क्षितिरतिविपुलतरे तव तिष्ठति पृष्ठे
धरणि धरणकिणचक्र गरिष्ठे ।
केशव धृत कच्छप रूप
जय जगदीश हरे ॥ २ ॥

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The Odyssey of the Olive Ridley

Class : Reptilia
Order : Testudines/Chelonia
Suborders : Two (Cryptodira and Pleurodira)
Families : 13
Genera : 75
Species : 356

Turtle, Tortoise and Terrapin

A bas-relief from Angkor Wat, Cambodia, shows Samudra manthan-Vishnu in the center and his turtle Avatar Kurma below

Turtle, (order Testudines), any reptile with a body encased in a bony shell

- Approximately 356 species of turtles distributed (both terrestrial and aquatic) in all continents except Antarctica.

- **Musk turtle** (***Sternotherus depressus***):

  Carapace length – less than 10 cm (4 inch), 150 gm.

- **Leatherback sea turtle** (***Dermochelys coriacea***):

  More than 1.5 metres (4.9 feet), 600 kg

The First Soviet Union spacecraft in 1968 (Zond 5) to orbit the moon carried a pair of tortoises, returned safely with surviving tortoises which lost only 10% of their body weight, but they remained active and showed no loss of appetite, according to NASA.

- The earliest known turtle fossils are from the Triassic Period, about 220 million years ago. Anatomically, they are nearly identical to modern turtles.
- Most turtles are omnivores.
- The temperature of the sand affects the sex.

World's oldest sea turtle fossil, *Desmatochelys padillai*, found in Colombia

Sea turtles/Marine turtles

Suborder: Cryptodira, Two families: Chelonidae (Five sps), Dermochelidae (One sps)

Species	IUCN Red list status	Distribution
Green, *Chelonia mydas*	Endangered (Population decreasing)	All temperate and tropical waters throughout the world. Between 85,000 and 90,000 nesting females, with two distinct populations in the Atlantic and Pacific Oceans, but also found in Indian ocean.
Loggerhead, *Caretta caretta*	Vulnerable	Inhabits the Atlantic, Indian, and Pacific Oceans and the Mediterranean Sea.
Kemp's ridley, *Lepidochelys kempii*	Critically Endangered	Range includes the Atlantic Ocean and the Gulf of Mexico. Almost all females return each year to a single beach—Rancho Nuevo in the Mexican state of Tamaulipas for nesting purposes.
Olive ridley, *Lepidochelys olivacea*	Vulnerable	Inhabits tropical and warm waters of the Pacific and Indian and Atlantic Ocean.
Hawksbill, *Erytmochelys imbricata*	Critically Endangered	Predominant in tropical reefs of the Indian, Pacific, and Atlantic Oceans.
Flatback, *Chelonioa depressa*	Data Deficient	Largely confined to Australian waters
Leatherback, *Dermochelys coriacea*	Vulnerable	Seen in all tropical and subtropical oceans, widest distribution

