Beaches in the eastern state host one of nature's grander spectacles — mass nesting of Olive Ridley sea turtles. **TOI** tracks the turtles' progress and how conservation efforts, community involvement and scientific studies converge to protect a species facing multiple challenges, including from climate change

How Odisha Cleared The Path For Olive Ridleys To Return

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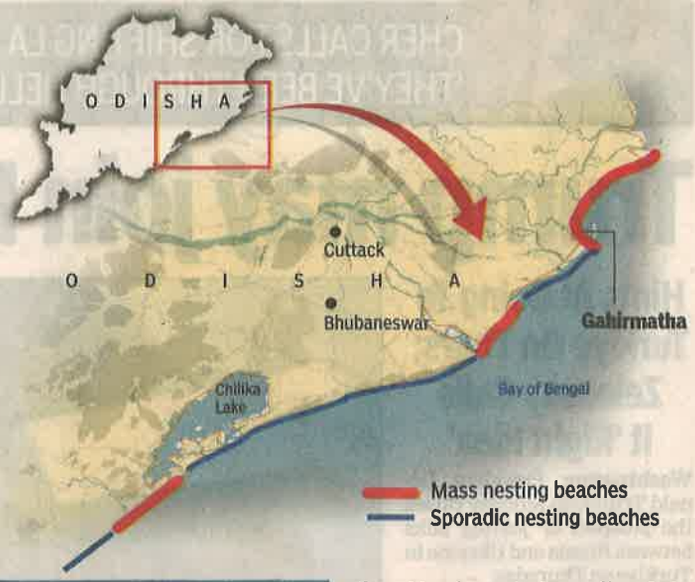
Photos: Ashis Senapati



Awe-Inspiring 'Arribada'

The Olive Ridley sea turtle — named for the colour of its shell — is among the smallest of all turtle species. It inhabits warm tropical waters of the Pacific, Atlantic and Indian oceans and is an omnivore with a varied diet. A depletion in its numbers has led to it being classified as 'vulnerable' in terms of conservation status. **Olive Ridleys are well-known for a mass nesting event, termed 'arribada' (Spanish for arrival),** during which hundreds of thousands of females come ashore to lay eggs.

Experts say that the Odisha coastline hosts the largest mass nesting sites for these turtles, followed by the coasts of Mexico and Costa Rica. Temperature plays a part in determining the sex of the hatchlings — warmer beaches produce more females while cooler conditions are linked to the birth of more males. **The hatchlings emerge after about 45-65 days and make their way to the sea.** Incidentally, females return to beaches in the same area where they were hatched to lay their eggs.

We are what we repeatedly do. Aristotle might not have had Olive Ridley sea turtles in mind when he spoke of the extraordinary power of routine, but few things embody his survival hack better than the nesting ritual that unfolds on Odisha's Gahirmatha beach at this time of the year.

As midnight descends on Gahirmatha, around 170km from Bhubaneswar, the beach turns into a strange and sublime address. Thousands of female Olive Ridleys emerge from the foamy edge of the Bay of Bengal and scurry up the beach, leaving a trail as they drag their flippers through the sand to find a comfortable spot before settling in. They are here to lay eggs. Once the job is done, they will vanish into the waves from where they had surfaced.

This nesting season was a landmark one. Over 6.1 lakh turtles laid eggs along the beach as against last year's 3.5 lakh. The nesting occurred over 14 days in Feb across various locations within the Bhitarkanika National Park, including the Nasi-1, Nasi-2, and Eakakulanasi islands.

Rushikulya beach, another nesting site in Odisha's Ganjam, reported record numbers. Between Feb 16 and 23, approximately 7 lakh turtles came ashore to nest, surpassing the 2023 count of 6.4 lakh. The bonus was around 2 lakh turtles returning for a second nesting phase after an eight-year gap, a rare occurrence that thrilled conservationists.

Some GPS-tagged turtles travelled thousands of kilometres to the Sri Lankan coast before returning to nest, offering insights into complex migration patterns.

"South equatorial currents are among the factors influencing the turtles' journey to the Odisha coast, along with food availability and quality of sand," divisional forest officer (Berhampur) Sunny Khokhar, who oversees safeguards for the nesting season at Rushikulya, told **TOI**.

Rallying Around Ridleys

Although similar mass nesting events occur in Mexico and Costa Rica, the scale of Odisha's "Arribada" — from the Spanish word "arribar", meaning "to arrive" — is unparalleled.

