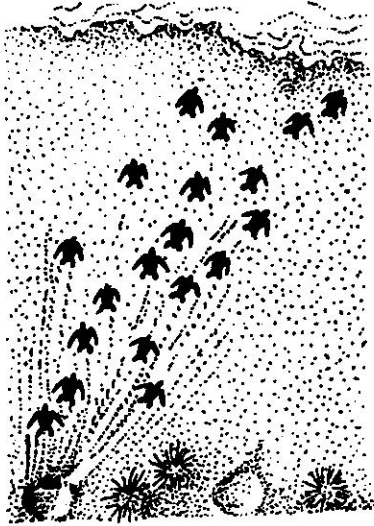


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Turtle extravaganza

by Satish Bhaskar

Life began in the sea, and even today our blue planet depends upon the sea for its very survival. A great equaliser, the sea feeds us, filters our pollutants, maintains our climate and ensures, through the hydrological cycle, that the Earth is well stocked with fresh water. Given our generation's penchant for environmental vandalism, the mission of saving the seas will probably be the cement to unite future generations. The process, in fact, has already begun. Young people from all walks of life, who realise that environmental imperatives require joint endeavours, have started rejecting narrow, parochial boundaries and chauvinistic, national attitudes. In country after country these Earth citizens have begun to speak out against the policies of their own governments when they contribute towards the degradation of common resources such as the sea and the atmosphere. As awareness grows,





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and the futility of trying to conquer nature for human survival becomes universally accepted, global warming, the depletion the ozone layer and the survival of the sea is destined to occupy the apex of political agendas. It is in this context that conserving creatures like whales and turtles, which migrate through the seas to the far corners of the globe, has begun to define futuristic environmental attitudes. In Orissa, one particular stretch of beach at Gahirmatha, plays host to hundreds of thousands of migrating turtles. Protecting this beach, in response to our country's global responsibility, has rightly become an article of faith. Almost seven years ago (Vol. No. 2) we carried an article on the Arribada phenomenon. This update will help keep readers in touch with the current status of the turtles and their ecosystem, as the author, a marine biologist, shares with us his experiences at Gahirmatha and his vision for tomorrow.

They arrive twice each year by the thousands, in some years by the hundred thousand, to mate offshore and to lay their eggs on the sandy beach — just as their ancestors have been doing at least 30 million years before the first man walked the earth. Travelling in loose groups numbering a few individuals to a few thousand, each olive Ridley turtle (*Lepidochelys olivacea*) manoeuvres its streamlined 50 kg bulk, swimming easily and steadily towards its nesting and breeding area on India's east coast. All females, except those undertaking the journey for the first time, the virgins, will each lay about 120 eggs and sometimes an additional clutch of similar size about 45 days later. The males make the arduous journey merely to mate, but it appears likely that mating will not result in eggs before the following nesting season — females are believed to possess the unusual ability to store viable sperm in their reproductive tracts for years on end! Males and females instinctively congregate off the beaches where they had hatched over five years earlier. The homing mechanism that enables nesting females to

locate the beach where they hatched after a journey of over 2,000 km — to an accuracy of a few kilometres, sometimes to a few meters — remains a mystery.

The main nesting place in India is at the Gahirmatha beach, a 35 km sandy stretch immediately south of the mouth of the Maipura river (a distributory of the Mahanadi) in Cuttack district, Orissa. Today, Gahirmatha and other beaches in Cuttack district host one of the last remaining major nesting populations of olive Ridley sea turtles in the world, rivalling or surpassing

the numbers that nest at other major sites such as the Pacific coasts of Mexico and Costa Rica. Though more Ridleys nest in Mexico than in India, the Mexican populations are decreasing at an alarming rate, as humans exploit them for their skin and meat.

Although migrating masses of sea turtles have been observed swimming northwards every winter from seas off Sri Lanka, the precise location of their feeding areas, the starting point of the spectacular migration, remains an enigma. The journey from the distant feeding grounds to breeding areas and back entails at least 4,000 km of swimming, half of it against prevailing sea currents.