Green sea turtle grazing on seagrass

Loggerrhead turtle swimming

Adult Kemp's ridley turtle nesting

An Olive ridley turtle emerged for nesting

Hawksbill turtle swimming

Nesting Flatback turtle

A leatherback turtle emerged for nesting

The Olive Ridley sea turtle or The pacific Ridley sea turtle

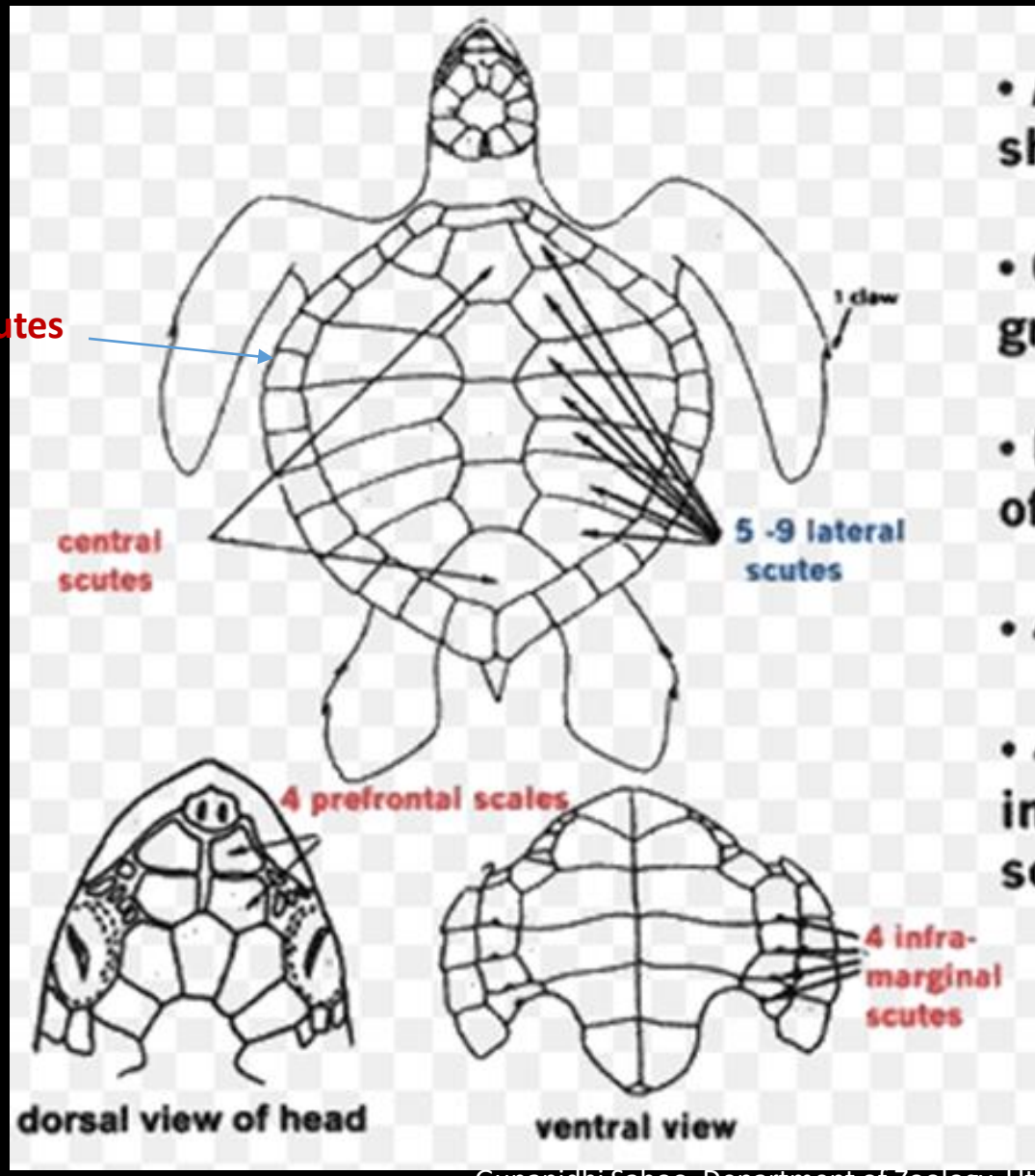
Lepidochelys olivacea Eschscholtz, 1829

(Gr: *lepidos*, meaning scale; *chelys*, which translates to turtle)

- **First described as *Testudo mydas minor*, Suckhow, 1798. Later renamed as *Chelonian olivacea*, Eschscholtz, 1829, and eventually *Lepidochelys olivacea* by Fitzinger, 1843 (Eschscholtz was first to propose the specific epithet *olivacea*).**
- **The smallest and most abundant of all the seven species of sea turtles.**
- **Both the ridleys are best known for their unique mass nesting called *arribada*.**
- **Only genus of sea turtles containing more than one extant species: *olivacea* and the closely related *kempii* (Kemp's ridley).**
- **Grows to about 2' in length, 50 kg, name from its olive-colored heart-shaped and rounded carapace.**
- **Adults are somewhat sexually dimorphic.**
  1. **Males have longer and thicker tails, used for copulation,**
  2. **Presence of enlarged and hooked claws on front flippers**
  3. **More concave plastrons (2 & 3 allow them to grasp the female carapace during copulation).**
  4. **Males also have longer, more tapered carapaces than females, which have round, dome-like carapaces.**
- **These turtles are omnivores, eating a variety of prey including crabs, shrimp, lobster, urchins, jellies, algae, and fish.**

