

LEATHERBACK TURTLES AND CLIMATE CHANGE

Turtle-y exposed to climate change



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Summary

- The Leatherback Turtle is the largest of all the living turtles. Weighing in at over 500kg, it is often called the 'gentle giant' of the ocean.
- Higher sand temperatures during egg incubation lead to disproportionately higher numbers of female turtles. Increasing sand temperatures caused by climate change could threaten the stability of Leatherback populations in the future.
- Rising sea levels and increased storm activity may wash away turtle nests and decrease turtle nesting habitat.
- Leatherbacks are listed as Critically Endangered on the IUCN's Red List and already face a number of threats, including accidental capture by fisheries, coastal development and mistaken consumption of plastic debris.
- Leatherback Turtles highlight the impacts of increasing air and sea temperatures, rising sea levels and changing ocean currents. These changes are likely to affect all marine turtles and many other marine species.

The IUCN Red List of Threatened Species™

LEATHERBACK TURTLES AND CLIMATE CHANGE

The Leatherback Turtle (*Dermochelys coriacea*) is the largest of all the living turtles. Leatherbacks can reach lengths of nearly two metres and can weigh more than 500 kg. The largest specimen ever found weighed an astounding 916 kg, justifying the Leatherback's title as a 'gentle giant' of the oceans.

Leatherbacks are easily distinguished from other turtles by their smooth, leathery and comparatively softer shells. They can dive to depths of more than 1,000 metres, much deeper than any other marine turtle. Leatherbacks are the sole member of their family and are unique among reptiles in their ability to maintain a constant internal body temperature higher than the surrounding water.

What do we know about Leatherback Turtles?

The Leatherback's ability to regulate its body temperature has afforded the species the widest distribution of all the world's reptiles. Individuals have been found as far north as Alaska and Norway, and as far south as the Cape of Good Hope in South Africa, southern Chile and Argentina. They are found in three of the world's oceans: the Atlantic, Indian and Pacific. Leatherback nesting sites are found in many countries around the world, including those in the Americas, Africa, Asia and Australasia.

For nesting, Leatherbacks require soft, sandy beaches with wide entry from the ocean. The females emerge on to the beaches and dig holes with their rear flippers to create a nest. Female Leatherbacks deposit approximately 100 eggs into the nest and then carefully back-fill their nests, disguising it from predators with a scattering of sand. Female Leatherbacks can repeat this process at approximately 10-day intervals during the nesting season. Once nesting is complete, female turtles return to the open ocean to feed for the first time since the egg-laying season began. Females tend to nest at between two and seven-year intervals.

The incubation period of Leatherback Turtle eggs is approximately 60 days. During this time the gender of the hatchlings is determined by the average temperature at which the eggs develop; cooler temperatures produce males, while warmer temperatures produce females. Hatchlings are in immediate danger of predation from birds, crustaceans, other reptiles, and feral animals (dogs, pigs, etc). Once they reach the ocean they are generally not seen again until maturity and virtually nothing is known about this life stage. Very few turtles survive this period to become adults.

Jellyfish are the main food of Leatherbacks, although other food types include sea squirts and other soft-bodied animals. These floating animals are found in great numbers where ocean currents meet, and where cool, nutrient-laden water moves upwards from lower depths. These sites may be thousands of kilometres away from the turtles' nesting sites, and are the reason for their huge migratory distances - further than any other marine turtle species.

How is climate change affecting Leatherback Turtles?

Climate change is likely to affect Leatherback Turtles in at least three important ways.

Increasing feminisation:

Average global temperatures are predicted to increase by at least 2°C in the next 40 years due to climate change. The resulting increase in the temperature of the sand used for nesting could have serious consequences for Leatherbacks, as well as other species whose gender is determined by embryonic temperature. The predicted outcome of this change is an increase in the number of females relative to males in populations. This could threaten the stability of Leatherback populations in the future.

Increases in temperature have also been shown to lead to hatchling abnormalities and developmental and other health problems in young Leatherbacks.



