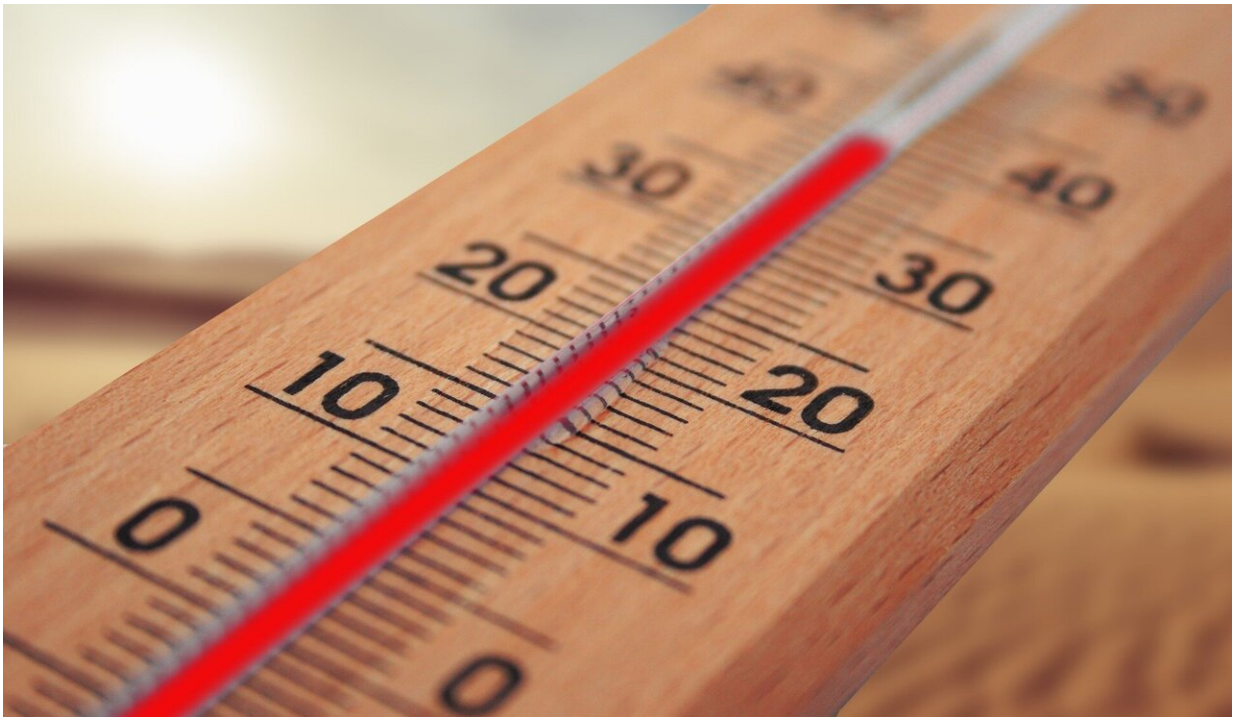


# Climate change could bring short-term gain, long-term pain for loggerhead turtles

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An overwhelming scientific consensus affirms that for thousands of species across the globe, climate change is an immediate and existential threat.

For the loggerhead turtle, whose vast range extends from the chilly

shores of Newfoundland to the blistering beaches of Australia, the story isn't so cut and dried.

New research from conservation biologists at Florida State University and their collaborators suggests that while some loggerheads will suffer from the effects of a changing climate, populations in certain nesting areas could stand to reap important short-term benefits from the shifting environmental conditions.

In an investigation of 17 [loggerhead turtle](#) nesting beaches along the coast of Brazil, scientists found that hatchling production—the rate of successful hatching and emergence of hatchling [turtles](#)—could receive a boost in temperate areas forecasted to warm under [climate change](#). But those improvements could be relatively short lived.

"Even though hatchling success is projected to increase by the year 2100 in areas that currently have lower temperatures, it is likely that as climate change progresses and temperatures and precipitation levels approach negative thresholds, hatchling production at these locations will start to decrease," said study author Mariana Fuentes, an assistant professor in FSU's Department of Earth, Ocean and Atmospheric Science.

The study was published in the journal *Scientific Reports*.

During the incubation process, marine turtle eggs are heavily influenced by their environments. Air and sand temperatures can determine the sex of hatchlings, spikes in [moisture content](#) can drown developing embryos, and excessive solar radiation exposure can affect turtles' morphology and reduce their chances of survival.

In their study, the FSU researchers evaluated current and projected hatchling production under a variety of different [environmental conditions](#) throughout the expansive Brazilian coastline.

In the northern equatorial nesting beaches where temperatures already soar, the team found persistent and accelerating climate change will increase air temperatures and escalate precipitation beyond the thresholds for healthy incubation—a major hit to [hatchling](#) production.

For the temperate beaches farther down the coast, climate change will bring similar increases in air [temperature](#) and precipitation. But, hundreds of miles from the equator, the effects of those changes look considerably different.

"These cooler beaches are also predicted to experience warming air temperatures; however, productivity is predicted to increase under both the extreme and conservative climate change scenarios," said former Florida State master's student Natalie Montero, who led the study.

Over the coming decades, as the climate shifts and temperatures climb, these conventionally cooler beaches will become more suitable for healthy loggerhead incubation. But if climate change continues unabated, "these beaches could also become too warm for successful production, much like the warmer beaches in our study," Montero said.

The researchers also stress that changes associated with a warming climate—[beach](#) erosion, unchecked coastal development and environmental degradation, for example—pose urgent threats to marine turtle nesting beaches at all latitudes, regardless of air temperature or precipitation.

And while contemporary and future shifts in climate conditions could benefit select loggerhead populations, well-documented warming trends suggest the long-term prospects of these and other ancient sea turtle species remain precarious.

"Sea turtles have been around for a long time and have survived many

changes to the global climate," Montero said. "However, climate changes of the past took a long time, allowing sea turtles to adapt to the changing conditions. Today's [climate](#) change is happening very quickly, and therefore sea turtles must adapt quickly or perish."

**More information:** Natalie Montero et al, Effects of local climate on loggerhead hatchling production in Brazil: Implications from climate change, *Scientific Reports* (2019). [DOI: 10.1038/s41598-019-45366-x](https://doi.org/10.1038/s41598-019-45366-x)

Provided by Florida State University

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