During the annual 'assault' on the Orissa beaches, hordes of olive Ridleys intent on burying their eggs on the sandy beach run a gauntlet of waiting mechanized trawlers, sail-boats and of the surf. Like humans at war, sea turtles too have mortal enemies on and under the sea, in the air and on land. In addition to trawler fishermen, sea turtles have to contend with sharks and killer whales which take all sizes of turtles from 40 gm hatchlings to adult leatherback sea turtles (*Dermochelys coriacea*) weighing 700 kg (an occasional leatherback has been observed swimming with the vast armadas of olive Ridleys, but no concentrated nesting areas for leatherbacks have been located so far on the In-

"Sex determination is dependent on the incubation temperature and the sex of emerging hatchlings is not determined until after the eggs are laid. It is observed that hotter sand favours faster incubation and tends to enhance production of female hatchlings"

dian mainland). A number of fish species take turtle hatchlings at sea. From the air, frigate birds, eagles and gulls snatch hatchlings swimming on the sea surface, especially over the first few days of the turtles' existence when the buoyancy of their incompletely absorbed yolk-sacs inhibits diving. Land predators such as domestic dogs, jackals, wild boar and crabs excavate turtle nests on land or catch the young as they scramble seawards after emerging from the sand.

The conditions for egg survival are best when the nesting of turtles coincides with strong onshore winds, the blustery conditions causing wind-blown sand to obliterate nesting tracks and sites on land. Land predators usually locate nests by smell and are also thus thwarted to some extent.

The earliest turtles, those of the Triassic (190 - 225 million years ago) differed surprisingly little in form from modern day sea turtles, of which the olive Ridley is one of seven surviving species. (There are over 220 species of related freshwater turtles and land tortoises). Despite their marine existence, sea turtles are reptiles, and therefore cousins to snakes, crocodilians and lizards, possessing lungs and breathing air. A major cause of turtle deaths the world over is accidental drowning in trawl nets. The Coromandel coast is no exception. Turtle eggs cannot hatch in water, unlike those of amphibians (frogs, newts and salamanders). Turtles are therefore dependent on the sanctity of their nesting beaches on land for their survival.

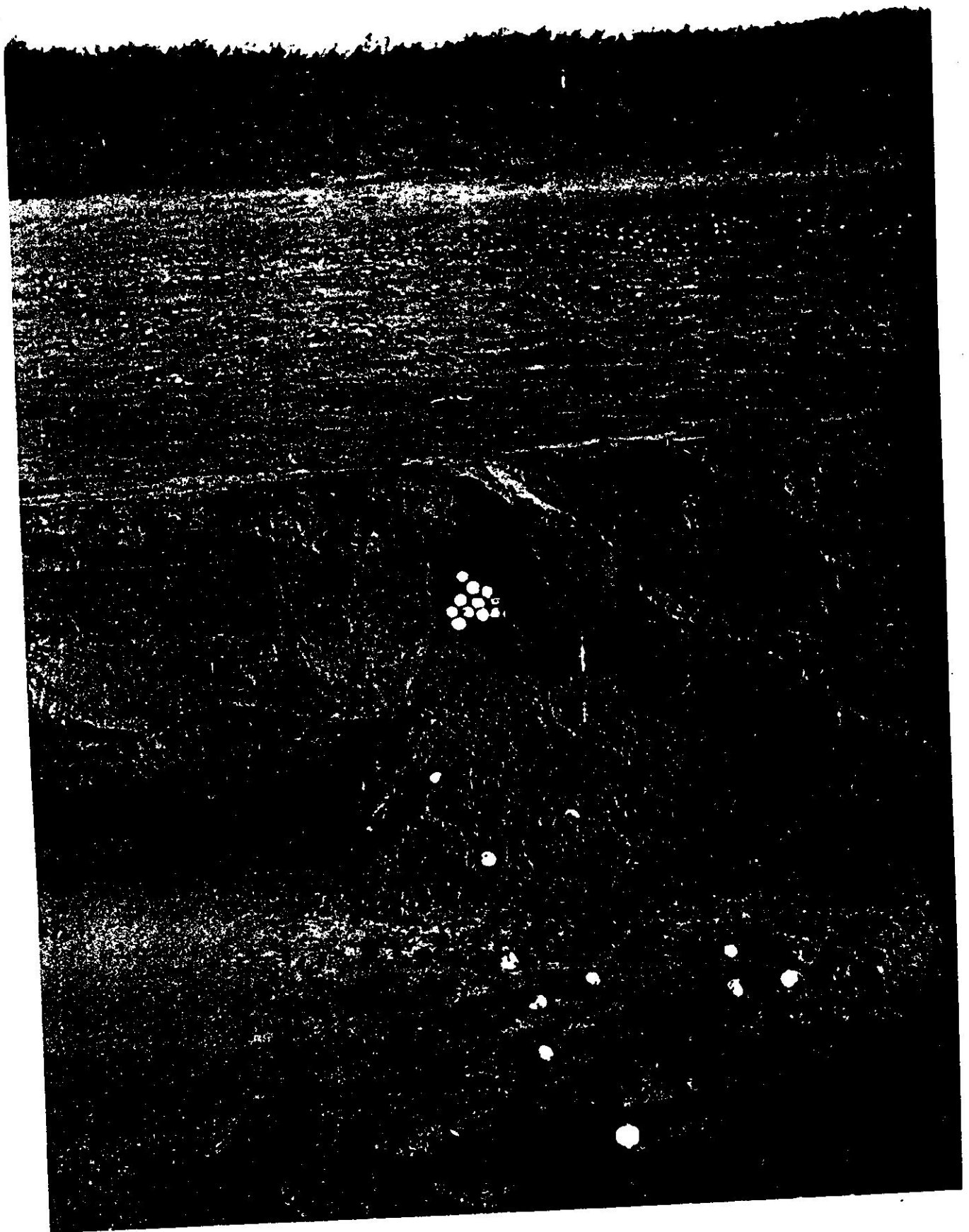
Eggs are laid seven to 90 cm below the surface of the sand and take 45-70 days to hatch, depending on the sand temperature. Other sea turtles, leatherback and green turtles, for instance, usually nest more often within a season than Ridelys, up to 11 times at 9 day intervals. About 100 eggs are laid on each occasion.