Carapace and Plastron

12-14 Marginal scutes



- Almost round-shaped shell
- Olive/grayish green color
- Between 5-9 pairs of lateral scutes
- 4 prefrontal scales
- 4 pairs inframarginal scutes

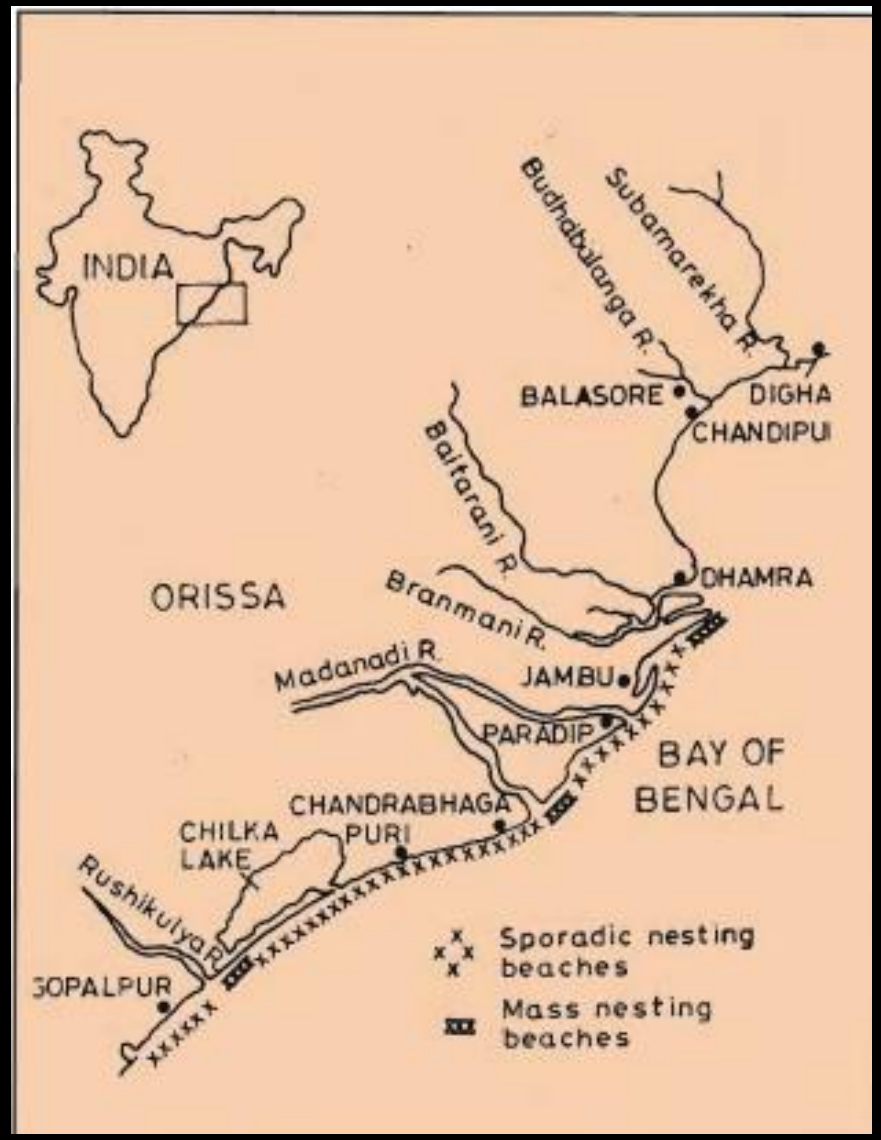
Distribution

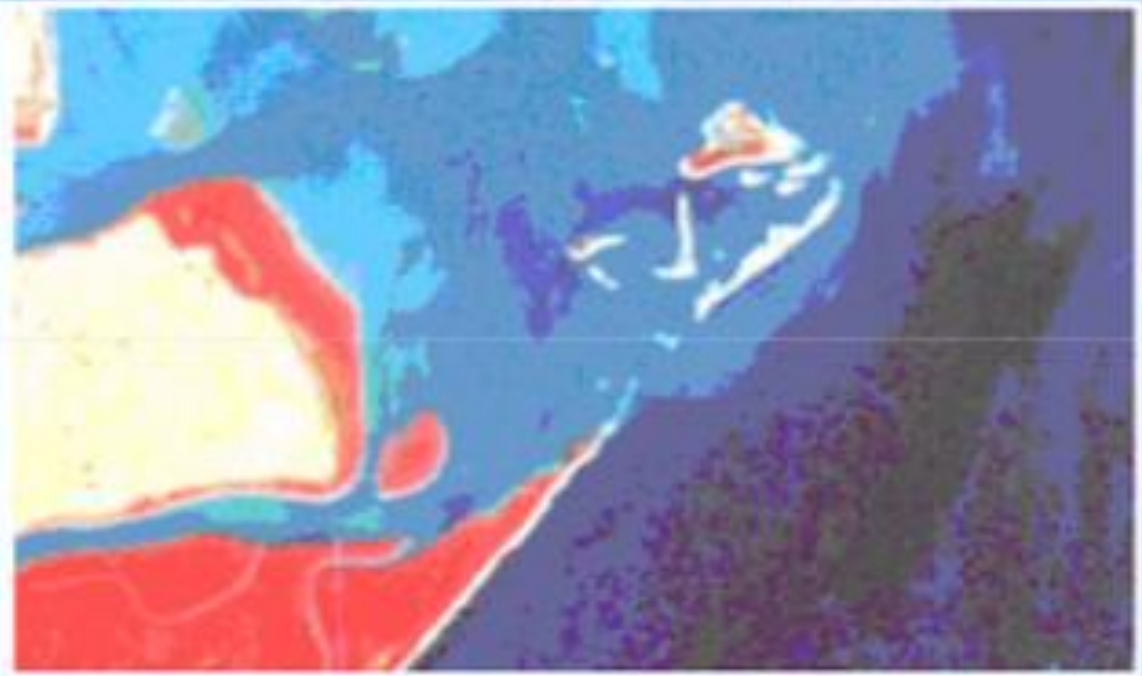
Lepidochelys olivacea **distribution map: red circles are major nesting grounds; yellow circles are minor nesting beaches.**

