

Sea Turtles Across the Globe: Life Cycle Stages and Species Overview

Rajesh kumar^{1*}, Bharti sahu², Vipul Singh Badguzar¹ and Anjana A¹

¹ICAR- Central Institute of Fisheries Education, Mumbai

²College of Fisheries, Dholi

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Abstract

Sea turtles, represented by seven species such as the leatherback, green, loggerhead, and hawksbill, experience distinct life stages: egg, hatchling, juvenile, and adult. Each stage involves unique behaviors and environmental interactions, from nesting on sandy beaches to juvenile foraging in coastal areas and extensive migrations as adults. These species inhabit diverse marine habitats worldwide, contributing to the ecological dynamics of tropical and subtropical oceans. Understanding their life cycles and species diversity highlights the integral role sea turtles play within marine ecosystem. Understanding the biology, behaviors, and environmental roles of sea turtles is key for effective conservation strategies. Their protection not only safeguards critical marine species but also supports the broader health and resilience of the ocean ecosystem.

Keywords: Sea turtles, marine biodiversity, climate change, endangered species

Introduction

Today, seven species of sea turtles—Leatherback (*Dermochelys coriacea*), Green (*Chelonia mydas*), Loggerhead (*Caretta caretta*), Hawksbill (*Eretmochelys imbricata*), Olive Ridley (*Lepidochelys olivacea*), Kemp's Ridley (*Lepidochelys kempii*), and Flatback (*Natator depressus*)—Sea turtles inhabit tropical and subtropical waters worldwide, with seven unique species ranging from the large leatherback to the small, critically endangered Kemp's Ridley. Each species plays an important role in the health of ocean ecosystem. Green turtles, for example, help maintain seagrass beds that provide vital habitats for marine life, while hawksbill turtles regulate sponge populations on coral reefs, promoting coral diversity. However, these species are facing unprecedented threats due to habitat destruction, climate change, pollution, and poaching. Rising global temperatures are causing loggerhead turtles to nest earlier as sea surface temperatures rise (Weishampel et al., 2004; Pike et al., 2006). The loss of sea turtles would have profound impacts on marine ecosystem. This article offers a comprehensive

overview of sea turtles, focusing on their life cycle and species diversity in the context of today's rapidly changing oceans.

The life cycle of sea turtles

The life cycle of sea turtles is characterized by distinct stages: egg, hatchling, juvenile, and adult. Each stage presents unique challenges and environmental interactions, contributing to the overall ecological role of these reptiles. Nesting populations separate themselves to breed, but they mingle during other life periods, such as feeding, foraging, and migration. The composition of the mixed stocks can vary (Bjorndal & Bolten, 2008). Some of them are more productive and can withstand greater mortality than others (Hilborn, 1985). Hence, when turtles mingle in shared feeding habitats, some source (nesting) populations are more vulnerable than others to common stressors (National Research Council, 2010).

