

Climate change challenge for animals reliant on external sources of heat

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A photograph of a farmer showing his affected plot due to drought in Karnataka, India, 2012. Credit: Pushkarv/Wikipedia

Animals that regulate their body temperature through the external environment may be resilient to some climate change but not keep pace with rapid change, leading to potentially disastrous outcomes for biodiversity.

A study by the University of Sydney and University of Queensland showed many animals can modify the function of their cells and organs to compensate for changes in the climate and have done so in the past, but the researchers warn that the current rate of climate change will outpace animals' capacity for compensation (or acclimation).

The research has just been published in *Nature Climate Change*, written by Professor Frank Seebacher School of Biological Sciences and Professor Craig Franklin and Associate Professor Craig White from the University of Queensland.

Adapting to climate change will not just require animals to cope with higher temperatures. The predicted increase to fluctuations in [temperature](#) as well as to overall temperature would require animals to function across a broader range of conditions.

This is particularly important for ectotherms, animals that rely on external sources of heat to control body temperature, and are therefore more influenced by environmental temperatures.

The research showed that many groups of ectotherms, which make up more than 90 percent of all animals, are able to change their physiological function to cope with an altered environment, but the rapid pace and fluctuations of human-induced [climate change](#) present serious challenges.

The researchers studied 40 years of published data to assess how biological functions change in response to a sudden fluctuations in environmental temperatures.

They found that the physiological rates of ectothermic animals, such as heart rate, metabolism and locomotion, had already increased over the past 20 years with increasing average temperatures.

"It is important that animals maintain the right balance between the large number of physiological functions despite environmental fluctuations. An increase in temperature that leads to changed reaction rates can upset that balance and cause the decline of individuals and species," said Professor Seebacher.

"For example, movement requires energy and oxygen to be delivered to muscles. However, if metabolism or the cardiovascular system can't cope with increased temperatures, animals can no longer move to forage, migrate or interact with each other.

"The overall trend in the last 20 years has been to increased physiological rates, and we predict that this would continue to increase with increasing temperature.

"Even if [animals](#) are able to maintain the balance of their [physiological functions](#) in a warmer climate, increased metabolism leads to increases in the food resources needed and could upset the balance in ecosystems, particularly if predator and prey populations respond very differently to the environmental temperature change."

More information: "Physiological plasticity increases resilience of ectothermic animals to climate change." *Nature Climate Change* (2014) [DOI: 10.1038/nclimate2457](https://doi.org/10.1038/nclimate2457)

Provided by University of Sydney

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