oil spill incidence of 2003. (Pers. Comm. Abrar-ul-Hasan).

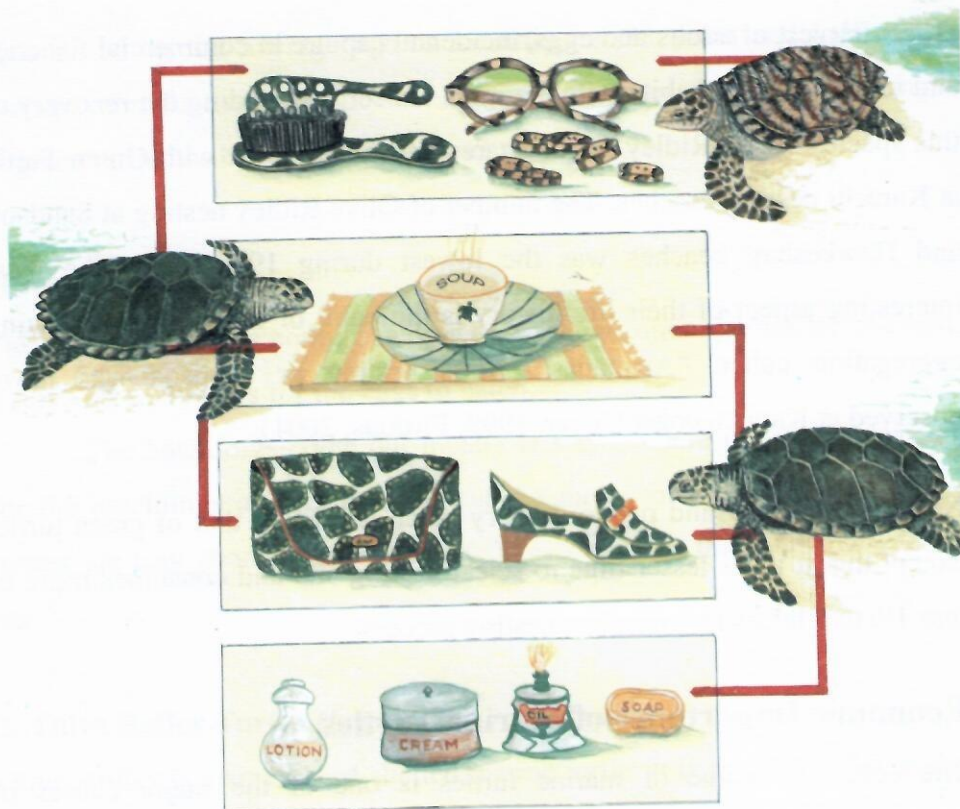
Direct harvest of adults and eggs, incidental capture in commercial fisheries and loss of nesting habitat, are the main concerns regarding the recovery of this species. Olive Ridley Turtle shares the same habitat with Green Turtle at Karachi nesting beaches. The number of Olive Ridley nesting at Sandspit and Hawkesbay beaches was the lowest during 1996-1997. The most interesting aspect of their life history is the habit of forming great nesting aggregation called "Arribadas". Mass nesting or arribada was never observed at Karachi coast (Asrar, 1999; Firdous, 2001).

Nesting behaviour and pattern is very much similar to that of green turtle, except that it takes lesser time to select nesting site and consumes more or less 1½ to 2 hours for complete nesting process.

Economic Importance of Marine Turtles

The economic value of marine turtles is one of the major causes of declining their populations. Marine turtles are used for food as well as making various products.

Turtle's meat steaks and turtle soup are relished as delicacy in many countries of the world. The skin of its neck and flippers is used for making leather for purses, shoes, vanity bags etc. The fat of turtle is used for manufacture of oil, makeup cream, lotion and soap. The turtle shell is prized for making combs, brush handles, eyeglass frames, buttons, hair clips and jewelry. However, in Pakistan it is neither consumed as food, nor there is any industry for making turtle products.



Turtle Products

Threats to Hatchlings and Marine Turtles:

Marine turtles are susceptible to population decline because of their vulnerability to anthropogenic impacts during all life stages from eggs to adult. The main threats, which affect turtle stocks, both in marine as well as terrestrial environments, are as under:

i. Journey of Hatchlings to the Sea is Full of Dangers:

The journey of the hatchlings from the nest to the sea is full of dangers. In the night, the ghost crabs and stray dogs, the most efficient nocturnal predators, wait for them.



Crab holding hatchling

Country: SWD

The innocent creatures without having any defense mechanism, fall easy prey to them. Dogs, crows and kites, which come early in the morning for this feast, pick up the baby turtles, which fail to reach the sea till dawn.

During winter nights, the baby turtles are unable to crawl to the sea due to severe cold. In the morning with the warmth of sunshine, they start moving towards the sea. Their movements attract a host of enemies. If a few are lucky enough to reach the water, they have to face new dangers.