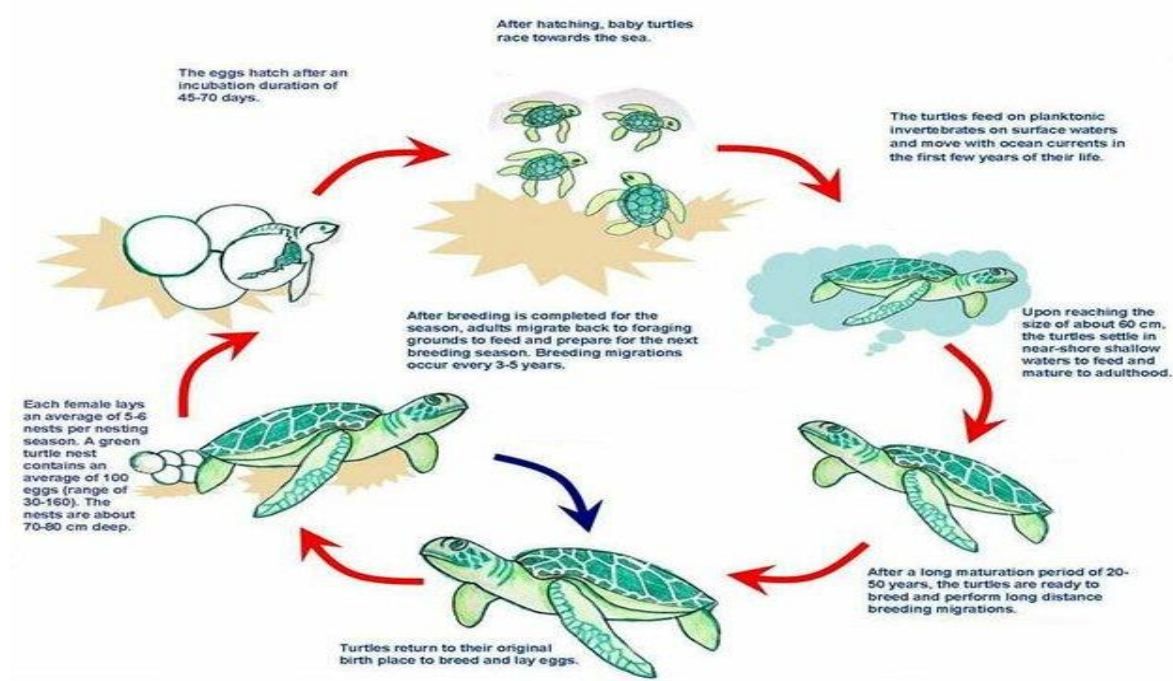


Figure 1: The life cycles of sea turtles

1. Egg stage

Sea turtles typically nest on sandy beaches, returning to their natal beaches to lay eggs, a behavior known as natal homing. Nesting is a critical period in the life cycle (Pike & Stiner, 2007). A female sea turtle can lay anywhere from 50 to over 200 eggs in a single nesting event, depending on the species. The eggs are deposited in a shallow nest dug into the sand, where they are incubated by the natural heat of the sand. Incubation duration varies between species

and is influenced by environmental factors such as temperature and humidity, generally ranging from 45 to 70 days.

2. Hatchling stage

Once the incubation period is complete, hatchlings emerge from the eggs, often synchronously, to evade predation. This critical moment marks the beginning of their journey to the ocean. Hatchlings are particularly vulnerable during this phase, facing threats from predators such as birds, crabs, and other animals. The instinctive behavior to move toward the brightest horizon, typically the ocean, is vital for their survival. After reaching the ocean, hatchlings enter a phase known as the "lost years," where they spend several years in the pelagic zone, largely unobserved. During this time, they rely on oceanic currents for transportation and feed on various planktonic organisms. The survival rate during this stage is exceedingly low, with estimates suggesting that only 1 in 1,000 hatchlings will reach adulthood.



Fig 2: Leatherback hatchling

3. Juvenile stage

As sea turtles grow and develop, they transition from the pelagic environment to more coastal habitats, where they often inhabit areas with abundant food sources such as seagrass beds and coral reefs. Juvenile turtles typically remain in these foraging areas for several years, gradually increasing in size. This stage is critical for their growth and development, as they establish feeding habits and adapt to their respective ecological niches.

Juvenile sea turtles face various challenges, including predation from larger marine species and competition for food resources. Their growth rates can vary significantly based on factors such as species, habitat availability, and environmental conditions.



Fig 3: Leatherback juvenile

4. Adult stage

Adulthood is reached only after an extended juvenile stage (often exceeding 20 years; Ernst et al., 1994; Mortimer, 1995), and few hatchlings survive to adulthood due to naturally high mortality during the first several years of life (Mortimer, 1995; Heppell, 1998). Upon reaching sexual maturity, which can occur anywhere from 20 to 50 years of age, depending on the species, sea turtles become adults and exhibit migratory behaviors. Adult sea turtles often migrate long distances between foraging grounds and nesting sites, demonstrating remarkable navigational abilities. During this stage, adult sea turtles play vital ecological roles. For instance, adult green turtles contribute to the health of the seagrass ecosystem through grazing, while hawksbill turtles help maintain coral reef health by controlling sponge populations.



Fig 4: Leatherback adult

Species overview

Sea turtles are divided into seven unique species, each with specific adaptations, habitats, and ecological roles. These species are distributed globally, inhabiting tropical and subtropical oceans, and play vital roles in maintaining marine ecosystem.

1. **Green turtle (*Chelonia mydas*):** The green sea turtle is the largest hard-shelled sea turtle. Named for the green color of its fat, they are unique among sea turtles in that they are herbivores, eating mostly seagrasses and algae, which supports the health of seagrass beds. Green turtles are found in tropical and subtropical waters worldwide and are one of the largest sea turtle species.