But then these turtles usually nest every other year, or even once every four years, while the olive Ridley nests every year. The large number of eggs (100-800) laid within a season offsets heavy predation levels at egg, hatchling and juvenile stages. It is estimated that only one out of a 100 eggs laid actually survives to adulthood, but even this is enough to ensure the survival of the species. This survival strategy is, however, extremely fragile and predation by humans, especially on adult turtles, may tilt the scales towards turtle extinction.

The Orissa State Forest Department now provides complete protection at the main nesting site at Gahirmatha, where in the '70s turtle eggs were collected for commerce by the boatload. Situated in the delta of the Mahanadi, Gahirmatha is backed by mangrove swamps which hinder human access to the beach which forms the seaward edge of the Bhitarkanika National Park. Although there exists a village, Satabhaya, very near the main nesting beach, the inhabitants are vegetarian and have no dietary interest in turtle meat or eggs. The forest department sensibly involves villagers in the protection and patrolling of the beaches; on-going turtle research is restricted mainly to the period between the 'arribada' (a Spanish word meaning 'the arrival'. Here: the arrival of the mass-nesting turtles) and the emergence of the young turtles.

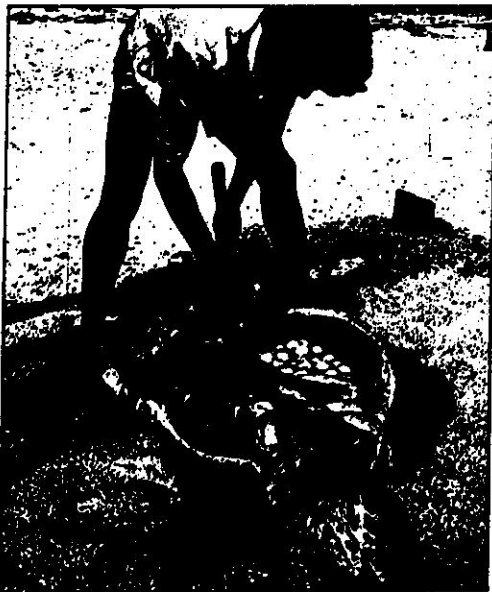
" Like humans at war, sea turtles too have mortal enemies on and under the sea, in the air and on land. In addition to trawler fishermen, sea turtles have to contend with sharks and killer whales which take all sizes of turtles"