The achievement is the result of decades of conservation efforts initiated after thousands of deaths were reported each nesting season between 1999 and 2003, prompting the Supreme Court to intervene.

In 2004, the Odisha govt launched a concerted initiative to protect the species, classified as "vulnerable" on the International Union for Conservation of Nature's Red List.

The measures included enforcing fishing bans, cleaning up beaches, reducing light pollution, and protecting nesting grounds from predators.

Community involvement has been central to these efforts. Villagers assist forest officials in patrolling the beaches, ensuring that eggs are protected from predators like wild animals and stray dogs. Volunteers also help relocate eggs from vulnerable pits to artificial hatching points, where they are kept until the hatchlings emerge.

"I am the bridge between the forest department and the local community, especially fisherfolk," said Rabindra Kumar Sahu, a volunteer from Podampeta village near the Rushikulya nesting site. "We need constant dialogue to address the fisherfolk's concerns, while ensuring that the turtles are not harmed."

Assistant conservator of forests Dibya Behera credits local involvement with bringing global recognition to Odisha's Arribada. "Without their support, conservation isn't possible. Over time, they have developed a sense of belonging with the turtles," he told **TOI**.

Fishing restrictions have been key to reducing turtle mortality. Under the Odisha Marine Fisheries Regulation Act, mechanised trawlers are banned around nesting areas from Nov to May.

"We enforce this fishing ban strictly during the nesting season and also switch off high-mast lights near highways to reduce disturbance," said chief wildlife warden Prem Kumar Jha.

Shifting Sands

Along with the plaudits coming Odisha's way, newer challenges, too, have emerged.

A warming planet is subtly altering the turtles' nesting conditions. According to a study by researchers from the Indian Institute of Science (IISc), Bengaluru, and Dakshin Foundation, warmer sands produce more females. The paper, "Monitoring Sea Turtles in India 2008-2024", points out that "feminisation" could disrupt the species' long-term survival prospects.

The hatchling sex ratio during mass nesting at Rushikulya was found to be about 71% female on average. "Nesting in some years produced female-biased sex ratios due to high temperatures, while a few threw up male-biased sex ratios," said turtle biologist B C Chaudhury.

Unlike humans, sea turtles don't have sex chromosomes. The sex of hatchlings is determined by sand temperature during incubation.

"When eggs incubate above 31°C, the hatchlings will be female," said Muralidharan Manoharakrishnan, senior wildlife researcher at WWF-India. "Temperatures fluctuating between extremes produce a mix of male and female turtles."

In 2022, when sea temperatures reached 33°C, 97% of hatchlings at Rushikulya were female. Similar patterns were observed in 2011, with an average temperature of 31°C yielding 97% female hatchlings. Conversely, lower temperatures in 2014 (average of 29.5°C) produced more males (72%). Chaudhury said that over the last 15 years, the sex ratio at Rushikulya has been skewed towards females. Although no such study has been conducted at Gahirmatha, Chaudhury reckons that the trend there would be the same.

Turtles' Trot

As millions of hatchlings begin their maiden journey into the sea, the odds of survival are slim. Only one in 1,000 hatchlings survives to adulthood, braving natural predators and environmental threats.

"After mating mid-sea, the males turn back, while females come ashore in batches to nest," said turtle expert Sushil Datta. "They dig a pit about 1.5 feet deep, lay 100-120 eggs, and leave them in nature's care. It's a fragile cycle, but those who endure sustain one of the world's most extraordinary phenomena."

Odisha's conservation measures extend beyond local enforcement. In 2022-23, the Defence Research & Development Organisation (DRDO) postponed missile testing at Dr Abdul Kalam Island, formerly Wheeler Island, to avoid disturbing nesting turtles. Armed forces and the Coast Guard are also deployed during the nesting season to ensure the safety of the turtles. "Olive Ridleys need a clean beach where they can lay eggs. They return to the sea if they find the nesting place polluted," conservationist Bijay Kumar Kabi said.

The Odisha forest department recently released two GPS-tagged turtles into the sea at Gahirmatha to study their behaviour. The Wildlife Institute of India hopes satellite data will provide new insights into Olive Ridleys' lives in the waters.

"The sophisticated chip is expected to reveal interesting aspects of their deep ocean life, while making it clear how many days they take to reach their destination," divisional forest officer (Bhitarkanika), Sudarshan Gopinath Yadav said.

By the time Olive Ridleys again resume their long march to Odisha's shores, DFO Khokhar and his team would have known a little more about their famous annual guests.

With inputs from Ashis Senapati