

Some like it hot: Tropical species 'not as vulnerable' to climate change extinction

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In the face of a changing climate many species must adapt or perish. Ecologists studying evolutionary responses to climate change forecast that cold-blooded tropical species are not as vulnerable to extinction as previously thought. The study, published in the British Ecological Society's *Functional Ecology*, considers how fast species can evolve and adapt to compensate for a rise in temperature.

The research, carried out at the University of Zurich, was led by Dr Richard Walters, now at Reading University, alongside David Berger now at Uppsala University and Wolf Blanckenhorn, Professor of Evolutionary Ecology at Zurich.

"Forecasting the fate of any species is difficult, but it is essential for conserving biodiversity and managing natural resources," said lead author Dr Walters. "It is believed that <u>climate change</u> poses a greater risk to tropical cold-blooded organisms (ectotherms), than temperate or polar species. However, as potential adaptation to climate change has not been considered in previous extinction models we tested this theory with a model forecasting evolutionary responses."

Ectotherms, such as <u>lizards</u> and insects, have evolved a specialist physiology to flourish in a stable tropical environment. Unlike species which live in varied habitats tropical species operate within a narrow range of temperatures, leading to increased dangers if those temperatures change.



"When its environment changes an organism can respond by moving away, adapting its physiology over time or, over generations, evolving," said Walters. "The first two responses are easy to identify, but a species' ability to adapt quick enough to respond to climate change is an important and unresolved question for ecologists."

The team explored the idea that there are also evolutionary advantages for species adapted to warmer environments. The 'hotter is better' theory suggests that species which live in <u>high temperatures</u> will have higher fitness, resulting from a shorter generation time. This may allow them to evolve relatively quicker than species in temperate environments.

The team sought to directly compare the increased risk of extinction associated with lower genetic variance, owing to temperature specialisation, with the lowered risk of extinction associated with a shorter generation time.

"Our model shows that the evolutionary advantage of a shorter generation time should compensate species which are adapted to narrow temperature ranges," said Walters. "We forecast that the relative risk of extinction is likely to be lower for tropical species than temperate ones."

"The tropics are home to the greatest biodiversity on earth, so it imperative that the risk of <u>extinction</u> caused by climate change is understood," concluded Walters. "While many questions remain, our theoretical predictions suggest <u>tropical species</u> may not be as vulnerable to climate warming as previously thought."

More information: Walters.R, Blanckenhorn. W, Berger. D, "Forecasting extinction risk of ectotherms under climate warming: an evolutionary perspective", *Functional Ecology*, August 2012, <u>DOI:</u> <u>10.1111/j.1365-2435.2012.02045.x</u>



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