Nesting Grounds

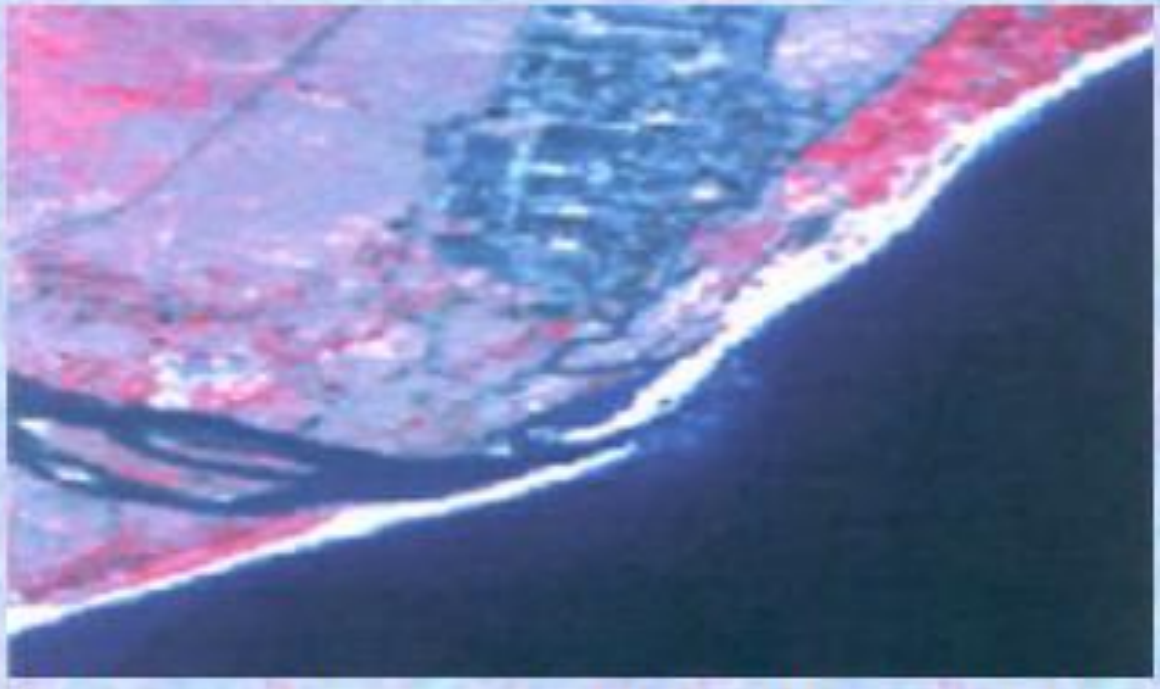
- Best known for their behavior of synchronized nesting in mass numbers, termed ***arribadas***.
- Females return to the **same beach** from where they hatched, to lay their eggs.
- They lay their eggs in conical nests about one and a half feet deep, which they laboriously dig with their hind flippers
- In the Indian Ocean, the majority of olive ridleys nest in two or three large groups near **Gahirmatha and Rushikulya in Odisha**.
- The coast of Odisha is the **largest mass nesting site** for the olive ridley, followed by the **coasts of Mexico (Playa Escobilla), Costa Rica (Nancite and Ostional beaches) and Nicaragua (La Flor)**.
- Total number on earth: **Around EIGHT lakh nesting females**.

Olive ridley rookeries of Odisha





The Gahirmatha beach after its fragmentations in 1989.



The sea beach north of Rushikulya River mouth has emerged as one of the major mass nesting area of olive ridley in India.

WHY DO OLIVE RIDLEY TURTLES VISIT SPECIFIC BEACHES FOR NESTING PURPOSES

Some environmental parameters of Olive ridley concentration localities (Hughes, 1972, Sahoo, 2015)

Locality	Salinity (ppt)	Range of sea surface temp. (°C)	Annual rain fall (mm)	Mangroves along shore lines	Neritic fauna	Organic content	Tides	Spring tidal range	Relative abundance of *L. olivacea*
Bay of Bengal	<34	25-28	>1000	Abundant	Abundant	High	Semidiurnal	2-4	Abundant
Surinam	<34	25-28	>1000	Abundant	Abundant	High	Semidiurnal	2-4	Abundant
Pacific S. Mexico	<33	27-28	>1000	Abundant	Abundant	High	Semidiurnal	2-4	Abundant
West Africa	<35	25-27	>1000	Abundant	Abundant	High	Semidiurnal	2-4	Present
North Australia	<35	27-29	>1000	Abundant locally	Abundant	High	Semidiurnal	2-4	Present
South China Sea	<33	25-28	>1000	Abaundant	Present	High	Mixed	4+	Present
N. Mozambique and Tanzania	<35	25-28	>500	Abaundant locally	Abaundant locally	High inshore	Semidiurnal	2-4	Present
West Malaysia	<36	24-28	>1000	Abaundant locally	Abaundant locally	High inshore	Semidiurnal	2-4	Present