Sex determination is dependent on the incubation temperature and the sex of emerging hatchlings is not determined until after the eggs are laid. It is observed that hotter sand favours faster incubation and tends to enhance production of female hatchlings. A temperature of around 30° C results in 50% males and 50% females. However, the sex ratio (number of females per thousand males) in nature is not known. Such knowledge assumes great importance wherever eggs are transplanted to hatcheries to circumvent egg and hatchling predation on land and





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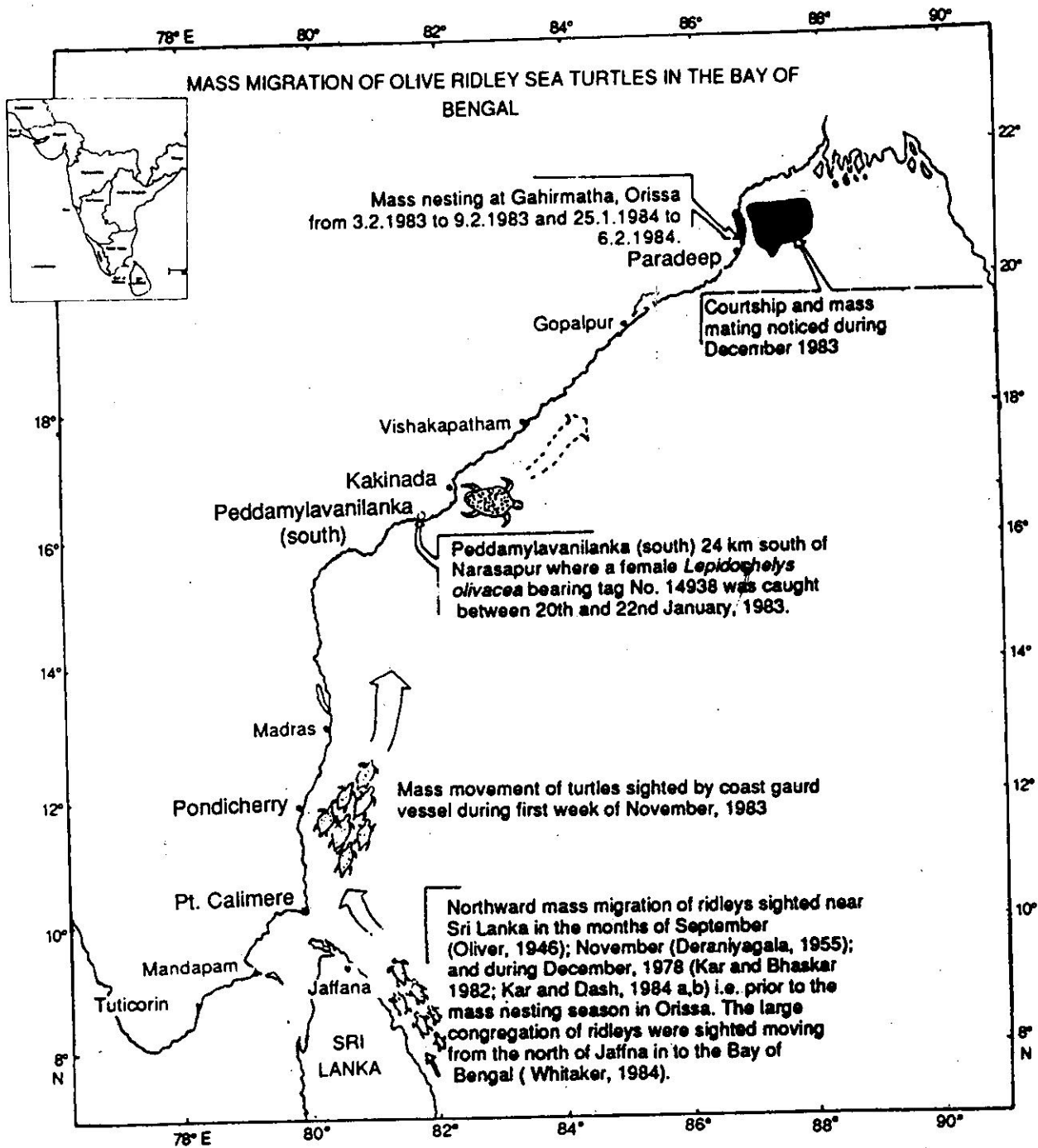