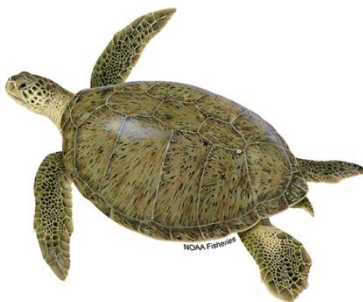


Fig 5: *Chelonia mydas*

2. **Loggerhead turtle (*Caretta caretta*):** Loggerheads are known for their large heads and strong jaws, adapted for crushing hard-shelled prey like crabs and mollusks. They inhabit both temperate and tropical waters and are especially common in the Atlantic, Pacific, and Indian Oceans.

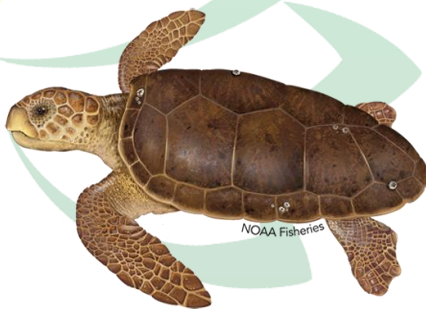


Fig 6: *Caretta caretta*

3. **Leatherback turtle (*Dermochelys coriacea*):** The largest and most distinctive of all sea turtles, the leatherback has a soft, leathery shell rather than a hard one. Leatherbacks are highly migratory, traveling across entire ocean basins to feed on jellyfish, their primary diet.



Fig 7: *Dermochelys coriacea*

4. **Hawksbill turtle (*Eretmochelys imbricata*):** Recognized for their pointed beaks and strikingly patterned shells, hawksbills play a crucial role in coral reef ecosystem by consuming sponges, which prevents the overgrowth of reefs. They are mainly found in tropical coral reefs.

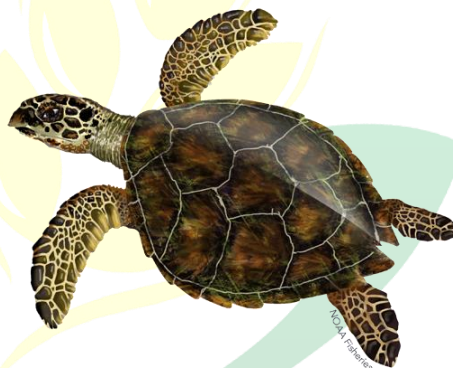


Fig 8: *Eretmochelys imbricata*

5. **Olive ridley turtle (*Lepidochelys olivacea*):** Named for their olive-colored shells, olive ridleys are the smallest of the sea turtle species. They are famous for their synchronized mass nesting events called "arribadas," particularly along the coasts of Central America and India.



Fig 9: *Lepidochelys olivacea*

6. **Kemp's ridley turtle (*Lepidochelys kempii*):** Kemp's ridley sea turtles are the smallest sea turtles in the world. The species is named after Richard M. Kemp, a fisherman from Key West, Florida, who first submitted the species for identification in 1906. Kemp's ridleys primarily inhabit the Gulf of Mexico and are known for their synchronized nesting. They feed on crabs, fish, and mollusks in shallow coastal waters.

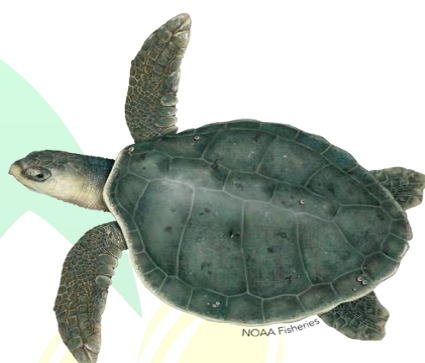


Fig 10: *Lepidochelys kempii*

7. **Flatback turtle (*Natator depressus*):** Endemic to the coastal waters of Australia, The flatback turtle (*Natator depressus*) nests exclusively along the northern coast of Australia. It gets its name from its relatively flat, smooth shell, unlike other marine turtles, which have a high domed shell. Its diet includes sea cucumbers, soft corals, and other invertebrates. Flatbacks are unique among sea turtles as they rarely venture into the open ocean.



Fig 11: *Natator depressus*

Interesting facts about the sea turtles

In Hawaiian mythology, the honu (green sea turtle) symbolizes wisdom and good luck. In ancient Hindu mythology, the turtle (often represented by the god Vishnu's second avatar, Kurma) is considered a crucial figure. also, the image of a turtle carrying the Earth on its back



represents the stability and support that the natural world provides to humanity. In modern symbolism, such as the turtle's representation of patience, persistence, and resilience.

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