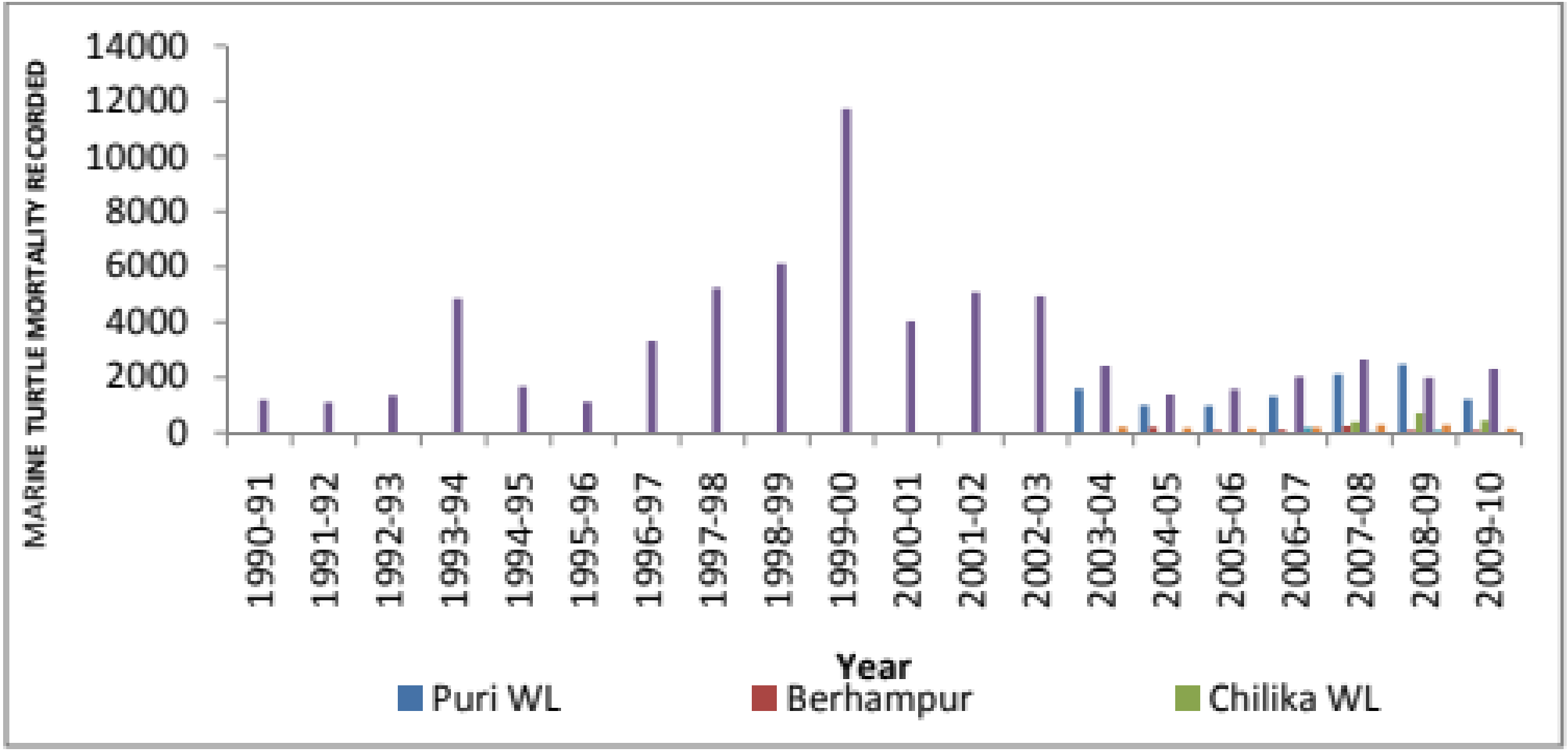
Chemical analyses of green turtle nesting beaches in three oceans (Mortimer, 1990)