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D. Nayak

In most years there have been two arribadas in Orissa, but twice in the eighties the second arribada failed to appear. In fact the 1982 arribada was a very weak one, with only about 5,000 Ridleys having nested, as compared to several hundred thousand in a good year. The Gahirmatha beach (facing page) is infested by dogs, one of which probably excavated this exposed nest. During the annual 'assault' on the Orissa beaches, hordes of olive Ridleys intent on burying their eggs on the sandy beach run a gauntlet of waiting mechanized trawlers, sail-boats and indeed the surf itself (page 36/37). Around the world, if caught, turtles such as this hawksbill (above left) end up as meat. Apart from humans, sea turtles have mortal foes on and under the sea, in the air and on land. All species of turtles must, for instance, contend with enemies such as this tiger shark (top) in whose intestines the remains of a large hawksbill turtle were discovered. A symbol of international conservation and cooperation, the future of this olive Ridley (above right) lies almost entirely in the hands of today's world leaders and their attitude towards the protection of marine environments.



Mass mating, mass nesting places and the migratory route of the Olive Ridley sea turtles in the Bay of Bengal.

(Source: The Turtle Paradise - Gahirmatha. M. C. Dash & C. S. Kar, 1990)

subjected to unnatural temperature regimes.

The uncontrolled exploitation of olive Ridleys such as that which occurred in the '70s and early '80s, when huge numbers were being landed at Digha in West Bengal mainly for the Calcutta market, must end. Astronomical numbers of Ridley eggs are lost in some years to sea erosion at Gahirmatha. One of the objectives of research there must be to forestall these losses and to eventually make turtle eggs, which are a valuable protein resource, available for human consumption, *without affecting natural turtle populations.*

Though sea turtles flourished in the Jurassic period (136 to 190 million years ago), they did not nest in India then. The Indian peninsula was then landlocked, being part of the super-continent Gondwana, hemmed in on the west by Africa and Madagascar and on the east by Australia. India then drifted towards the rest of Asia (which together with Europe and North America formed the northern super-continent Laurasia).

Today sea turtle nesting is restricted to the tropics and sub-tropics, and presumably always was. It would therefore have been many million years before turtles found warm nesting habitats in India, as the sub-continent drifted across south temperate latitudes and eventually entered the subtropics. Despite India's exceptionally fast northward drift (up to 17 cm/year, compared to 0-7 cm per year which is the usual speed of continental drift) it was not until 30 million years ago that India collided with and cohered to the rest of Asia (to push up and form the Himalaya). The time frames and environmental parameters involved in the olive Ridley's selection of the east coast of India for mass nesting remain hypothetical.

Today, the olive Ridleys that nest in Orissa constitute one of India's major wildlife resources and must be

considered as a world heritage. All seven surviving sea turtle species are endangered or threatened with extinction mainly because of man's exploitation of their meat, eggs, shells (as curios), skin (as leather) and because of our alteration or destruction of nesting beaches. There has been a recent world-wide awareness of the need to conserve sea turtles and their habitat. India's nesting turtle populations are among the three largest in the world (the others being those of Mexico and Australia). Our turtle conservation programme is therefore of global importance.

A warning that India's nesting Ridley populations

are in decline may already be in evidence. In most years there have been two *arribadas* in Orissa, but twice in the eighties the second 'arribada' failed to appear. In fact the 1982 *arribada* was a very weak one, with only about 5,000 Ridleys having nested, as compared to several hundred thousand in a good year. Whether the occasional fall in numbers is a natural transient phenomenon (perhaps reflecting a temporary shortage in the turtles' food supply) or an indication that turtle populations are decreasing is unclear. The 1982 debacle in nesting numbers at Orissa was followed by a bumper year when 800,000 turtles were estimated to have nested on the Orissa beaches. In any case, the turtles are far too valuable — as a food resource, as an ecol-

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ogically and biologically important species and as part of India's animal heritage — to be allowed to reach the precarious level of population of the related Kemps Ridley (*Lepidochelys kempfi*) in the Atlantic. From an estimated world population of 42,000 in 1947, estimates suggest there are now less than 5,000 Kemps Ridleys — a result of unregulated human exploitation. It is our collective responsibility to ensure that India's magnificent sea turtles are propagated and conserved for the aesthetic, scientific and economic advancement of our children.