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Beach erosion:

Ocean levels are thought to have risen at an average rate of 1.8 mm per year since 1961, and are predicted to rise even more rapidly in the future. Increases in storm frequency and severity have also been predicted. This is likely to lead to increased beach erosion and degradation, which could wash away turtle nests and decrease nesting habitat in the longer term.

While climate change adaptation measures, such as sea walls, help to prevent sea level rise impacts on human populations, their increased construction is likely to further reduce the availability of Leatherbacks' nesting habitat in the future.

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Dispersal and food availability:

Ocean currents are important for both juvenile and adult Leatherbacks. Juveniles use them to aid dispersal following hatching and adults use them as aids to navigation and long-distance migration. In addition, changes to oceanic currents are likely to affect the abundance and distribution of jellyfish and other Leatherback prey species. While climate change impacts on ocean currents are likely, the nature of these changes, and hence their effects on Leatherbacks, remain uncertain.

Can Leatherback Turtles adapt to climate change?

Throughout their evolution, marine turtles have experienced climatic changes and have adapted accordingly. However, the current rates at which changes to the climate are occurring are believed to be faster than anything Leatherbacks and other marine turtle species have encountered previously. Such rapid changes, in combination with the Leatherbacks' long and slow-

maturing life history, may limit the species' capacity to adapt quickly enough to prevent severe population impacts.

While physiological adaptation may be limited in Leatherbacks, there have been suggestions that the species may be able to adapt behaviourally in order to persist in the changing climate. While females are known to return to the same region and perhaps nesting beach, to nest each breeding year, Leatherbacks are among the most flexible turtle species in their nest site choice. Over time, Leatherbacks' flexibility may help them adapt their nesting site choice to select more favourable areas. Indeed, northward extensions of both nesting and feeding areas have been observed in the species.

For this to be possible, potentially suitable beaches need to be available in more favourable areas. Coastal developments and pressures from humans have already rendered many possible sites unsuitable, and increasing sea wall development and beach erosion are likely to further reduce beach availability.

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Other threats

Leatherbacks' ability to adapt to climate change may be further limited by other factors already contributing to their Critically Endangered status. Leatherbacks already face a suite of threats, which include human harvesting, accidental capture by fisheries, coastal development and mistaken consumption of plastic debris. Such ongoing threats are likely to make Leatherbacks less resilient to further pressures, especially those arising from climate change. There is a clear need for greater protection of this species.

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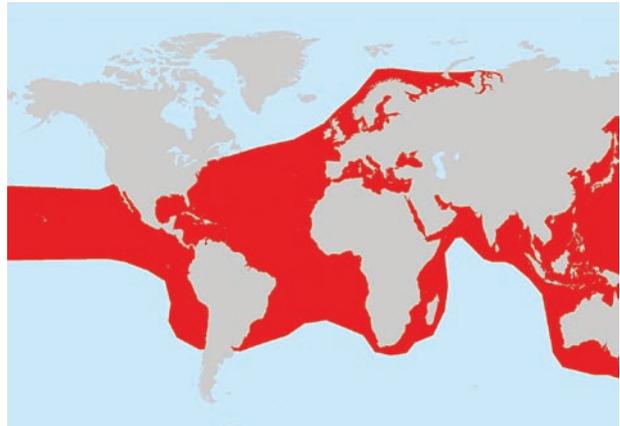
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Leatherback Turtle geographical range – © IUCN Red List

“Sea turtles are truly resilient creatures that have survived millions of years of global change, yet today they are in decline pan-globally due to the unprecedented pace of climate change and other human-generated impacts. Sea turtles are bellwethers, whose message to man is that slowing and reversing climate change is urgent.”

“Healthy oceans are the underpinning of human well-being in coastal regions across the planet, and through ecosystem services like oxygen production and carbon sequestration, they are undisputedly critical to overall human survival. The bottom line in saving the seas lies in controlling what humans put into and take out of it – it is all about human behaviours as they relate to consumption and waste. Sea turtles have proven again and again to be exceedingly good flagships for engaging people and “selling” the concepts of ocean conservation to the public.”