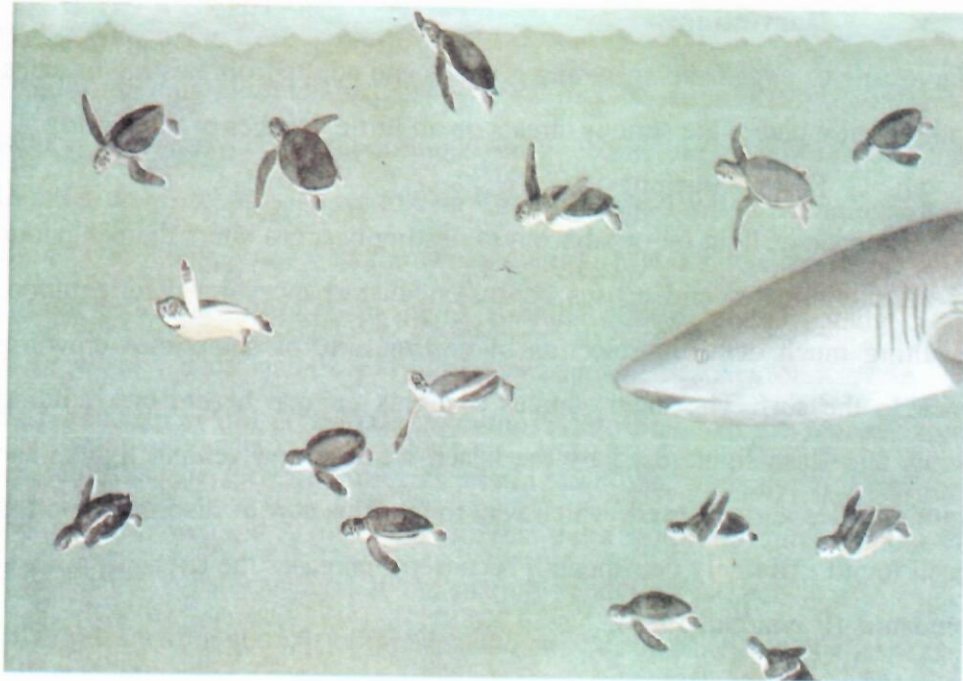


Seagull holding hatchling in beak

Sea gulls, fish, crabs and small sharks attack and eat them. Very few are able to escape and carried by the currents to the area where seaweeds are found, which is a safer place for them. Approx. one individual in 1000 attains adulthood (Firdous, 1988). This is a very small ratio of survival of baby turtles to reach adulthood.

ii. Nesting Beach Habitat Degradation:

This is caused by construction of buildings, sand excavation and extraction, because these result in decreasing quality and quantity of nesting area, available to female turtles.



Shark and hatchlings

iii. Marine Habitat Degradation:

Marine habitat is spoiled by dredging, installation of jetties, beach development and pollution like oil spills and release of industrial wastes into the sea. Turtles swallow plastic bags and oil soaked food resulting in death. Moreover, marine pollution (heavy metals and PCBs) directly affects the function of respiration, skin, blood chemistry and salt gland.

iv. Accidental Mortality:

Mortality due to boat strikes, entanglement in marine fishing operations (shrimp trawling, dynamite fishing and long lining) are incidental cases, but a large number of turtles are killed every year due to such accidents. Unlike land turtles, the sea turtles are not able to retreat their heads and flippers into protective shell covering and thus vulnerable to sharks and large fishes in all stages of their life.

Olive Ridley turtle nests were recorded. The same situation prevailed till 2001. Although occasional sightings of one or two individuals on the beaches have been reported, yet there is no record or evidence of nesting of Olive Ridley turtle after August 2001. The reduction in the nesting number of Olive Ridley is much more than 80% (about 98%) from 1987 to 1997.

Status:

According to the criteria laid down in the IUCN Red List 2004, the status of Olive Ridley turtle falls well in the category of "Critically Endangered" species since 1997.

CONSERVATION MEASURES

i. International Legal Protection:

All the marine turtle species are declared "Endangered" and listed in appendix I of CITES (Convention on International Trade in Endangered Species of Wild Fauna and Flora).

ii. Protection Under Sindh Wildlife Ordinance:

Green and Olive Ridley Turtles are legally protected under Sindh Wildlife Ordinance, which makes it an offence punishable by law to harass, hurt any adult turtle or hatchling, to steal eggs or disturb nests (Wild Life Protection Act 1993).

iii. Turtle Excluder Device (TED):

In Pakistan, use of turtle excluder device (TED) has been made mandatory for all fishing trawlers for conservation of Turtles.

RECOMMENDATIONS

i. Education of Coastal Rural Communities:

Coastal rural communities are required to be educated to save marine turtles, which are precious biological heritage of coastal people.

ii. Eco-tourism:

The nesting beach may be developed into "Eco-tourism" for turtle's conservation and awareness.

iii. Better Monitoring:

More manpower is required to be deployed to check both the anthropogenic activities causing disturbance to turtles, as well as attack of predators on hatchlings. The stray dogs have to be kept away or exterminated from the spawning beaches.

iv. Turtle Sanctuary:

All the nesting beaches, along Pakistan coast, may be declared as "Turtle sanctuary" to provide strict protection.

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GREEN TURTLE

Kick off your shoes, and loosen your girdles,
And listen to the story of the Green Sea turtle.

It's a huge reptile with a big hard shell,
With a little green head and an itty, bitty tail.

It moves around with its "arms" and "legs"
And it crawls on land when it lays its eggs.

The sea is its home most of the time,
And it can swim so fast it would blow your mind.

On land it is slow, as most turtles are,
When it crawls in the sand it doesn't get too far.

And that's the problem. That's why it's in danger,
When it's walking on shore it's caught by "strangers"

See, people like its shell. They eat its meat,
They think the eggs are a special treat.

Turtles have existed since the Dinosaurs,
And you know about them—they're not here anymore.

It's sad to think all these turtles will die,
No wonder it seems there's a tear in their eye.

**Brownie Troop
California USA**



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