

Climate change downsizing fauna, flora: study

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Plants are seen in Paris in 2010. Climate change is reducing the body size of many animal and plant species, including some which supply vital nutrition for more than a billion people already living near hunger's threshold, according to a study released Sunday.

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From micro-organisms to top predators, nearly 45 percent of species for which data was reviewed grew smaller over multiple generations due to [climate change](#), researchers found.

The impact of rapidly climbing temperatures and shifts in [rainfall](#)

[patterns](#) on body size could have unpredictable and possible severe consequences, they warned.

Previous work established that recent climate change has led to sharp shifts in habitat and the timing of reproductive cycles. But impact on the size of [plants and animals](#) has received far less attention.

Jennifer Sheridan and David Bickford at the National University of Singapore looked at scientific literature on climate-change episodes in the distant past and at experiments and observations in recent history.

[Fossil records](#), they found, were unambiguous: past periods of rising temperatures had led both marine and land organisms to become progressively smaller.

During a warming event 55 million years ago -- often seen as an analogue for current climate change -- [beetles](#), bees, spiders, [wasps](#) and ants shrank by 50 to 75 percent over a period of several thousand years.

Mammals such as [squirrels](#) and woodrats also diminished in size, by about 40 percent.

The pace of current warming, though, is far greater than during this so-called Palaeocene-Eocene Thermal Maximum (PETM).



A toad is seen in Borneo in July 2011. Climate change is reducing the body size of many animal and plant species, including some which supply vital nutrition for more than a billion people already living near hunger's threshold, according to a study released Sunday.

It, too, has begun to shrink dozens of species, the study found.

Among 85 examples cited, 45 percent were unaffected. But of those remaining, four out of five had gotten smaller, while a fifth got bigger.

Some of the shrinkage came as a surprise. "Plants were expected to get larger with increased [atmospheric carbon dioxide](#)," but many wound up stunted due to changes in temperature, humidity and nutrients available, the researchers said.

For cold-blooded animals -- including insects, reptiles and amphibians -- the impact is direct: experiments suggest that an upward tick of one degree Celsius translates into roughly a 10 percent increase in metabolism, the rate at which an organism uses energy. That, in turn, results in downsizing.

The common toad, for example, has measurably shriveled in girth in only two decades, along with some tortoises, marine iguanas and lizards.

Overfishing has been blamed for decreased [body size](#) in both wild and commercially-harvested aquatic species, threatening the key source of protein of a billion people around the world, mainly in Africa and Asia.

But experiments and observational studies have shown that warming waters play a role as well, especially in rivers and lakes.

Birds -- including passerines, goshawks and gulls -- and mammals such as soay sheep, red deer and polar bears, have also trended towards less bulk.

Some of the most worrying changes are at the bottom of the food chain, especially in the ocean, where tiny phytoplankton and calcium-building creatures are dwindling in size due to acidification and the reduced capacity of warmer water to hold oxygen and nutrients.

Carbon pollution has probably locked in an additional 1.0 C increase in average global temperatures, and continued emissions of greenhouse gases could push up the thermometer another 4.0 to 5.0 C (7.4 to 9.0 F) by centuries end, according to the UN's Intergovernmental Panel on Climate Change (IPCC).

Because warming is occurring at unprecedented rates, "many organisms may not respond or adapt quickly enough", especially those with long generation times, the authors noted in an email.

"We do not yet know the exact mechanisms involved, or why some organisms are getting smaller while others are unaffected," they added. "Until we understand more, we could be risking negative consequences that we can't yet quantify."

The study is published in the peer-reviewed journal *Nature Climate Change*.

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