Beaches	% Particles	% Silt-clay	Electrical conductivity (mhos/cm)	% Organic carbon	% $CaCO_3$	Mineral composition
Atlantic Ocean						
Ascension Island						
Biogenic beaches	0.9-12.6[a]	0.9-3.4[a]	0.12-2.39[b]	0.11-0.22[a]	73.7-97.4[a]	Calcite, quratz, volcanic fragments
Volcanic beaches	3.1-35.4[b]	1.0-9.0[b]	0.18-12.8[b]	0.07-0.14[b]	0.9-61.4[b]	Quartz, volcanic fragments, assorted oxides, plagioclase, calcite
Tortuguero, Costa Rica	0	1.0	0.14	0.05	2.5	Quartz, volcanic glass & fragments, opaline, silica plagiocas & assorted oxides, rare rhodochrosite, 4% iron
Surinam	6.7	1.5	-	0.06	13.6	Quartz, calcite
Pacific Ocean						
Penarik, Terengganee, Malaysia	1.0	1.1	0.4	0.03	0.8	Quartz
Heron Island, Australia	0.9	3.2	0.16	0.4	95.2	Calcite
Sand Island, Rose Atoll, American Samoa	74.4	1.7	-	0.28	97.7	Calcite
Hawaii Sholas						
Trig Island French Frigate	30.2	4.5	0.96	0.73	94.8	Calcite
East Island, French Frigate	36.2	15.5	5.89	2.4	79.6	Calcite, seabird guano
Tern Island, French Firgate	13.0	2.8	0.25	0.27	97.3	Calcite
S.E. Island, Pearl & Homes Reef	76.8	1.1	-	0.28	97.5	Calcite
Polihua beach, Lanai Island	2.0	1.4	1.96	0.09	95.8	Calcite
Indian Ocean						
Aldabra Atoll	1.1[c]	2.1[c]	0.11-0.62[d]	0.08-0.16[d]	96.6-97.4[d]	Calcite
Hawks bay-sandpit beach, Pakistan	0.5	1.4	0.72	0.03	52.8	Calcite, quartz

[a], [b] & [d] : Rang measured among 10, 5 and 9 beaches, respectively

[c]: calcium phosphate levels of 37,203 ppm recorded.

THREATS



Mortality of ORT along the Odisha coast during the period 1990-91 to 2009-10

Causes of Decline

- Habitat loss and degradation
- Wildlife trade
- Disruption of the food chain
- Predation of eggs by wild animals
- Collection of eggs and meat for consumption
- Incidental capture (bycatch)
- Climate change
- Pollution

ECONOMIC IMPORTANCE

- Cheap source of protein for coastal people
- Shell: Jewellery & ornaments
- Skin: Leather articles
- Oil from fat: Cosmetic base, highly penetrating, medicinal value
- Egg as food

- Marine turtles fulfil important roles in marine ecosystems.
- They feed on invertebrates and may play important roles in both open ocean and coastal ecosystems.

WWF treats ORT as priority species (ecologically, economically and/or culturally the most important species on our planet).

Probable management strategy of sea turtles in Odisha coast

	Numbers	Biomass (tons)
Estimated no of females visiting per year	5, 00, 000	20, 000
Estimated no of males accompanying females	5, 00, 000	20, 000
Average number of eggs laid per year (110 eggs per female)	5, 50, 00, 000	
Average no of eggs damaged by erosion & non-human predators (30%)	1, 65, 00, 000	
Average hatching success from undamaged eggs (83%)	2, 7 8, 05, 000	
Hatching mortality	High	
Estimated average no reaching adulthood (0.1%)	27, 805	

Laws protecting sea turtles

- All species included in Appendix I or II of CITES, 1973.
- Conservation of migratory species of wild animals, 1979
- Wildlife Protection Act of India, 1972, Schedule I
- IUCN Status: Vulnerable
- Population Trend: Decreasing

Organisations involved

- Project Sea Turtle, 1998
- Operation Kachhapa
- Dakshin Foundation
- MCBT, Centre for Herpetology
- WPSI
- Rushikulya Sea Turtle Protection Committee
- Wildlife Society of Orissa

Turtle Excluder Device, Platform Transmitter Terminal (PTT), Awareness

Conservation measures

- Gahirmatha Wildlife Marine Sanctuary
- Participatory approach to involve local communities
- Coordination with all stake holders, both Govt. & Voluntary organisations
- Capacity building through training
- Legal enforcement
- Eco development through village communities
- Popularization of TEDs

Current Research

1. Action to address the impacts of climate change.
2. Monitoring the migration patterns of marine turtles.
3. Improving and supporting trade controls.
4. Protecting nesting sites.
5. Reducing bycatch and promoting smart fishing.
6. Population genetics.
7. Diseases.