

# Climate change link to lizard extinction

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By Victoria Gill Science reporter, BBC News



Lizards are more vulnerable to climate change than previously thought. Climate change could wipe out 20% of the world's lizard species by 2080, according to a global-scale study.

An international team of scientists also found that rising temperatures had already driven 12% of Mexico's lizard populations to extinction.

Based on this discovery, the team was able to make global predictions using an "extinction model".

They conclude, in an article in Science journal, that "lizards have already crossed a threshold for extinctions".

Although the grim prediction for 2080 could change if humans are able to slow global climate warming, the scientists say that a sharp decline in their numbers had already begun and would continue for decades.

The large research team was led by Barry Sinervo from the Department of Ecology and Evolutionary Biology at the University of California in Santa Cruz, US.

He said: "We are actually seeing lowland species moving upward in elevation, slowly driving upland species extinct, and if the upland species can't evolve fast enough then they're going to continue to go extinct."

Lizards, the researchers say, are far more susceptible to climate-warming extinction than previously thought. Many species live right at the edge of their "thermal limits".

Rising temperatures, they explained, leave lizards unable to spend sufficient time foraging for

food, as they have to rest and regulate their body temperature.

A group of biologists including Dr Raymond Huey from the University of Washington in Seattle wrote an accompanying article in Science explaining the significance of the research.

Dr Huey and his colleagues said the predictions were "disturbing".

But they pointed out that follow-up surveys were needed to confirm the results.

"Lizard populations rise and fall over time and failure to detect individuals during short surveys may indicate transient rarity rather than extinction," they wrote.

But their article went on to say that the research team had shown that "climate-forced extinctions were not only in the future" but were "happening now".

## Lost lizards validate grim extinction predictions

- 19:00 13 May 2010 by [Michael Le Page](#)
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Predictions that climate change alone could lead to the extinction of more than one-fifth of plant and animal species before the end of the century have often come under fire, and not just from climate-change deniers. Some biologists are sceptical because the predictions are largely based on theoretical models. Now, the most detailed study yet of one group of species – lizards – suggests extinction levels could indeed be as bad as predicted.

Crucially, the new forecast is based on actual data of what is driving lizards to extinction today on four continents.

The international team of researchers led by Barry Sinervo of the University of California, Santa Cruz, found that even though their habitats remained intact, the population of one group of lizards in Mexico has shrunk by 12 per cent since 1975 due to climate change. They found that the reptiles are disappearing because they need to spend more time in the shade to avoid overheating, leaving them less time to find food.

### Silent spring

While lizards need to bask in the morning sun to warm up, they have to retreat into the shade later in the day to avoid heat stress. The hotter it gets, the less time they have to forage for food. Surprisingly, though, warmer springs rather than warmer summers are the killer, because this is the time when lizards reproduce and so need lots of extra food.

The team used its data from Mexico to predict where else lizards might be disappearing. They then compared their predictions with field studies of more than 1000 lizard populations on four different continents. They found that their predictions were accurate. Based on this, they predict that 20 per cent of lizard species will be extinct by 2080.

"This is surprising and very disturbing. None of us expected it," says Raymond Huey of the University of Washington in Seattle, who wrote an accompanying commentary on the study. "I

would have predicted that lizards were less vulnerable to warming."

## **Models questioned**

Sinervo's forecast is significant because it is based on real-world studies of populations declining as the climate warms. Until now, most estimates of how many species are threatened by climate change have been based on theoretical studies that look at the climatic and environmental conditions that species need to survive, and overlay this with estimates of how much suitable habitat will remain as the world warms.

"This study is really important because it shows that widespread extinctions associated with climate change are not simply a theoretical construct," says Chris Thomas at the University of York in the UK.

In a widely cited paper in 2004, Thomas and colleagues estimated that 15 to 37 per cent of terrestrial plant and animal species will be "committed to extinction" by 2050 ([Nature, vol 427, p 145](#)). Subsequent studies have reached similar conclusions. There is a lot of uncertainty about such predictions, he says, but it goes both ways: fewer species may die out than predicted, but then again, even more may go extinct.

## **Fine details**

Not all biologists have been convinced, though. One criticism has been that most models are "coarse" in that they do not take into account local details, like mountains and valleys, which might provide climatic refuges for organisms. Then again, studies that do take the finer detail in account do not always predict fewer extinctions, Thomas says.

For instance, coarse models assume it always gets colder higher up but in Europe north-facing slopes and frost hollows can be colder than higher parts of mountains.

Unpublished work by Thomas's team shows that when this is taken into account for one species of beetle, it disappears even faster than in cruder models.

## **Butterfly effects**

Another criticism is that although there have been periods of extremely rapid regional warming at the end of recent ice ages, [they don't appear to have been marked by major extinctions](#), although this could be because the fossil record is incomplete or poorly studied.

A few studies show some direct evidence of climate change causing extinctions. Butterfly populations are disappearing at the "hot edge" of their distributions in Europe, for instance, while [some small mammals are disappearing from low-lying areas in Yosemite National Park](#) in California.

However, these findings have not been used to make forecasts in the same way Sinervo's team has done, based on the comprehensive lizard study. "The possibility that climate change will drive a new spate of extinctions across the world is rapidly turning from speculation into fact," says Thomas.

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